Marietta Canty, LLC
Environmental Consulting

Revised Cleanup Criteria and Risk Assessment Report

Wastewater Facilities Comprising the Closed-Loop System
Units 3 & 4 Effluent Holding Pond (EHP) Area
Colstrip Steam Electric Station
Colstrip, Montana

Project No. 17-1006

August 29, 2019

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List of Acronyms

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ADD	Average Daily Dose
AOC	Administrative Order on Consent
ATSDR	Agency for Toxic Substances and Disease Registry
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
BMP	Best Management Practice
BSL	Baseline Screening Levels
BTV	Background Threshold Value
BTAG	Biological Technical Assistance Group
C	Concentration
Cal/EPA	California Environmental Protection Agency
CCME	Canadian Council of Ministers of the Environment
CCR	Coal Combustion Residuals
CCRA	Cleanup Criteria and Risk Assessment
censored	Statistical term for concentrations below the laboratory detection limit ("non-detects")
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm	centimeters
COI	Constituent of Interest
COC	Chemicals of Concern
COPC	Chemicals of Potential Concern
CSEM	Conceptual Site Exposure Model
DAF	Dilution Attenuation Factor
DEQ	Montana Department of Environmental Quality
3&4 EHP	Units 3&4 Effluent Holding Pond
EPC	Exposure Point Concentration
EPRI	Electric Power Research Institute, Inc.
ERA	Ecological Risk Assessment
EU	Exposure Unit
ft/day	feet per day
gpm	gallons per minute
GWPS	Ground Water Protection Standard
HAZWOPER	Hazardous Waste Operations and Emergency Response
HEAST	Health Effects Assessment Summary Tables
HHRA	Human Health Risk Assessment
HHS	Human Health Standard
Hydrometrics	Hydrometrics, Inc.
in	inches
IRIS	Integrated Risk Information System
IUR	Inhalation Unit Risk

List of Acronyms

Kg	kilograms
LADD	Lifetime Average Daily Dose
LCL	lower confidence limit
LOAEL	Lowest Observed Adverse Effect Level
MCA	Montana Code Annotated
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram
mg/kg-day	milligrams per kilogram per day
mg/L	milligrams per liter
MPC	Montana Power Company
NCEA	National Center for Environmental Assessment
Neptune	Neptune and Company, Inc.
NJDEP	New Jersey Department of Environmental Protection
NOAEL	No Observed Adverse Effect Level
NP	Northern Pacific
OEHHA	Office of Environmental Health Hazard Assessment
OSHA	Occupational Safety and Health Administration
pCi/g	picoCuries per gram
pCi/L	picoCuries per liter
PPLM	PPL Montana, LLC
PPRTV	Provisional Peer Reviewed Toxicity Value
PRG	Preliminary Remediation Goal
RAGS	Risk Assessment Guidance for Superfund
RAIS	Risk Assessment Information System
RBCA	Risk-Based Correction Action
RBSL	Risk Based Screening Level
RCRA	Resource Conservation and Recovery Act
RfC	Reference Concentration
RfD	Reference Dose
RME	Reasonable Maximum Exposure
RSL	Regional Screening Level
SC	Specific Conductance
SCEM	Site Conceptual Exposure Model
SES	Steam Electric Station
SF	Slope Factor
SFCC	South Fork Cow Creek
SLERA	Screening-level Ecological Risk Assessment
SOEP	Stage One Evaporation Pond
SMCL	Secondary Maximum Contaminant Level
SPLP	Synthetic Precipitation Leaching Procedure
SSCL	Site Specific Cleanup Level
SSL	Soil Screening Level
SSL	Statistically Significant Level (under the Federal CCR Rule)

List of Acronyms

STEP	Stage Two Evaporation Pond
s.u.	standard units
Talen	Talen Montana, LLC
TDS	Total Dissolved Solids
T&E	Threatened and Endangered
TRV	Toxicity Reference Value
UCL	Upper Confidence Limit
95 UCL	95 Percent Upper Confidence Limit
USDOE	United States Department of Energy
USEPA	United States Environmental Protection Agency
yr	year
µmhos/cm	micromhos per centimeter

Executive Summary

Hydrometrics, Inc. (Hydrometrics), on behalf of Talen Montana, LLC (Talen), retained Marietta Canty, LLC (Canty) and Neptune and Company, Inc. (Neptune) to prepare a Cleanup Criteria and Risk Assessment (CCRA) Report for the Wastewater Facilities Comprising the Closed-Loop System at the 3&4 Effluent Holding Pond area, "the 3&4 EHP area," of the Colstrip Steam Electric Station (SES), the "Facility," located in Colstrip, Montana. The 3&4 EHP CCRA Work Plan was submitted to the Montana Department of Environmental Quality (DEQ) on April 4, 2018 (Canty, 2018c). The DEQ provided comments on the CCRA Work Plan on April 26, 2018 (DEQ, 2018a), which were addressed within the initial CCRA Report submitted to the DEQ on November 15, 2018 (Canty, 2018d). The DEQ provided comments on the initial CCRA Report on January 25, 2019 (DEQ, 2019a) and comment responses were submitted to DEQ on behalf of Talen on February 22, 2019 (Canty, 2019a). Discussions regarding the comments and responses were held on March 6, 2019 at DEQ (2019b), on March 21, 2019 per teleconference (DEQ, 2019b), on April 12, 2019 at DEQ (2019c), and on June 13, 2019 per teleconference (DEQ, 2019c). Revised comment responses on the CCRA Report were submitted to DEQ on May 24, 2019 (Canty, 2019b). DEQ provided additional comments on the CCRA Report and the comment responses on June 7, 2019 (DEQ, 2019d) and July 30, 2019 (DEQ, 2019e). Comment responses for the DEQ comments on the 3&4 EHP Work Plan, Report, and comment responses are provided within Appendix J.

To address potential process wastewater migration due to pond seepage and pipeline spills, PPL Montana, LLC (PPLM; Talen's predecessor) and the DEQ entered into an Administrative Order on Consent (AOC) Regarding Impacts Related to Wastewater Facilities Comprising the Closed-Loop System at the Colstrip SES on August 3, 2012, (DEQ/PPLM Montana, 2012). It is important to note that the AOC addresses impacts related to process wastewater and does not address other media (unless impacted by the process wastewater). The 3&4 EHP area is one of three areas at the Colstrip SES identified in the AOC as having groundwater impacts attributable to process wastewater.

Future pond closure at the 3&4 EHP area will be conducted in accordance with the United States Environmental Protection Agency (USEPA) Coal Combustion Residuals (CCR) Final Rule. Because requirements of the CCR Rule have been, or will be, implemented at the 3&4 EHP area, additional groundwater data collected as part of the CCR Rule were considered in the preparation of this CCRA Report.

The following general approach for the CCRA Report was followed based on prior discussions with the DEQ (2017a):

1. Identification of the 3&4 EHP Constituents of Interest (COIs) beginning with the list of CCR Rule detection and assessment monitoring constituents (Appendices III and IV)
    a. Begin with Source Data (Pond Data), as worst-case data
    b. Consider the CCR Well data, which are collected from wells at the pond boundaries and would be expected to show higher concentrations of constituents if impacted by process water; and are analyzed for total metals, rather than dissolved
    c. Consider DEQ-7 Standards
    d. Consider USEPA Maximum Contaminant Level (MCL) and USEPA Regional Screening Levels (RSLs) for Tapwater

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e. Consider Background Screening Levels (BSLs)
f. Consider other constituents potentially posing a Human Health or Ecological Risk

2. Preparation of the Site Conceptual Exposure Model (SCEM), including identification of the following:
    a. Potential Sources
    b. Potential Release Mechanisms
    c. Potential Media
    d. Potential Exposure Pathways
    e. Potential Receptors

3. Assess Human Health and Ecological Risks Associated with the COIs (also referred to as Chemicals of Potential Concern [COPCs] and, if retained after assessment, Chemicals of Concern [COC]) either Qualitatively or Quantitatively, as appropriate, for:
    a. Groundwater
    b. Surface Water
    c. Streambed Sediments (if present)
    d. Soil (in spill areas)

4. Development of Cleanup Criteria for COIs/COCs
    a. Review Groundwater and Surface Water Cleanup Criteria (following DEQ guidance and considering that DEQ-7 Values are Cleanup Standards)
    b. Determine Human Health-Based Cleanup Criteria
    c. Determine Ecological-Based Cleanup Criteria
    d. Determine Leaching-Based Cleanup Criteria (Soil)
    e. Compare to Background Screening Levels (BSLs)
    f. Determination of Final Cleanup Criteria

5. Develop Recommendations for the Incorporation of the Cleanup Criteria into the Remedy Evaluation

Using the above described approach, the following groundwater COIs/COCs were identified for the 3&4 EHP area as presented in the Table below.

3&4 EHP Groundwater COIs/COCs

CCR Appendix III Constituents	CCR Appendix IV Constituents	Other Potential 3&4 EHP Constituents
Boron	Cobalt	Manganese
Sulfate	Lithium	
	Selenium	

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Note: Radium and thallium were not identified as COIs/COCs; however, they will remain COPCs while additional radium and thallium groundwater data are collected. Radium and thallium will continue to be monitored and evaluated in groundwater as part of the Federal CCR Rule compliance monitoring and continue to be reviewed under the AOC.

A SCEM is presented within this CCRA to identify the contaminant sources, affected environmental media, release and transport mechanisms, potential human and ecological receptors, and exposure pathways under the current and reasonably anticipated future uses of the 3&4 EHP area. The preparation of the SCEM is a requirement of the AOC, as well as a required element in conducting a risk assessment.

A Risk Assessment approach was developed and followed based on guidance of the AOC, as well as direction provided by the DEQ (2017a), in which DEQ indicated that risks should be evaluated for the 3&4 EHP area without the operation of the groundwater capture system. This 3&4 EHP CCRA Report presents both a Human Health Risk Assessment (HHRA) and an Ecological Risk Assessment (ERA) following DEQ's Risk Assessment guidance. The risk assessment process was used to identify COPCs beyond the constituents listed in the Appendices III and IV of the CCR Rule. Depending on the type of media, both quantitative (i.e., forward risk calculations) and qualitative evaluations (i.e., comparison to screening levels or standards) were conducted. Comprehensive statistical analyses of the data were conducted to support the risk assessment process (Appendix D). Neither human health nor ecological COCs were retained for surface water or soil. As a final step in the CCRA, Cleanup Criteria were developed for the identified COIs/COCs. Summaries of the risk assessments and Cleanup Criteria are presented below by medium.

<u>Surface Water (Various Ephemeral Surface Water Bodies)</u>
One human health COPC in surface water, boron, was initially identified, but not retained as a human health COC at the 3&4 EHP area (see Section 10.1). Three ecological COPCs, boron, selenium and sulfate, were identified in surface water during the screening phase of the ERA, but not retained as COCs in the Baseline ERA at the 3&4 EHP area (see Appendix C). Therefore, surface water was not found to pose either a human health or ecological risk. Cleanup Criteria for surface water were not developed.

<u>Soil (Various Seep/Spill Areas</u>
Six human health COPCs (arsenic, barium, cobalt, lithium, manganese, and radium) were initially flagged as soil COPCs in the former seep/spill areas at the 3&4 EHP area, but not retained as human health COCs (see Section 10.4). Eight ecological COPCs (antimony, arsenic, barium, boron, cadmium, manganese, selenium and Radium 228) were identified in the former seep/spill areas at the 3&4 EHP area at the initial screening phase of the Ecological Risk Assessment (initial Screening Level Ecological Risk Assessment [SLERA]), but not retained as COCs in the Baseline Ecological Risk Assessment (BERA, see Appendix C). Therefore, soil was not found to pose either a human health or ecological risk. Leaching COPCs were evaluated by conducting Synthetic Precipitation Leaching Procedure (SPLP) analyses and calculating site-specific soil standards following DEQ guidance (NJDEP, 2013; DEQ, 2016). Leaching COIs/COCs were not retained for the spill areas of the 3&4 EHP area (see Section 10.2). No action is required in the Remedy Evaluation regarding soil in the spill areas.

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Groundwater

Following DEQ guidance, human health risks were not forward calculated for groundwater. Rather, groundwater concentrations were compared to the DEQ-7 Standards as a qualitative evaluation of risk. If a DEQ-7 Standard was not available, groundwater concentrations were compared to the USEPA Maximum Contaminant Levels (MCL; if available) and the USEPA Tapwater RSL (if available) in accordance with the AOC.

Forward risk calculations were performed for ecological (livestock) risks associated with the various groundwater stock wells located at the 3&4 EHP area. Groundwater pumped into the stock tanks was not found to pose an unacceptable risk to livestock (see Appendix C). However, per DEQ's request, ecological (livestock) Cleanup Criteria for groundwater were also developed. Ecological (livestock) Cleanup Criteria for groundwater were limited to one scenario (livestock consumption via groundwater pumping into stock tanks). Table ES-1 presents the groundwater COIs/COCs, DEQ-7 Standards, screening levels, BSLs, and proposed Cleanup Criteria by hydrostratigraphic unit.

The groundwater Cleanup Criteria should be used in the Remedy Evaluation to develop remedial alternatives to address COI/COC groundwater concentrations that exceed these values, including after the capture system is shut down. In addition, the remedial actions should address all the regulated substances listed in the AOC Control Action definition (Section IV.B.; DEQ/PPLM, 2012), which include three of the COIs/COCs (sulfate, boron, selenium), as well as potassium, sodium, magnesium, Total Dissolved Solids (TDS), and salinity. Lastly, radium and thallium concentrations in groundwater at the 3&4 EHP appear to be consistent with background levels and neither was identified as a groundwater COI/COC. However, because a radium groundwater BSL was not available for comparison, as a conservative measure radium will remain a COPC while additional groundwater data are collected. Similarly, because a limited number of groundwater samples collected from wells located around the process pond perimeter and used as part of the Federal CCR Rule compliance monitoring had total thallium concentrations greater than the MCL, as a conservative measure thallium will remain a COPC while additional groundwater data are collected. Radium and thallium will continue to be monitored and evaluated as part of the Federal CCR Rule compliance monitoring and continue to be reviewed under the AOC.

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Table ES-1 Groundwater Standards, Screening Levels and Proposed Cleanup Criteria – 3&4 EHP Area

COI/COC	Ground-water DEQ-7/MCL (mg/L)	USEPA Tapwater RSL (mg/L)	BSL Range (mg/L)	Ecological (Livestock) Cleanup Criterion (mg/L)	Cleanup Criterion Source	Proposed Cleanup Criteria				
						Alluvium (mg/L)	Spoils (mg/L)	Clinker (mg/L)	Coal-Related (mg/L)	SubMcKay (mg/L)
CCR Appendix III Constituents										
Boron	NA[5]	4	0.8 – 3.9	39 [1]	RSL	4 (RSL)	4 (RSL)	4 (RSL)	4 (RSL)	4 (RSL)
Sulfate	NA[5]	NA	2,150 – 3,140	3,000 [2]	Livestock/ BSL	3,000 (livestock)	3,000 (livestock)	3,140 (BSL)	3,000 (livestock)	3,000 (livestock)
CCR Appendix IV Constituents										
Cobalt	NA[5]	0.006	0.00066 – 0.0232	0.03 [1]	RSL/BSL	0.02 (BSL)	0.0232 (BSL)	0.0232 [4] (BSL)	0.006 (RSL)	0.006 (RSL)
Lithium	NA[5]	0.04	0.072 – 0.12	NA [3]	BSL	0.12 (BSL)	0.09 (BSL)	0.09 [4] (BSL)	0.072 (BSL)	0.072 [4] (BSL)
Selenium	0.05[6]	0.1	0.0024 – 0.01	0.28 [1]	DEQ-7	0.05 (DEQ-7)	0.05 (DEQ-7)	0.05 (DEQ-7)	0.05 (DEQ-7)	0.05 (DEQ-7)
Other Potential 3&4 EHP Constituents										
Manganese	NA[5]	0.43	0.26 – 2.48	61 [1]	RSL/BSL	0.61 (BSL)	2.48 (BSL)	0.67 (BSL)	0.48 (BSL)	0.43 (RSL)

Notes:

BSL Background Screening Level (Neptune, 2017)
CCR Coal Combustion Residual
COI Constituent of Interest
COC Chemical of Concern
MCL Maximum Contaminant Level
mg/L Milligrams per liter
NA Not available/not applicable
RSL Regional Screening Level

(1) Calculated Cleanup Criterion protective of livestock (calf), see Appendix C
(2) Upper limit of "marginal" sulfate range for livestock (USDA-ARS, 2009)
(3) Cleanup Criterion could not be calculated – no mammalian Toxicity Reference Value (TRV) available, see Appendix C
(4) BSL not available. BSL for adjacent hydrostratigraphic layer used as a proxy value.
(5) Neither a DEQ-7, nor an MCL has been established.
(6) Value is both the DEQ-7 and the MCL.

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In addition, a comparison was made between the groundwater BSLs used in the preparation of the 3&4 EHP CCRA and for the Plant Site CCRA. At the time the groundwater BSLs were revised in 2017 (Neptune), the Plant Site CCRA Report (Canty, 2018a) had already been prepared and submitted to DEQ. As such, it was agreed that the 2016 BSLs would apply to the Plant Site CCRA and the 2017 BSLs would apply to the SOEP/STEP and 3&4 EHP CCRA Reports (DEQ, 2017d). Table ES-2 below compares the 2016 BSLs and the revised 2017 BSLs for the 3&4 EHP groundwater COIs/COCs. The revisions to the 2017 BSLs in comparison to the 2016 BSLs for the COIs/COCs were minimal (if at all).

Table ES-2 BSL Comparison for the 3&4 EHP Groundwater COIs/COCs

COI/COC	Alluvium (mg/L)		Spoils (mg/L)		Clinker (mg/L)		Coal-Related (mg/L)		SubMcKay (mg/L)	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
CCR Appendix III Constituents										
Boron	1.6	1.6	0.818	0.8	4	3.9	1.1	1	1.3	1.2
Sulfate	2,600	2,530	3,045	2,841	3,160	3,140	2,061	2,150	2,200	2,190
CCR Appendix IV Constituents										
Cobalt	0.02	0.02	0.0232	0.0232	NA	NA	0.0034	0.0034	0.00066	0.00066
Lithium	0.092	0.12	0.09	0.09	NA	NA	0.072	0.072	NA	NA
Selenium	0.009	0.009	0.0023	0.0024	0.01	0.01	0.005	0.01	0.005	0.005
Other Potential 3&4 EHP Constituents										
Manganese	0.6	0.61	2.79	2.48	0.67	0.67	0.54	0.48	0.27	0.26

Notes:
2016 Neptune, 2016. BSLs prepared in 2016 and used for the Plant Site CCRA (DEQ, 2017d).
2017 Neptune, 2017. Revised BSLs and used for the SOEP/STEP and 3&4 EHP CCRA (DEQ, 2017d).
CCR Coal Combustion Residuals
COC Chemical of Concern
COI Constituent of Interest
mg/L milligrams per liter
NA Not analyzed

The BSLs were used in the development of the groundwater Proposed Cleanup Criteria for instances when the DEQ-7 standard, or other appropriate screening levels, were lower than background levels. Under the AOC, cleanup criteria may not be more stringent than background (DEQ/PPLM, 2012). As a result of the 2017 revisions to the BSLs, the groundwater Proposed Cleanup Criteria varied slightly for three of the 3&4 EHP COIs/COCs (and SOEP/STEP COIs/COCs) in comparison to the Plant Site, as shown in Table ES-3.

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Table ES-3 Groundwater Proposed Cleanup Criteria Comparison between the SOEP/STEP and 3&4 EHP Areas and the Plant Site

COI/COC	Alluvium (mg/L)		Spoils (mg/L)		Clinker (mg/L)		Coal-Related (mg/L)		SubMcKay (mg/L)	
	Plant Site	STEP/ 3&4 EHP	Plant Site	STEP/ 3&4 EHP	Plant Site	STEP/ 3&4 EHP	Plant Site	STEP/ 3&4 EHP	Plant Site	STEP/ 3&4 EHP
CCR Appendix III Constituents										
Boron	4	4	4	4	4	4	4	4	4	4
Sulfate	3,000	3,000	**3,045**	**3,000**	**3,160**	**3,140**	3,000	3,000	3,000	3,000
CCR Appendix IV Constituents										
Cobalt	0.02	0.02	0.0232	0.0232	0.0232	0.0232	0.006	0.006	0.006	0.006
Lithium	**0.092**	**0.12**	0.09	0.09	0.09	0.09	0.072	0.072	0.072	0.072
Selenium	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Other Potential Constituents										
Manganese	**0.6**	**0.61**	**2.79**	**2.48**	0.67	0.67	**0.54**	**0.48**	0.43	0.43

Notes:
Bold SOEP/STEP and 3&4 EHP Groundwater Proposed Cleanup Criterion differed from the Plant Site.
CCR Coal Combustion Residuals
COC Chemical of Concern
COI Constituent of Interest
mg/L milligrams per liter

1.0 INTRODUCTION AND PURPOSE

Hydrometrics, Inc. (Hydrometrics), on behalf of Talen Montana, LLC (Talen), retained Marietta Canty, LLC (Canty) and Neptune and Company, Inc. (Neptune) to prepare a Cleanup Criteria and Risk Assessment (CCRA) Report for the Wastewater Facilities Comprising the Closed-Loop System at the Units 3 & 4 Effluent Holding Pond (3&4 EHP) area of the Colstrip Steam Electric Station (Colstrip SES), the "Facility", located in Colstrip, Montana (see Figure 1).

The Units 3&4 EHP area is located to the east-southeast of the Plant Site at the Facility and is used to impound fly ash, scrubber slurry paste, and bottom ash. A CCRA Work Plan was previously prepared for the 3&4 EHP area of the Facility and submitted to the Montana Department of Environmental Quality (DEQ) on April 4, 2018 (Canty, 2018c). The DEQ provided comments on the CCRA Work Plan on April 26, 2018 (DEQ, 2018a), which were addressed within the initial CCRA Report submitted to the DEQ on November 15, 2018 (Canty, 2018d). The DEQ provided comments on the initial CCRA Report on January 25, 2019 (DEQ, 2019a) and comment responses were submitted to DEQ on behalf of Talen on February 22, 2019 (Canty, 2019a). Discussions regarding the comments and responses were held on March 6, 2019 at DEQ (2019b), on March 21, 2019 per teleconference (DEQ, 2019b), on April 12, 2019 at DEQ (2019c), and on June 13, 2019 per teleconference (DEQ, 2019c). Revised comment responses on the CCRA Report were submitted to DEQ on May 24, 2019 (Canty, 2019b). DEQ provided additional comments on the CCRA Report and the comment responses on June 7, 2019 (DEQ, 2019d) and July 30, 2019 (DEQ, 2019e). Comment responses for the DEQ comments on the 3&4 EHP Work Plan, Report, and comment responses are provided within Appendix J.

1.1 FACILITY BACKGROUND

The Colstrip SES Facility is a zero-discharge facility. As such, there are no direct wastewater discharge points from the Plant Site to surface water. However, seepage losses from the 3&4 EHP have migrated from the ponds to groundwater. Specifically, impacted groundwater has been identified downgradient from the 3&4 EHP Main Dam, east of the Saddle Dam in multiple units, in clinker directly south of the 3&4 EHP, in South Fork Cow Creek (SFCC) alluvium, and in multiple units southwest and northwest of the pond (Hydrometrics, 2017a).

Facility-related wastewater constituents are anticipated to be largely derived from constituents that occur naturally in the coal formations. To mitigate migration of the seepage losses, Talen captures process water or groundwater impacted by process water at 83 groundwater capture wells, 15 trenches, leachate collection systems between and below the pond liners, and dam toe and chimney drains. Talen pumps captured water to lined process cells in the 3&4 EHP for evaporation; or the captured water is piped to the Plant Site and treated for re-use via the Vibratory Shear Enhanced Process (VSEP; Hydrometrics, 2017a).

In addition, some pond liner systems have been upgraded or replaced to reduce seepage, additional site awareness training has been conducted, and more efficient reuse of water is being implemented.

1.2 REGULATORY HISTORY

1.2.1 Administrative Order on Consent

To address seepage losses from the Facility ponds and potential wastewater migration, PPL Montana, Inc. (PPLM; Talen's predecessor) and the DEQ entered into an Administrative Order on Consent (AOC) Regarding Impacts Related to Wastewater Facilities Comprising the Closed-Loop System at the Colstrip SES on August 3, 2012, (DEQ/PPLM, 2012). It is important to note that the AOC addresses impacts related to wastewater and does not address other media (unless impacted by the wastewater).

As part of the AOC, PPLM committed to prepare Site Reports for the three Colstrip SES Areas, as follows: (1) the Plant Site, (2) the Units 1 & 2 Stage One Evaporation Pond and Stage Two Evaporation Pond (SOEP/STEP), and (3) the Units 3&4 EHP areas (see Figure 1 for a depiction of these areas). These site reports are the basis for further remedial activities under the AOC. A fourth category of reporting, involving area process wastewater pipeline spills or releases not included in one of the previously mentioned areas, and other miscellaneous areas that are mutually agreed upon by the parties to address in the AOC, was also defined. All past process wastewater spills and releases have fallen into one of the three areas defined earlier in this paragraph.

The development of cleanup criteria, as well as human health and ecological risk assessments, associated with the wastewater of the Units 3&4 EHP area, is included within this report. CCRA Reports for the Plant Site (Canty, 2018a) and SOEP/STEP Area (Canty, 2018b) have been previously prepared and submitted to the DEQ.

The requirements of the AOC are provided in a detailed summary located in Appendix A. In summary, the AOC requires the CCRA Report to identify, at a minimum, the following (Article VI.B):

- Cleanup Criteria for the Constituents of Interest (COIs[1]);
- Identification of transport mechanisms for the COIs;
- Identification of potential receptors;
- Identification of exposure pathways; and
- If there are COIs, recommendation of additional site characterization needed to determine what, if any, human health or ecological risks are posed by releases from the Site.

1 *The AOC (DEQ/PPLM, 2012; Article IV.F) defines COIs as those parameters found in soil, groundwater, or surface water that (1) result from Site operations and the wastewater facilities and (2) exceed background or unaffected reference area concentrations. The AOC subsequently defines the development of cleanup criteria for the COIs generally following the DEQ risk assessment process (DEQ, 2017b). The DEQ refers to potential contaminants within their Risk Assessment Scope of Work (DEQ, 2017b) as Chemicals of Potential Concern (COPCs) and, if retained after assessment, Chemicals of Concern (COCs). As part of the risk assessment process, parameters were screened against background concentrations, as well as other appropriate screening levels following the DEQ risk assessment process. As such, the terms COIs and COPCs/COCs have nearly synonymous definitions for the purposes of this CCRA and are, therefore, used interchangeably within this report for practicality.*

Lastly, the AOC indicates:

- If the CCRA identifies one or more COIs that exceed Cleanup Criteria, then remedial measures are necessary and a Remedy Evaluation Report shall be prepared.
- If the CCRA does not identify COIs that exceed Cleanup Criteria, then remedial measures are not needed and there is no need for further action.

1.2.2 USEPA Coal Combustion Residuals Rule

Numerous mitigation measures have been completed at the 3&4 EHP area to reduce seepage from the ponds/cells (Hydrometrics, 2017a). In addition, individual cells within the 3&4 EHP have been closed and new cells constructed in accordance with the requirements of the United States Environmental Protection Agency (USEPA) Coal Combustion Residuals (CCR) Final Rule that was initially signed December 19, 2014, was published in the Federal Register on April 17, 2015 (80 FR 21301), and became fully effective in October 2015 (USEPA, 2017). The USEPA finalized the CCR regulations to provide comprehensive Federal rules for the safe disposal of coal ash from coal-fired power plants. The rule establishes technical requirements for CCR landfills and surface impoundments under Subtitle D of the Resource Conservation and Recovery Act (RCRA).

Any remaining cells at the 3&4 EHP area that are used for storage of CCR are scheduled for future closure. The Colstrip Wastewater AOC Settlement Agreement requires the conversion to a "non-liquid" disposal system for CCR material generated by Colstrip Units 3&4 scrubbers which is deposited in the effluent holding ponds for Units 3&4 (3&4 EHP) no later than July 1, 2022. The CCR Rule requires the start of closure within 30 days of final receipt of CCR with final closure of a CCR unit within 5 years of starting closure activities unless an extension is granted.

Because there is considerable overlap in the requirements of the CCR Rule and those of the AOC, requirements of the CCR Rule were considered in conjunction with the requirements of the AOC. Requirements of both the CCR Rule and the AOC were considered in the preparation of this CCRA Report.

1.3 CCRA REPORT APPROACH

The following general approach for the CCRA Report was followed based on prior discussions with the DEQ (DEQ, 2017a):

1. Identification of the 3&4 EHP COIs beginning with the list of CCR Rule detection and assessment monitoring constituents (Appendices III and IV)
    a. Begin with Source Data (Pond Data), as worst-case data
    b. Consider the CCR Well data, which are also worst-case (if any) because they were collected at the pond boundaries
    c. Consider DEQ-7 Standards
    d. Consider USEPA Maximum Contaminant Levels (MCL) and USEPA Regional Screening Levels (RSLs) for Tapwater
    e. Consider Background Screening Levels (BSLs)
    f. Consider other constituents potentially posing a Human Health or Ecological Risk

2. Preparation of the Site Conceptual Exposure Model (SCEM), including identification of the following:
    a. Potential Sources
    b. Potential Release Mechanisms
    c. Potential Media
    d. Potential Exposure Pathways
    e. Potential Receptors

3. Assess Human Health and Ecological Risks Assessment Associated with the COIs (also referred to as Chemicals of Potential Concern [COPCs], and, if retained after assessment, Chemicals of Concern [COCs]) either Qualitatively or Quantitatively, as appropriate, for:
    a. Groundwater
    b. Surface Water
    c. Streambed Sediments (if present)
    d. Soil (in pipeline spill areas)

4. Development of Cleanup Criteria for COIs/COCs
    a. Review Groundwater and Surface Water Cleanup Criteria (following DEQ guidance and considering that DEQ-7 Values are Cleanup Standards)
    b. Determine Human Health-Based Cleanup Criteria
    c. Determine Ecological-Based Cleanup Criteria
    d. Determine Leaching-Based Cleanup Criteria (Soil)
    e. Compare to BSLs
    f. Determination of Final Cleanup Criteria

5. Develop Recommendations for the Incorporation of the Cleanup Criteria into the Remedy Evaluation

2.0 FACILITY OPERATION, BACKGROUND AND DESCRIPTION

2.1 FACILITY OPERATION

The Colstrip SES (the Facility) is located in the city of Colstrip, within Rosebud County in the south central area of the State of Montana. The Facility consists of four units: Units 1 and 2 are 333 megawatts each; and Units 3 and 4 are 805 megawatts each. Construction on Units 1 and 2 began in 1972 and they came on-line in the mid-1970s. Units 3 and 4 were constructed later; Unit 3 came on-line in 1983 and Unit 4 came on-line in 1985. Talen is the operator and an owner of the Facility, which is co-owned by PacifiCorp, Puget Sound Energy, Inc., Portland General Electric Company, Avista Corporation, and NorthWestern Corporation (Hydrometrics, 2015).

The Facility generates electricity through the combustion of coal. Fly ash, a by-product of coal combustion, is removed by air scrubber systems to reduce emissions. Bottom ash collects at the bottom of the boiler. Fly ash, bottom ash, and Facility wastewaters contain constituents of the original coal. A closed-loop process water/scrubber system is used at the Facility to reduce impacts to water resources in the area. Ash and water based liquid wastes from the generating plants are impounded in ponds designed and constructed to control seepage losses. The Plant Site pond system includes ponds that serve all four generating units in various capacities. Fly ash disposal is not currently conducted on the Plant Site, but rather in holding ponds at two locations: (1) to the northwest of the Plant Site at the Units 1&2 SOEP/STEP and (2) to the east-southeast of the Plant Site at Units 3&4 EHP. Process ponds at the Facility have been servicing Colstrip Units 1&2 since 1975 and Colstrip Units 3&4 since the early 1980's, although locations, function, and pond construction have changed, including closures and reconstruction (Hydrometrics, 2015).

Portions of the Facility pond systems are presently being updated and retrofitted to meet the requirements of the new USEPA CCR Final Rule that was initially signed into effect December 19, 2014 and became fully effective in October 2015 (USEPA, 2017).

2.2 UNITS 3&4 EHP AREA BOUNDARY

The Units 3&4 EHP area is located to the east-southeast of the Plant Site and is used to impound fly ash, scrubber slurry paste, and bottom ash. The 3&4 EHP area boundary was established and presented in the AOC to include both the active operations area and pipelines in the area. One area included within the 3&4 EHP area boundary is beyond the property line of areas owned by the Facility owners. A small portion of the area in the northwest corner of the 3&4 EHP area, near Drain Pit 3, is state-owned property, but the remainder is owned by the Facility owners. Figure 2 presents the boundary of the Units 3&4 EHP area.

The 3&4 EHP area is a fenced, controlled access area. In addition, within the fenced perimeter of the 3&4 EHP area, additional fencing surrounds the 3&4 EHP ponds/cells to prevent access to process water management areas, particularly by livestock. Large portions of the 3&4 EHP area are leased to ranchers for grazing livestock, who access the area through locked gates or through the main Plant Guardshack. Stock water is provided from groundwater supply wells at various locations around the perimeter of the pond. The stock wells are more than one-half mile from the 3&4 EHP, except for PSW-1 and PSW-3, which are near but outboard of the cutoff wall along its western boundary. Archery

hunting within the 3&4 EHP area is allowed with permission and archery hunters access the area through the Guardshack.

2.3 PHYSICAL CHARACTERISTICS OF THE FACILITY

2.3.1 Regional Geology

Colstrip is located in the northern portion of the Powder River Basin, an asymmetrical basin oriented northwest to southeast. This structural basin is responsible for the general regional orientation of bedding. "In general, Fort Union Strata dip very gently (less than a few degrees) in easterly and southerly orientations from west to east across the coalfield, respectively. Locally, however, dips are steepened by high-angle faults that are present at the Colstrip area" (Roberts, et. al, 1999, as cited in Hydrometrics, 2017a).

Stratigraphy in the Colstrip area consists of, in descending order, Quarternary alluvium, the Fort Union Formation, Hell Creek/Lance Formation, Fox Hills Sandstone, and Bearpaw Shale. The Fort Union Formation is divided into three members; the upper Tongue River Member, the middle Lebo Shale Member, and the lower Tullock Member. The Tongue River Member is at the surface in the Colstrip area. The deeper Lebo Shale, and then the Tullock Members are exposed to the north. At Colstrip, the total thickness of the Fort Union Formation is about 650 feet. The Lebo Shale is typically about 75-125 feet thick and is found at variable depths in the Colstrip area depending on the amount of erosion that the Tongue River member has undergone (Hydrometrics, 2017a).

The Fort Union Formation consists of alternating and intercalated deposits of shale, claystone, mudstone, siltstone, sandstone, carbonaceous shale and coal. The formation was deposited in a fluvial system of meandering, braided, and anastomosed streams near the basin center and by alluvial fans at the margins. The fluvial systems were typically oriented northeast-southwest (Flores and Ethridge, 1985 as cited in Hydrometrics, 2017a).

- Anastomosing streams consist of multiple channels within a single drainage. Individual floodplains of an anastomosing system may include braided or meandering, or straight characteristics. Deposition typically occurs under low energy conditions near a local base level (Makaske, 2000 as cited in Hydrometrics, 2017a).
- Braided flow systems consist of a network of flow channels within a single floodplain or flow belt (Makaske, 2000 as cited in Hydrometrics, 2017a). These channels have multiple thalwegs that branch back and forth from single to multiple channels.
- Meandering streams consist of one or more individual channels that migrate back and forth across a single floodplain. Meandering channels consist of one thalweg.

Numerous coal seams are present in the Tongue River Member of the Fort Union Formation, the result of peat deposits that accumulated in swampy areas and channels. A tropical to sub-tropical climate resulted in thick peat deposits within the swamps and bogs (Nicols and others, 1989, Flores, R.M. and others, 1999 as cited in Hydrometrics, 2017a). Because of the depositional setting, the coal beds may pinch out laterally or stop abruptly. The main coal seams of interest near Colstrip are the sub-bituminous Rosebud (~ 24 feet thick) and McKay seams (~ 8-10 feet thick), which can economically be strip-mined. These two coal seams merge into a single seam on the west side of the Little Wolf Mountains near the Absaloka Mine. The Rosebud Coal, however, is the only seam mined in the Colstrip

SES Facility area due to quality of the McKay Seam which makes it currently undesirable for use in many coal-fired boilers. Both the Rosebud and McKay coals are generally cleated. That is, they contain natural vertical fracturing generally oriented perpendicular to the bedding plane. Hydraulic conductivity of the coal seams is typically around one to three feet per day, but fluctuates locally.

The Rosebud Coal, and in some places, the McKay Coal has burned. This is most easily identified as red cap rock on hilltops around the region. Burning of the coal baked the overlying strata. As a result of the burning, the coal volume reduced either leaving a void for the overlying rock to collapse in or resulted in slow settling of the overlying rock into the space formerly held by the coal. The thermally altered rock is referred to as clinker or scoria. Collapse of the rock resulted in secondary porosity (fractures) in the overlying strata.

The depositional setting results in numerous lateral facies changes within the sedimentary rock deposits. Channel sandstones often grade laterally into siltstones or shale (facies changes) resulting in preferential pathways for groundwater flow within the more permeable sandstone. Cementation, or the chemical binding of individual grains to one another, is highly variable within the units, mostly consisting of weak calcium carbonate cement although thin deposits with silica cementation also occur. Localized thin limestone beds may also exist. The combination of the depositional setting of the Fort Union Formation which resulted in lateral facies changes, variations in the lithologies of vertical sequences (sandstone, siltstone, shale), mining disturbances that have interrupted the original depositional setting, formation of highly fracture clinker from in situ coal burning, secondary porosity (minor fractures in bedrock) combined with erosion and deposition from the creek result in vertical and horizontal anisotropy (the condition of having different properties in different directions) and heterogeneities (variations through space within a geologic formation). Although driven by potentiometric heads, because of the anisotropic and heterogeneous nature of the geology, groundwater flow may not always follow a direct path from high potentiometric heads to lower head areas.

2.3.2 Groundwater

The classification and a description of the groundwater at the 3&4 EHP are provided below.

Groundwater Classification

The BSLs (Neptune, 2017) determined that unimpacted background groundwater for all units at the Facility had a specific conductance (SC) greater than 2,500 µmhos/centimeter (cm; equivalent to microSiemens/cm) ranging from 3,997 to 4,810 µmhos/cm. As such, groundwater at the Facility is a typical Class III water.

According to the Administrative Rules of Montana (ARM) 17.30.1006 Classifications, Beneficial Uses, and Specific Standards for Ground Waters, Class III ground waters are those ground waters with a natural specific conductance that is greater than 2,500 and less than or equal to 15,000 microSiemens/cm at 25°C. Further, ARM 17.30.1006(3) states:

(a) The quality of Class III ground water must be maintained so that these waters are at least marginally suitable for the following beneficial uses:

(i) Irrigation of some salt tolerant crops;
(ii) Some commercial and industrial purposes;
(iii) Drinking water for some livestock and wildlife; and
(iv) Drinking, culinary, and food processing purposes where the specific conductance is less than 7,000 microSiemens/cm at 25°C.

(b) Except as provided in ARM 17.30.1005(2), a person may not cause a violation of the following specific water quality standards for Class III ground water:

(i) the human health standards listed in DEQ-7, except that the nitrate and nitrogen and nitrate plus nitrite nitrogen standards listed in DEQ-7 do not apply to groundwaters with specific conductance equal to or greater than 7,000 microSiemens/cm at 25°C. The nitrate nitrogen and nitrate plus nitrite nitrogen standards for these waters are each 50 milligrams per liter (mg/L); and

(ii) for concentrations of parameters for which human health standards for ground water are not listed in DEQ-7, no increase of a parameter to a level that renders the waters harmful, detrimental, or injurious to the beneficial uses listed for Class III water. The department may use any pertinent credible information to determine these levels.

(c) The nondegradation provisions of 75-5-303, Montana Code Annotated (MCA), do not apply to Class III ground water.

Description of Hydrogeology

Geology in the 3&4 EHP area generally includes alluvium, shallow overburden bedrock, Rosebud and McKay Coal, clinker, and various deeper strata of the Fort Union Formation. Colluvium blankets the slopes in many areas and may grade into alluvial deposits which are present in many of the drainage bottoms. Spoil associated with area coal mining are also upgradient of the 3&4 EHP area in upper Cow Creek and South Fork Cow Creek (SFCC). A general description of these deposits in approximate descending order follows.

- Alluvium – These deposits are present in drainage bottoms in the 3&4 EHP area. Major deposits are found in Cow Creek and SFCC. In Cow Creek, the alluvial deposits may be as much as 50 feet thick. In SFCC, the alluvium is typically less than 30 feet thick. Minor alluvial deposits are also present in some of the drainages tributary to Cow Creek and SFCC and the drainage below the 3&4 EHP Main Dam Valley Drain Sump and are typically less than 20 feet thick. The thickest alluvial deposits occur in the farthest downstream areas, with thinning of the deposits in an upstream direction.

  Alluvium in the 3&4 EHP consist of various mixtures of clay, silt, sand, and gravel. Thin deposits of basal gravels, overlying the bedrock contact, are present in the larger valleys of Cow Creek and SFCC. However, basal gravel deposits may be absent in the smaller drainages except in isolated cases. Where present, the basal gravel is primarily composed of clinker fragments. Gravel generally grades upward into poorly sorted sands and silts, as is characteristic of ephemeral channel and floodplain depositional environments. Nearer surface deposits include silty clay to clayey silt that are generally gradational with colluvium that lines the valley margins

and blankets much of the valley bottoms. The result is an overall fining-upward grain size sequence.

Alluvial deposits typically exhibit lenses of coarser-grained deposits embedded within finer matrices, as the coarsest materials are deposited during higher energy water flow events and finer materials are deposited by shallower, lower energy water. Periodic storm events result in short-term high flows that deposit gravel and sand within the channel and flooding results in deposits of silt and clay in quiescent areas. These deposits are apparent downgradient of the 3&4 Main Dam Valley Drain Sump, where multiple thin, discontinuous coarser lenses were observed at different elevations and at different locations across the drainage.
Deposition during lower energy events result in finer-grain materials encompassing coarser-grained material. Migration of the valley channel during depositional times resulted in deposition of coarser grained materials in the finer matrix.

Rock fragments observed in the coarser grained deposits are typically angular to sub-rounded and are mostly comprised of clinker. The presence of the highly erodible and easily weathered clinker is indicative of the near source deposition which occurred.

Hydraulic conductivity of the alluvium varies greatly and is a function of overall grain size, degree of sorting, size of the interstitial spaces, grain orientation, and degree of cementation, if any. Alluvium with relatively large grain sizes, good connection between larger pore spaces, consistent grain orientation, and limited cementation exhibit higher permeability. In general basal gravels exhibit higher permeability than overlying sediments that exhibit mixing of grain sizes and lower overall grain sizes. Conversely, lower permeabilities are associated with small overall grain size, poor interconnection of pore spaces, and random grain orientation. Monitoring wells completed in the alluvium are designated with an “A”.

- Colluvium – Colluvium is a deposit of sediments which have been transported downslope by gravitational means to the point of deposition. In the 3&4 EHP area, colluvium is most often a silty clay or clayey silt composition, although coarser rock fragments or deposits may be present locally. Colluvium deposited on the valley slopes tends to grade laterally into the alluvium at the valley margins. Colluvium also tends to be in gradational contact with underlying weathered bedrock when alluvium is absent. Because of the stratigraphic position near ground surface and the general fine grain size of particles, hydraulic conductivities are typical very low(less than 1 foot per day) and little groundwater is transmitted. Probably the most significant contribution of colluvium in the Colstrip area is storage for precipitation water, which is released at varying rates to provide recharge to adjacent alluvial deposits and/or or springs.
- Rosebud overburden – Bedrock units of the Fort Union Formation are comprised of siltstone, claystone, shale, and fine-grained sandstone that typically overlay Rosebud Coal. In the majority of the 3&4 EHP area, the Rosebud Coal has been partially or completed burned. As this happened, sediments in the Rosebud overburden were altered to form clinker (see next bullet). There are not any wells completed in unaltered Rosebud Coal overburden near the 3&4 EHP.
- Clinker – Also referred to as scoria, porcelanite (when semi-vitrified), and baked shale; clinker is comprised of thermally altered and collapsed overburden (sandstone, siltstone, shale, etc.) formed by the in situ burning of previously underlying coal. The degree of thermal metamorphism varies depending on the temperature of the burn, thickness of the overburden, vertical fracture patterns, moisture, and duration of burn. As the coal burned, its volume

decreased. As this occurred, or some period of time after burning concluded, the overburden collapsed into the void left by the burned coal. The result is a moderate to highly fractured interval of metamorphosed sedimentary rock. Ash layers and/or layers of unburned coal remain at the base of the clinker. Substantial amounts of clinker occupy the hilltops around the 3&4 EHP. A bentonite amended concrete cutoff wall was installed around the perimeter of the 3&4 EHP, through clinker deposits and into intact underlying bedrock, to inhibit horizontal flow of water from the pond through the clinker.

Clinker is generally quite permeable, a function of the secondary porosity caused by fracturing. Hydraulic conductivity in the clinker may exceed 2,500 feet per day (ft/day) due to its coarseness of rock fragments, interconnected pore space, and parallel orientation of rock fragments and gravels. Clinker is typically well drained due to the high permeability and rarely contains useable amounts of groundwater. If present, groundwater in clinker is typically "trapped" by structural low areas following periods of recharge. Wells completed in clinker are designated with the coal that the interval correlates with. For example, if the well is completed to the base of the former Rosebud Coal interval, it is designated with an "R".

- Rosebud Coal – Cleated coal with thickness on the order of 20 to 25 feet. This coal has burned in most of the 3&4 EHP near the pond, leaving clinker and ash in its place. Complete sections of Rosebud Coal are only present in a few isolated areas including; the northwest corner of the 3&4 EHP at well 659D; near the eastern extent of the saddle dam at well 621D; and southwest of the 3&4 EHP at wells 1010R. Rosebud Coal typically exhibits a relatively low hydraulic conductivity on the order of one to three feet per day. Unburned remnants of the Rosebud Coal are often found near the base of the clinker and range from zero to nearly full sections of coal. Wells completed in the Rosebud Coal or clinker occupying the former coal interval are designated with an "R".
- Spoil – Spoil consists of silt, clay, sandstone, coal fragments, and formerly overburden units that were removed and have been used to backfill areas where the Rosebud Coal was mined. Spoil is not present in the 3&4 EHP area except in small isolated areas where test mining was conducted and upgradient of the area. Spoil is present in the headwaters of Cow Creek and SFCC, upstream of the 3&4 EHP area. Hydraulic conductivity of spoil units is highly variable. Areas with large rock or grain fragments situated near the base of backfilled pits may exhibit high permeability. More commonly, fine grained materials fill these pore spaces, resulting in lower hydraulic conductivity.
- Interburden – Typically comprised of siltstone and claystone which separate the Rosebud and McKay Coal seams. Interburden is present directly above the McKay Coal (when present) and is either in contact with clinker or the Rosebud Coal (if present). The thickness of the interburden is highly variable, ranging from about one foot northwest of the 3&4 EHP, 13 feet northeast of the pond, and 30 feet or more south of the pond. Hydraulic conductivity of the interburden is variable depending on lithology. The interburden typically contains a shale or claystone layer that inhibits downward, or upward, flow of groundwater. Wells completed in the interburden are typically designated with an "I".
- McKay Coal – Cleated coal with thicknesses in the 3&4 EHP of typically about seven to ten feet. The McKay Coal is present around much of the perimeter of the 3&4 EHP, and under most of the pond. However, the coal has been removed by erosion in the center and northern end of the pond and has undergone various degrees of burning in other areas. The McKay Coal is generally a complete, unaltered, unit along the southeast, south, and west sides of the pond.

The McKay Coal is highly altered along the north and northeast of the pond. The cutoff wall was installed through the McKay Coal interval into tight bedrock on the north and east sides of the pond. The base of the cutoff wall is higher than the McKay Coal on the south and west sides of the pond. The McKay Coal was removed by erosion in the immediate vicinity of the 3&4 EHP at elevations below about 3,200 feet. Hydraulic conductivity in the coal is typically on the order of one to three feet per day. Wells completed in the McKay Coal or burned remnants/clinker correlative with the McKay Coal are designated with an "M".

- Sub-McKay – Fort Union strata consisting of interbedded claystone, siltstone, fine-sandstones, and thin coal seams. Channel sands are common, resulting in numerous lateral sedimentary facies changes. These depositional changes result in rapid variations in thickness and limit the lateral continuity of units. Sandstone is typically un-cemented or poorly cemented with calcium-carbonate. Hydraulic conductivity of the sub-McKay unit is variable (<1 to >20 ft/day) and is dependent on the amount of interconnected pore space, cementation, and grain size and grain orientation.

Groundwater is present in alluvium and shallow bedrock, which may include Rosebud Coal in limited areas, Rosebud-McKay interburden, McKay Coal, and sub-McKay. Shallow groundwater found in alluvium is unconfined in the 3&4 EHP area. Specifically, groundwater is present in the alluvium north of the 3&4 EHP Main Dam Valley Drain Sump, downgradient of the 3&4 Saddle Dam Valley Drain Sump, in Cow Creek, and in SFCC. Smaller volumes of water are present in drainages tributary to Cow Creek, including the one containing groundwater capture at the Drain Pit #3 Interception Trench and the Drain Pit #5 Interception Trench (see Figure 3-4 in the Site Report, Hydrometrics, 2017a). These drain pits are used to contain water drained from scrubber slurry and/or clear water return pipelines prior to maintenance.

Clinker in the area typically contains very little, if any, water due to its high permeability and the orientation of the floor of the deposit. Where present, groundwater in clinker in the 3&4 EHP is typically isolated and is likely associated with local structural low points at the lower contact. Residual water may also be present from pond losses that occurred in, or around late 2004. Clinker in the vicinity of the 3&4 EHP has been eroded and is present only on hill tops. The clinker is not an aquifer due to its lack of sufficient amounts of groundwater and lateral discontinuity (Hydrometrics, 2017a).

The McKay Coal contains a small amount of groundwater. Yield from monitoring wells completed in this unit are typically quite low, generally one to two gallons per minute or less. Since the McKay Coal is eroded around major portions of its entire perimeter, it is not laterally continuous through the region. The McKay Coal is not targeted as an aquifer in the immediate 3&4 EHP area (Hydrometrics, 2017a).

Water is present in the sub-McKay strata at various depths. Wells completed in these units typically exhibit low yields but can vary from less than a half-gallon per minute to more than ten gallons per minute. Water quality is variable, but this unit is frequently used as a stock water supply source in the 3&4 EHP area. Stock well, monitoring well, capture well, and capture trench locations, and sub areas are shown on Figure 3-4 in the Site Report (Hydrometrics, 2017a).

Several indicator parameters are used to evaluate potential process wastewater impacts to groundwater at the Units 3&4 EHP area. These include specific conductance (SC), dissolved boron, chloride, sulfate, and the ratio of calcium to magnesium. Chloride is considered a secondary indicator parameter due to multiple potential area sources that cause a high degree of concentration variability.

Groundwater Flow

Alluvial groundwater in Cow Creek and SFCC flows eastward or downstream towards Rosebud Creek. Very little groundwater is present in the alluvium directly downstream of capture in SFCC. Alluvium in drainages that are tributary to Cow Creek, and have been impacted by pond water, have very little groundwater flow toward the creek, due to ongoing groundwater capture. Very little groundwater is present in clinker. Groundwater flow in the Rosebud clinker or coal is generally away from the 3&4 EHP, but is locally influenced by groundwater capture systems near the south and west sides of the 3&4 EHP, where impacted water is being captured and pumped to the EHP. Similar to the Rosebud, groundwater flow direction in the McKay (during fall 2015) is away from the 3&4 EHP toward Cow Creek and SFCC. The McKay Coal is absent north of the 3&4 EHP and is found sparsely in the area east of the 3&4 EHP Saddle Dam and is typically either burned or partially burned (Hydrometrics, 2017a).

It is not uncommon in the Colstrip area to encounter completely dry intervals between hydrostratigraphic units, indicating there is no vertical flow at these locations. Actual vertical flow between separate saturated units is controlled by the hydraulic conductivity of the individual units, the hydraulic conductivity of the intermediate unit, and the difference in head between units (Hydrometrics, 2017a).

Groundwater Mitigation Activities

Groundwater mitigation in the 3&4 EHP area is conducted when/where process water impacts are interpreted through review of groundwater monitoring data. Mitigation activities include capturing potentially impacted groundwater and routing it to the 3&4 EHP, source reduction by paste deposition and pond lining, implementation of Best Management Practices (BMPs) to reduce water inventory, and revegetation. Groundwater capture/containment is conducted at 100 sites in the 3&4 EHP area. Of these 100 sites, 83 are capture wells, 15 are interception trenches and two are dam sumps.

Capture systems in the 3&4 EHP area target groundwater in multiple hydrostratigraphic intervals including alluvium, Rosebud Coal (mostly remnants of burned coal and clinker formed by burning coal), shallow interburden bedrock, McKay Coal (only in SFCC where the coal is in direct contact with alluvium), and some sub-McKay bedrock (mostly north and east of the 3&4 EHP where the McKay Coal is absent). Capture systems sites tend to be clustered because preferential groundwater flow pathways limit dispersal of impacted groundwater (Hydrometrics, 2017a). The locations of the groundwater capture wells, trenches, and sumps are shown in Figure 3.

Groundwater Use

Groundwater at the 3&4 EHP area is not currently used as drinking water by humans. Water is present in the sub-McKay strata at various depths. Wells completed in these units typically exhibit low yields but can vary from less than a half-gallon per minute to more than ten gallons per minute. Water quality is variable, but this unit is frequently used as a stock water supply source in the 3&4 EHP area. Stock Wells PSW-1 through PSW-10 are used to supply stock tanks at the 3&4 EHP area (Hydrometrics, 2017a). One additional stock well (PSW-11) is located southeast of the 3&4 EHP on an adjacent section of land. Numerous groundwater monitoring wells are also present at the 3&4 EHP area. Figure 4 depicts the locations of the stock wells.

2.3.3 Surface Water

The classification and descriptions of the surface water at the 3&4 EHP are provided below.

Surface Water Classification

Two natural ephemeral drainages are located at the 3&4 EHP area, Cow Creek and SFCC, which drain into Rosebud Creek. Rosebud Creek is part of the Yellowstone River Drainage. The water-use classification listed in ARM 17.30.611 for the Yellowstone River Drainage, described as follows, is subject to C-3 Classification Standards: (c) Yellowstone River Drainage from the Billings water supply intake to the North Dakota state line and including the Big Horn River drainage [except the water listed in (1)(c)(i) through IX-C-3 17.30.629].

Cow Creek and SFCC are classified as C-3 waters as is their receiving water, Rosebud Creek, which means that the water is naturally marginal for drinking, culinary, and food processing purposes, agriculture, and industrial water supply. A C-3 water generally needs pre-treatment in order to be used as a potable water supply. Specifically, ARM 17.30.629 states:

(1) Waters classified C-3 are to be maintained suitable for bathing, swimming, and recreation, and growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl, and furbearers. The quality of these waters is naturally marginal for drinking, culinary, and food processing purposes, agriculture, and industrial water supply.

(2) No person may violate the following specific water quality standards for waters classified C-3:

(a) The water quality standard for Escherichia coli bacteria (E-coli) varies according to season, as follows:

(i) from April 1 through October 31, the geometric mean number of E-coli may not exceed 126 colony forming units per 100 milliliters and 10% of the total samples may not exceed 252 colony forming units per 100 milliliters during any 30-day period; and
(ii) from November 1 through March 31, the geometric mean number of E-coli may not exceed 630 colony forming units per 100 milliliters and 10% of the samples may not exceed 1,260 colony forming units per 100 milliliters during any 30-day period.

(b) Dissolved oxygen concentration must not be reduced below the applicable standards specified in department Circular DEQ-7.

(c) Induced variation of hydrogen ion concentration (pH) within the range of 6.5 to 9.0 must be less than 0.5 pH unit. Natural pH outside this range must be maintained without change. Natural pH above 7.0 must be maintained above 7.0.

(d) The maximum allowable increase above naturally occurring turbidity is 10 nephelometric turbidity units, except as permitted in 75-5-318, MCA.

(e) A 3°F maximum increase above naturally occurring water temperature is allowed within the range of 32°F to 77°F; within the range of 77°F to 79.5^{o}F, no thermal discharge is allowed which will cause the water temperature to exceed 80°F; and where the naturally occurring water temperature is 79.5^{o}F or greater, the maximum allowable increase in water temperature is 0.5^{o}F. A 2°F per-hour maximum decrease below naturally occurring water temperature is

allowed when the water temperature is above 55°F. A 2°F maximum decrease below naturally occurring water temperature is allowed within the range of 55°F to 32°F.

(f) No increases are allowed above naturally occurring concentrations of sediment or suspended sediment (except as permitted in 75-5-318, MCA), settleable solids, oils or floating solids, which will or are likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish, or other wildlife.

(g) True color must not be increased more than five color units above naturally occurring color.

(h) Concentrations of carcinogenic, bioconcentrating, toxic, radioactive, nutrient, or harmful parameters may not exceed the applicable standards set forth in Department Circular DEQ-7 and, unless a nutrient standards variance has been granted, Department Circular DEQ-12A.

(i) (j) [Associated with discharge permits – not applicable for the Facility].

(k) In accordance with 75-5-306(1), MCA, it is not necessary that wastes be treated to a purer condition than the natural condition of the receiving water as long as the minimum treatment requirements, adopted pursuant to 75-5-305, MCA, are met.

Surface Water Description

To the north and east of the 3&4 EHP area, the topography slopes away from the ponds/cells to the ephemeral tributary drainages of Cow Creek. A few minor tributaries drain the area north and west of the 3&4 EHP area, including the Drain Pit #5 tributary, which drains the west side of the 3&4 EHP, as well as reclaimed mine lands to the west of the 3&4 EHP. A small tributary north of the Main Dam drains the north side of the 3&4 EHP and several small tributaries drain the east side of the 3&4 EHP below the Saddle Dam. A small tributary runs from the south end of Saddle Dam eastward past the 560A capture system to Cow Creek, draining the eastern side of the 3&4 EHP. Surface water locations are depicted in Figure 5.

To the south and southeast of the 3&4 EHP, the topography slopes towards the south from the ponds/cells toward small ephemeral tributary drainages of South Fork Cow Creek (SFCC).

Flow in Cow Creek and SFCC is ephemeral along the reaches that are within the 3&4 EHP area, with water present typically in the form of snowmelt or storm runoff (see also "Ephemeral Surface Water Description" below). Flow in smaller tributaries to Cow Creek and SFCC are also ephemeral. The ephemeral nature of all the drainages in the 3&4 EHP area result in highly variable water quality that is dependent on the conditions at, and prior to, the sampling event. Surface water monitoring is conducted in accordance with the Water Resources Monitoring Plan (Talen, 2015). Because of the ephemeral nature of Cow Creek and SFCC, surface water data are limited. All other tributary drainage sites have typically been dry during monitoring events for the past 10 years.

Two earthen stock ponds are present in the 3&4 EHP area. One is located to the east of the Saddle Dam and is fed by a spring (SP-14). The other pond is located south of the 3&4 EHP ponds/cells near SFCC and is referred to as PSW-4 Overflow Pond (Newfields, 2017; Hydrometrics, 2017a). Both earthen stock ponds contain water approximately half of the year. Surface water data are available from the earthen stock ponds. Both ponds may be a water source for livestock or wildlife; however, the primary sources of stock water are several stock wells (see Section 2.3.2 above and Figure 4).

An historic mining cut, referred to as the Northern Pacific (NP) Cut, located to the west of Drain Pit #5 contains water some of the year and may be used as stock water. Surface water is also present some of the year behind the West Seep Diversion Dam located southeast of the NP Cut. Surface water data were available for both the NP Cut and the West Seep Diversion Dam. Both the NP Cut and the West Seep Diversion Dam surface water may be a water source for livestock or wildlife; however, again the primary sources of stock water are several stock wells (see Section 2.3.2 above and Figure 4).

Overall, surface water in the 3&4 EHP area is very limited consisting of process ponds, earthen stock ponds, a historic mining cut, a diversion impoundment, and overland flow in tributaries and drainages. Very rarely is surface water flow present in the main drainages of the 3&4 EHP area (i.e., Cow Creek and SFCC) as further described below. Surface water BSLs (Neptune, 2017) are available, but not directly applicable to the 3&4 EHP area because they are based on East Fork Armells Creek at the Plant Site, rather than the ephemeral drainages Cow Creek and SFCC present at the 3&4 EHP (Hydrometrics, 2017a). Although not directly applicable because East Fork Armells Creek does not flow through the 3&4 EHP area, these surface water BSLs were used for comparison purposes because of the lack of background surface water data for the 3&4 EHP area (see also Table B-2.1 in Appendix B).

Ephemeral Surface Water Description

Per ARM 17.30.602 (10), "Ephemeral stream" means a stream or part of a stream which flows only in direct response to precipitation in the immediate watershed or in response to the melting of a cover of snow and ice and whose channel bottom is always above the local water table. The information provided herein demonstrates that Cow Creek and South Fork Cow Creek:

(1) only flow in response to precipitation or snow and ice melt and
(2) the channel bottom of these two streams is always above the local water table.

Thereby, Cow Creek and South Fork Cow Creek meet the definition of an ephemeral stream along the reaches that are within the 3&4 EHP area.

(1) Stream Flow Occurs Solely in Response to Precipitation or Snowmelt

Both Talen and Hydrometrics employees routinely travel through Cow Creek and South Fork Cow Creek throughout the year. Flow is only observed in the drainages following precipitation events or during snowmelt runoff periods when the ground is frozen or the snowmelt exceeds the infiltration capacity of the local soil. Following these events, water may be present for extended period of times in natural depressions or manmade “reservoirs”. However, the channels and depressions dry up during summer, fall and winter, except in the case when high intensity rainfall may cause additional runoff.

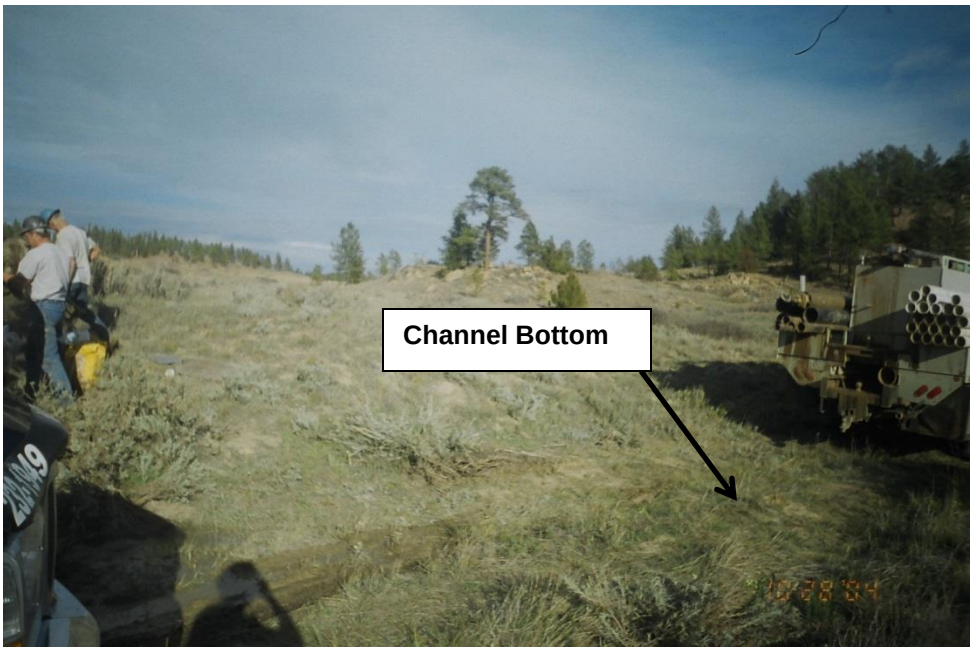
South Fork Cow Creek - The following photographs were taken in South Fork Cow Creek during the fall of various years. Two main points demonstrate the ephemeral nature of the drainage. First, there is not any flow. This is a typical condition in South Fork Cow Creek except during snowmelt runoff periods, particularly when the ground is frozen, and runoff following intense or prolonged precipitation events. Second, the bottom of the channel is vegetated indicating that perennial flow does not occur.



Photograph 2-1: South Fork Cow Creek – Late Fall – view downstream from near well 672A. Note vegetated channel and dry conditions



Photograph 2-2: South Fork Cow Creek – Late Fall – view upstream from near well 672A. Note vegetated channel and dry conditions



Photograph 2-3: South Fork Cow Creek – at well 666A. Note fully vegetated channel and lack of flow. Water present in photo is from injection water used during drilling.

Cow Creek - The following series of photos are from Cow Creek. Similar to South Fork Cow Creek, the photos illustrate the ephemeral nature of the drainage due to a lack of surface water flow and well vegetated drainage bottom.



Photograph 2-4: Google Earth image of Cow Creek at Stock Well PSW-9. Note vegetation in drainage bottom illustrating lack of surface water flow and lack of visible water.



Photograph 2-5: Cow Creek Drainage (dry) looking east /southeast from Well PSW-9.



Photograph 2-6: Cow Creek near the confluence of the 3&4 Main Dam tributary drainage.

(2) Relationship Between Channel Bottom and Local Water Table

Cow Creek - Wells 557A, 558A, and 559A were completed in Cow Creek alluvium at the Colstrip SES site boundary, downgradient/downstream of the Units 3&4 Effluent Holding Ponds (3&4 EHP), in 1982 (see Figure 3). Groundwater levels have been monitored at these wells since their completion. A hydrograph for well 557A illustrates typical groundwater fluctuations and the depth to water below the channel at this location. Water levels in the sentinel alluvial wells are shown in relationship to the Cow Creek channel bottom elevation in the following hydrograph (Figure 2-1). Groundwater level elevations have remained below the channel bottom elevation throughout the entire period of record. Based on these water level elevation data, the local groundwater table is between approximately 13 and 22 feet below the channel bottom.

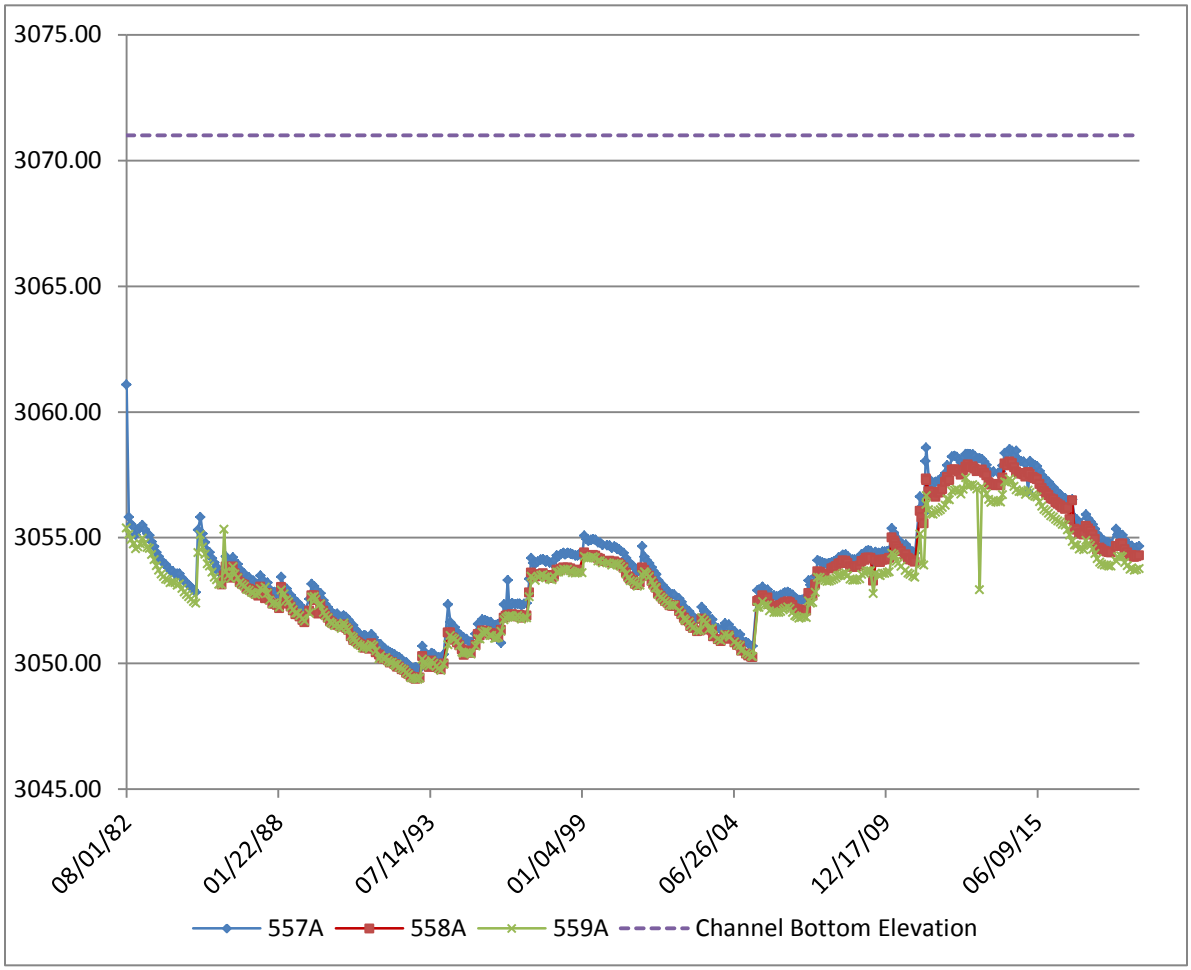


Figure 2-1 Hydrograph of Wells 557A, 558A, 559A in Cow Creek Alluvium from 1982 to 2018

Well 626A is located at the confluence of the tributary drainage that holds the Units 3&4 EHP and Cow Creek. The following hydrograph illustrates groundwater levels in relation to the channel bottom adjacent to the well (Figure 2-2). As can be seen, groundwater has risen to about 3 feet below ground surface of the channel bottom, but has never been observed intersecting the ground surface. Groundwater clearly does not issue to the surface at either of these locations.

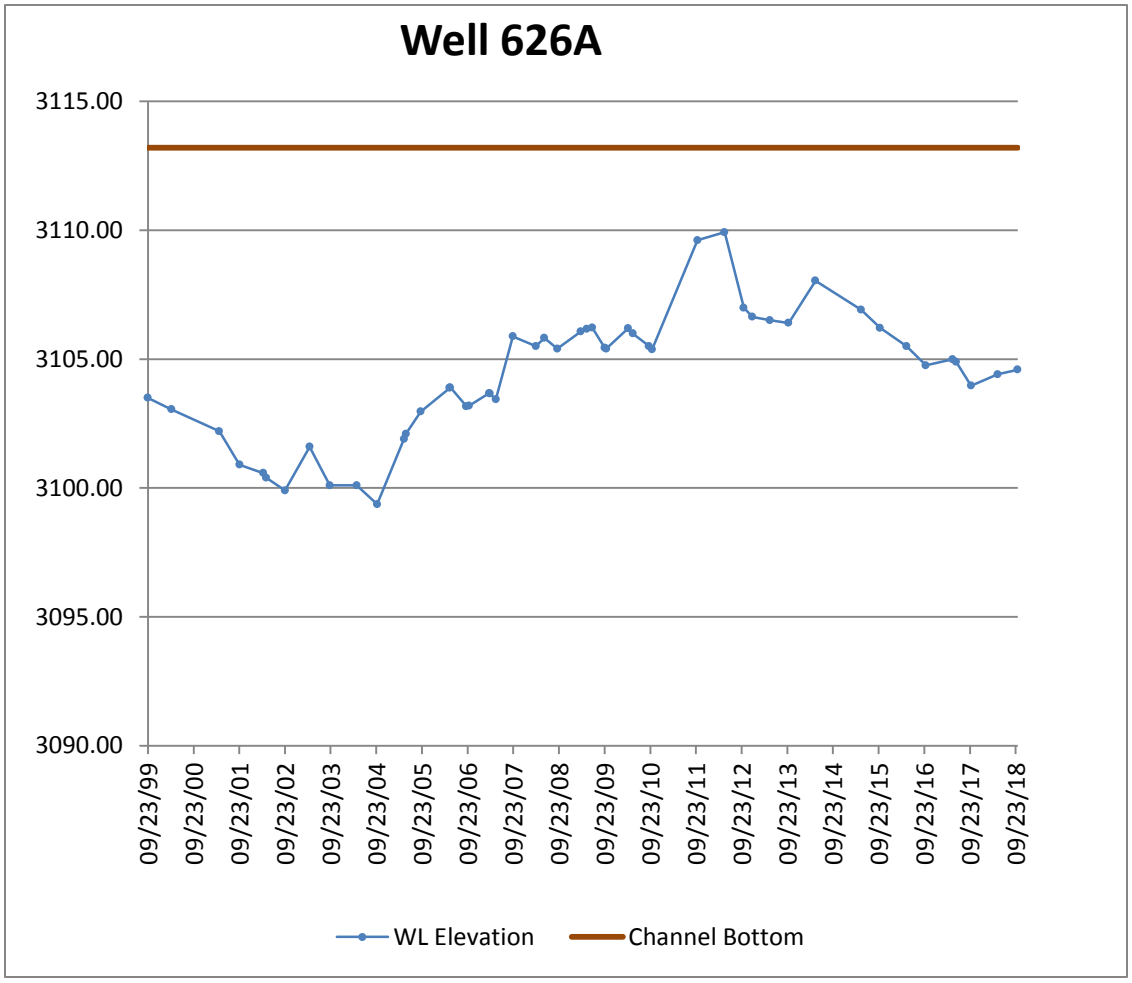


Figure 2-2 Hydrograph of Well 626A in Cow Creek from 1999 to 2018

South Fork Cow Creek - Well 568A is completed southeast and downgradient/downstream of the 3&4 EHP in alluvium of South Fork Cow Creek (see Figure 2-3). This well was installed and has been monitored for water levels since 1982. Similar to groundwater level elevations observed in the Cow Creek drainage, water levels recorded throughout the period of record (1982 to 2019) at 568A and 569A have always occurred at elevations that are well below the South Fork Cow Creek channel bottom elevation. A hydrograph for well 568A is shown in the following hydrograph (Figure 2-3). Based on 36 years of observation, the depth to the water table beneath the channel bottom ranges from about 5 to 14 feet below ground surface. Note that water levels recorded between 2004 and 2019 are relatively stable compared to those measured prior to that time, which is likely the effect of groundwater capture that is being conducted in the alluvium in the area.

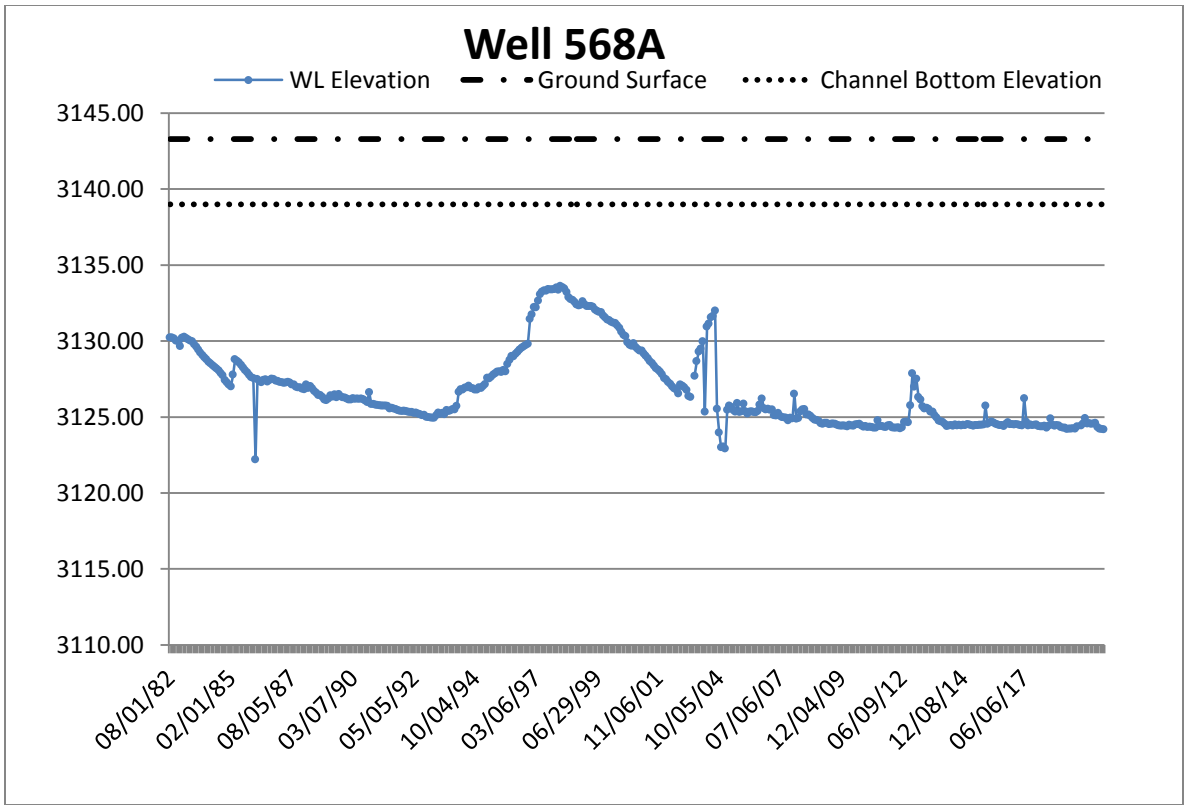


Figure 2-3. Hydrograph of Well 568A in South Fork Cow Creek Alluvium from 1982 to 2019

Surface Water Use

Surface water at the 3&4 EHP is not currently used for drinking water by humans. The presence of surface water at the 3&4 EHP is not continuous because of the ephemeral nature of the drainages. When present, surface water may be used for stock water; however, the primary sources of stock water are several private stock wells.

2.4 DEMOGRAPHICS AND LAND USE

2.4.1 Demographics

As of the 2010 Census, the population of Colstrip was 2,214 people, which included 863 households and 622 families (United States Census Bureau, 2014). The Colstrip SES Facility employs approximately 360 people (PPLM, 2014). The nearest residence, which is located in the town of Colstrip, is approximately 1.5 miles from the boundary of the 3&4 EHP area.

2.4.2 Past/Current Land Use

Colstrip was established in 1924 by Northern Pacific Railroad to provide coal for steam locomotives. Sub-bituminous coal was/is mined from the Fort Union Formation. In 1958, diesel fuel replaced coal to power the trains and the Montana Power Company (MPC) purchased the rights to the mine.

The Plant Site has been used as the location of a coal-fired power plant since the mid-1970's. A portion of the Plant Site was mined for coal prior to construction of the power plant units that commenced in

1972. In addition, soil, shallow bedrock, and coal were excavated from below the plant itself prior to construction.

The 3&4 EHP area is a fenced, controlled access area. In addition, within the fenced perimeter of the 3&4 EHP area, additional fencing surrounds the 3&4 EHP ponds/cells to prevent access to process water management areas, particularly by livestock. Large portions of the 3&4 EHP area are leased to ranchers for grazing livestock, who access the area through locked gates or through the main Plant Guardshack. Archery hunting within the 3&4 EHP area is allowed with permission and archery hunters access the area through the Guardshack. Figure 5 depicts current land uses at the 3&4 EHP area.

The water supply for the Colstrip SES Facility and the town of Colstrip is Castle Rock Lake, which stores water pumped via a pair of 30-mile pipelines from the Yellowstone River located to the north. Groundwater at the 3&4 EHP is not currently used as drinking water by humans. However, various wells are present that are used as stock water supply sources. Stock Wells PSW-1 through PSW-7, PSW-9, and PSW-10 are used to supply stock tanks within the 3&4 EHP area boundary. Two additional stock wells are located south (PSW-8) and southeast (PSW-11) of the 3&4 EHP area on adjacent property. (Hydrometrics, 2017a). The stock wells at the 3&4 EHP area are depicted in Figure 4.

2.4.3 Future Use

The Facility is reasonably anticipated to remain as the location of a coal-fired power plant well into in the future. The 3&4 EHP area is anticipated to remain as a disposal area for Units 3&4. The associated land use activities in the town and at the 3&4 EHP area are reasonably anticipated to remain into the future. In addition, the leasing of portions of the 3&4 EHP area for livestock grazing is anticipated to continue in the future, as well hunting with permission.

In the future, groundwater is not anticipated to be used as drinking water in the 3&4 EHP area. Residences are not present in the 3&4 EHP area. The stock wells at the 3&4 EHP are anticipated to be used for livestock watering. Future drilling of the domestic wells in the 3&4 EHP area is not anticipated to be allowed or necessary based on current and anticipated future land uses. However, institutional controls are not in place to prevent the future domestic use of groundwater.

In the 3&4 EHP area, use of groundwater for irrigation is not anticipated due to yield and water quality. The potential for future use as irrigation water is limited by yield and quality. Institutional controls are not in place to prevent irrigation use of groundwater.

DEQ-7 Standards apply to all groundwater in Montana and, hence, all groundwater at the Facility regardless of usage. Presently, no institutional controls are in place to prevent the domestic or irrigation/livestock use of groundwater. It should be noted that if a remedial action includes institutional controls, that determination will not occur until DEQ chooses the final site remedy.

3.0 IDENTIFICATION OF CONSTITUENTS OF INTEREST

The AOC applies to wastewater at the Colstrip SES, which is a closed-loop system that does not discharge wastewater. To identify the 3&4 EHP COIs/COPCs as required by the AOC, data from the primary source of the potential constituents (i.e., the ponds at the 3&4 EHP area) were used. The constituents present in the 3&4 EHP in the dissolved state have the potential for migration into groundwater.

As a first step in the identification of the COIs/COPCs, the dissolved pond water concentrations (i.e., filtered samples) presented in the Units 3 & 4 EHP AOC Site Report (Hydrometrics, 2017a), as well as in a Process Pond Sampling Technical Memorandum (Hydrometrics, 2017b), for the constituents listed in Appendices III and IV of the CCR Rule (USEPA, 2017) were compared to the standards and screening levels presented in the AOC.

As a second step in the identification of the COIs/COPCs, available data from numerous CCR wells installed around the perimeter of the 3&4 EHP were compared to the standards and screening levels presented in the AOC. However, the CCR well data are mostly total recoverable concentrations and, therefore, not directly comparable to groundwater standards and screening levels that are based on dissolved concentrations. Consequently, the CCR well data were used as a secondary, qualitative screening approach if concentrations of the CCR Appendices III and IV constituents in the pond water samples exceeded standards and screening levels. Because the CCR well data are generally total recoverable concentrations, comparisons of CCR well data to screening levels based on dissolved concentrations results in a conservative bias. However, screening levels for radium are based on total concentrations and, therefore, a conservative bias does not apply to radium. A total of 32 groundwater wells were installed around the perimeter of the 3&4 EHP ponds/cells and another seven were installed as background wells to collect data required by the CCR Rule. Figure 7 depicts the locations of the CCR wells. CCR well data used in the COI/COPC identification process are presented in Appendix F.

In addition to the CCR Appendices III and IV constituents, additional constituents were assessed as potential COIs/COPCs that are present in the wastewater and had the potential to cause a human health or ecological risk.

Table 3-1 below presents various standards and screening levels for the CCR Appendix III and Appendix IV constituents, as well as other potential constituents identified in the risk assessment process.

Table 3-1 Potential 3&4 EHP Wastewater COIs/COPCs

Constituent	Groundwater DEQ-7 Standard (mg/L)	USEPA MCL (mg/L)	USEPA Tapwater RSL (mg/L)	BSL Range (mg/L)	Toxicity (in water)
CCR Rule Appendix III Constituents					
Boron	NA	NA	4	0.8 – 3.9	non-carc
Calcium	NA	NA	NA	303 -477	non-carc*
Fluoride	4	4	0.8	0.4 – 2.11	non-carc
Chloride*	NA	NA	NA	21-52	NA
Sulfate	NA	NA	NA	2,150 – 3,140	non-carc*
pH (lab)	NA	NA	NA	7.8 – 8.27 s.u.	NA
TDS	NA	NA	NA	3,445 – 5,010	NA
CCR Rule Appendix IV Constituents					
Antimony	0.006	0.006	0.0078	0.15 – 0.4	non-carc
Arsenic	0.01	0.01	5.2×10^{-5}	0.005	carc
Barium	1	2	3.8	0.024 – 0.27	non-carc
Beryllium	0.004	0.004	0.025	0.0002 – 0.02	non-carc
Cadmium	0.005	0.005	0.0092	0.002 – 0.01	non-carc
Chromium	0.1	0.1 (a)	NA	0.0146 – 0.1	non-carc
Cobalt	NA	NA	0.006	0.00066 – 0.0232	non-carc
Fluoride	4	4	0.8	0.4 – 2.11	non-carc
Lead	0.015	0.015 (b)	0.015	0.01 – 0.08	non-carc
Lithium	NA	NA	0.04	0.072 – 0.12	non-carc
Mercury	0.002	0.002 (c)	6.3×10^{-4}	0.001 – 0.005	non-carc
Molybdenum	NA	NA	0.1	0.004 – 0.1	non-carc
Radium 226/228	5 pCi/L	5 pCi/L	NA	NA	carc
Selenium	0.05	0.05	0.1	0.0024 – 0.01	non-carc
Thallium	0.002	0.002	0.0002	0.0003 – 0.05	non-carc
Other Potential 3&4 EHP Constituents (Identified in the Risk Assessment Process)					
Manganese	NA	NA	0.43	0.26 – 2.48	non-carc

Notes:
(a) value for total chromium
(b) lead treatment technology action level is 0.015 mg/L
(c) value for inorganic mercury
Chloride* Chloride is a secondary indicator parameter
BSL Background Screening Level (Neptune, 2017)
DEQ-7 Montana Numeric Water Quality Standard (DEQ, 2017c)
MCL Maximum Contaminant Level
mg/L milligrams per liter
NA Not Available/Not Applicable
non-carc* assumed non-carcinogenic, common constituent, human health toxicity data not available
pCi/L picocuries per liter
RSL Regional Screening Level (USEPA, 2018a)
s.u. Standard Units
USEPA United States Environmental Protection Agency

Tables 1A through 1C, located in the Tables section, present a summary of the 3&4 EHP water data for the potential COIs that were presented in the Units 3&4 EHP AOC Site Report (Hydrometrics, 2017a). Table 1A presents a summary of the CCR Appendix III constituents. Table 1B presents a summary of the CCR Appendix IV constituents. Table 1C presents a summary of other potential groundwater 3&4 EHP constituents that were selected based on the human health and ecological risk assessments.

Table 2, located in the Tables section, presents the groundwater BSLs (Neptune, 2017) by hydrostratigraphic layer for the CCR Appendices III and IV Constituents, as well as the other potential 3&4 EHP constituents. Please note that that 2016 groundwater BSLs (Neptune) apply to the Plant Site CCRA and the 2017 groundwater BSLs (Neptune) apply to the 3&4 EHP area, as well as the SOEP/STEP area (DEQ, 2017d).

Table 3, located in the Tables section, presents the screening for the identification of COIs/COPCs. The rationale for selection or deletion of a potential COI/COPC is presented in the table; however, the following general points should be noted:

- To identify COIs/COPCs, the 3&4 EHP pond water (wastewater) was considered the source (worst-case) of potential constituents.
- Migration of the COIs/COPCs from the 3&4 EHP to groundwater was considered the pathway of concern.
- Maximum dissolved concentrations of potential COIs/COPCs in the 3&4 EHP pond water data were used for comparison against the standards and screening levels because the COIs/COPCs could potentially migrate to groundwater if pond seepage occurs. The DEQ-7 Standards for groundwater (DEQ, 2017c) are generally reported in dissolved concentrations, where applicable (e.g., metals), and particulates would not migrate through the bottom liners of the ponds. The groundwater BSLs (Neptune, 2017) also represent dissolved concentrations because constituents are expected to be present in the dissolved phase in groundwater due to slow velocities and filtering characteristics of most strata.
- If dissolved concentrations were not available in the 3&4 EHP pond water data for a given potential COI/COPC, then the total concentrations were used.
- Maximum total concentrations of Radium 226/228 in the 3&4 EHP pond water data were used for comparison against standards and screening levels because both the DEQ-7 and the MCL are based on total concentrations.
- For some potential COIs, the 3&4 EHP pond water data were not specified as either dissolved or total concentrations (e.g., fluoride, sulfate), but assumed to be total concentrations as the samples were unfiltered.
- Groundwater samples collected from the CCR wells were analyzed for total recoverable metals concentrations as required by the Federal CCR Rule. (In certain instances where turbidity is high, dissolved concentrations were also analyzed). As such, total recoverable concentrations reported in the CCR well data were used as proxy values for dissolved concentrations. Total recoverable concentrations are not directly comparable to groundwater standards and screening levels that are based on dissolved concentrations and, therefore, such comparisons add a conservative bias and should be made with careful consideration. Please note, however, screening levels for radium are based on total concentrations and, therefore, a conservative bias does not apply to radium.

From the COPCs identified following the above described screening process, the following chemicals were retained as groundwater COCs presented in Table 3-2 below.

The COIs/COCs presented in Table 3-2 were identified for the 3&4 EHP area in accordance with the previously described screening process.

Table 3-2 3&4 EHP Groundwater COIs/COCs

CCR Rule Appendix III Constituents	CCR Rule Appendix IV Constituents	Other Potential Plant Site Constituents
Boron	Cobalt	Manganese
Sulfate	Lithium	
	Selenium	

Note: Radium and thallium were not identified as COIs/COCs; however, they will remain COPCs while additional radium and thallium groundwater data are collected. Radium and thallium will continue to be monitored and evaluated in groundwater as part of the Federal CCR Rule compliance monitoring and continue to be reviewed under the AOC.

3.1 AOC CONTROL ACTIONS AND REGULATED SUBSTANCES

The AOC (DEQ/PPLM, 2012) defines "Control Actions" (Section IV.B.) as "remedial actions directed toward reducing, containing or controlling the seepage or migration of regulated substances including but not limited to sulfate, boron, selenium, potassium, sodium, magnesium, total dissolved solids, and salinity measured by specific electrical conductance through the environment. Control actions shall include affirmative source mitigation measures."

Of the regulated substances listed in the Control Action definition of the AOC (DEQ/PPLM, 2012), sulfate, boron, and selenium were selected as COIs/COCs. Potassium, sodium, magnesium, total dissolved solids (TDS), and salinity were not selected as COIs/COCs through the screening process described above and presented in Table 3. Although not all of the regulated substances listed in the Control Action definition were selected as COIs/COCs, all listed constituents will be addressed in the remedial action development. In most instances, remedial actions designed to directly mitigate the COIs/COCs will indirectly mitigate the remainder of the regulated substances, as well.

4.0 SITE CONCEPTUAL EXPOSURE MODEL

A Site Conceptual Exposure Model (SCEM) was prepared to identify the contaminant sources, affected environmental media, release and transport mechanisms, potential human receptors, exposure points and pathways under the current and reasonably anticipated future uses of the Plant Site (see also Sections 2.4.2 and 2.4.3 above). The preparation of the SCEM is requested in the AOC, as well as a required element in conducting a risk assessment. The SCEM is presented as Figure 8.

4.1 SOURCES OF FACILITY CHEMICALS AND AFFECTED ENVIRONMENTAL MEDIA

The following potential sources of chemicals from the 3&4 EHP area were identified:

- Water based liquid waste that has been and is stored in the 3&4 EHP ponds/cells and has seeped from the ponds/cells.
- Water based liquid slurry waste that was accidentally released from pipeline/pipe spills or pond overflows.
- (Although not a source directly from water based liquid or slurry waste) - background-related chemicals in geological strata, such as unconsolidated sediments, rock, coal, spoils, previously in situ burned coal seams, which leach chemicals into groundwater.

Seepage from the 3&4 EHP was assumed to have primarily affected groundwater. Potential groundwater migration and diffuse seepage are assumed to flow toward drainage alluvium. The pipeline/pipe spills and pond overflows were assumed to have primarily affected soil and (potentially) secondarily affected drainage alluvium via over land flow. In addition, background-related chemicals in geological strata were assumed to have primarily affected groundwater and secondarily drainage alluvium and ephemeral surface water.

Wind suspension from soil in spill areas at the 3&4 EHP was assumed to have the potential to affect outdoor air (particulates; if COIs/COPCs were to be identified in soil).

The potential COIs originating from the 3&4 EHP wastewater were evaluated using several data sources, but primarily the following:

- The Units 3 & 4 EHP Site Report, prepared as a requirement of the AOC, summarizes the 3&4 EHP data and investigations that have been conducted at the 3&4 EHP relating to the ponds, spills associated with the pipelines, or changes in water quality identified in operational groundwater monitoring (Hydrometrics, 2017a). Table 2-3 of the Units 3 & 4 EHP Site Report presents the evaporation pond chemical profiles. (Note that additional pond water samples have been collected since the Site Report was prepared, see Section 10.5). Table 3-1 presents a summary of releases at the 3&4 EHP area and actions taken. Table 3-2 contains a list of the reports, dates of the reports, and short summaries of the work conducted and findings of the investigations or studies.
- The data collected from the numerous wells at the 3&4 EHP pursuant to the Federal CCR Rule (see Appendix F). Note that because the CCR well data are generally total recoverable concentrations, comparisons of CCR well data to screening levels based on dissolved concentrations results in a conservative bias. However, screening levels for radium are based on total concentrations and, therefore, a conservative bias does not apply to radium.

4.1.1 Anthropogenic Chemical Sources

The AOC addresses impacts related to the Colstrip SES Facility wastewater and does not address other media (unless impacted by the wastewater). As such, contaminants that have the potential to be present at the 3&4 EHP area that originated from sources other than the wastewater system, such as mining or agricultural activities, and for which little or no data are available, were not assessed within the CCRA Report.

4.2 CHEMICAL RELEASE MECHANISMS AND TRANSPORT PATHWAYS

Chemical release mechanisms and transport pathways/mechanisms are depicted in Figure 8, the SCEM. Primary chemical releases were assumed to occur by the following mechanisms:

- Pond seepage
- Pipeline/pipe releases
- Pond overflow
- Background-related geologic strata leaching, including upstream mining areas, and leaching/erosion from other anthropogenic background sources

The specific chemical transport pathways identified for the 3&4 EHP area and the identified transport mechanisms (i.e., migration) are discussed in the following sections. It should be noted that the AOC (Article VI.B) requires the CCRA Report to identify transport mechanisms for the COIs.

4.2.1 Pond Seepage and Groundwater Migration

Seepage losses from the ponds/cells at the 3&4 EHP area have historically impacted primarily shallow groundwater. However, numerous capture wells have been placed at the 3&4 EHP area downgradient of the ponds/cells that actively limit advective migration of impacted groundwater. Additional groundwater capture wells have been added as recently as 2018. Furthermore, individual cells within the 3&4 EHP have been updated, retrofitted, or closed; and new cells constructed in accordance with the requirements of the USEPA CCR Final Rule. Mitigation measures continue to be evaluated and upgraded so that migration is limited to the extent practicable.

In the area of the pond seepage losses, COIs could have been transported toward drainages in the alluvium via the shallow groundwater. Again, at present, an ongoing groundwater capture system limits migration of groundwater to the alluvium, but the future need of the capture system should be considered.

During meetings with the DEQ, the DEQ indicated that the CCRAs, as well as the Remedy Evaluation Reports, should consider conditions at the Facility if the capture well system was not operational (DEQ, 2017a).

4.2.2 Surface Releases to Soil and Subsequent Migration

Surface releases to soil in the 3&4 EHP area are summarized below. Table 3-1 in the 3&4 EHP AOC Site Report (Hydrometrics, 2017a) presents a summary of the known releases in the 3&4 EHP area. Releases of substantial magnitude are summarized below (from Hydrometrics, 2018a):

1987 to 2010 - Drain Pit #5 Area

Between 1987 and 2010, several releases of return water and scrubber slurry occurred near Drain Pit #5 (Montana Power Company, 1993; Hydrometrics, 1999; Hydrometrics, 2000c). Most of these releases were caused by problems with the 3&4 EHP scrubber slurry/return pipeline that runs parallel to and generally north of the access road to the 3&4 EHP. Most releases were contained in Drain Pit #5, but one release of slurry traveled down the drainage approximately 200 yards. A new monitoring well was installed, soil samples were collected and groundwater capture was initiated after a 2010 release of flyash slurry in this area (Hydrometrics, 2013). Groundwater monitoring and capture has been ongoing in this area.

1994 and 1999 - Drain Pit #3 Area

Two separate spills occurred near Drain Pit #3. The first occurred in 1994 when an undocumented volume of return pipeline water spilled as a result of pipeline failure. The spilled water infiltrated into the ground and groundwater monitoring was initiated at existing wells in the area (Montana Power Company, 1995). In 1999, approximately 200,000 gallons of clear water (return water) was released when the pipeline drain valve was left open causing Drain Pit #3 to overflow. Water flowed down the drainage of a tributary to Cow Creek between 3,000 and 5,000 feet from the drain pit. The released water was contained and removed. A following investigation resulted in installation of an interception trench (Drain Pit #3 Trench) and multiple monitoring wells (Hydrometrics, 2000c).

1994 and 1999 - North of Main Dam

Two separate spills occurred north of the Main Dam. In March 1994, a power outage shut down the 3&4 Area Main Dam Sump causing collection water to overflow down the drainage (Montana Power Company, 1993). In December 1999, collection water was released below the Main Dam Interception Trench when a gasket failure occurred (Hydrometrics, 2013, revised 2017). All water was contained upgradient of the 3&4 Main Dam Lower Interception Trench. Seeps of process water were observed at the toe of the 3&4 Main Dam (Hydrometrics, 2013, revised 2017).

1999 and 2012 - East of Saddle Dam

In December 1999, process water was discovered issuing to ground surface at two locations east of the saddle dam in December 1999. Surface water was contained by damming the drainage a short distance downstream at the point of issue. Captured water was pumped to the 3&4 EHP. The flow of water was stopped by lowering the water levels in G Cell. Installation of numerous monitoring wells began immediately. Groundwater capture wells were installed near the Saddle Dam Main Sump. An interception trench was installed in shallow material to collect groundwater flowing at the contact of unconsolidated and consolidated deposits (Hydrometrics, 2000a, 2000b). Groundwater collection and monitoring has been ongoing in this area. In a third location, recovered groundwater was spilled on the ground surface when the Saddle Dam sump overflowed in 2009 (Hydrometrics, 2010). Another spill occurred in this same area during October 2012 when pumps failed and collection water exited the Saddle Dam Valley Drain sump and flowed approximately 150 yards down the drainage (Hydrometrics, 2013, revised 2017).

2004 - South Fork Cow Creek (SFCC) Seep

In September 2004, an estimated 60 gallons per minute (gpm) of process water was observed issuing to ground surface south east of the 3&4 EHP in the SFCC drainage. Containment activities ensued immediately with construction of a small dam across the drainage downstream of the seep (South Fork Diversion). Water collected behind the dam was pumped to the 3&4 EHP. Water levels in F Cell and H Cell were lowered. Monitoring wells were installed in the South Fork Cow Creek drainage and completed in alluvium and shallow bedrock to characterize impacts. Capture systems were designed and began pumping to contain downgradient flow of impacted groundwater. Wells were also installed south of the 3&4 EHP into the Rosebud interval, McKay Coal and sub-McKay. Certain wells completed in the Rosebud Clinker were converted for capture and began operating. Wells were also installed upstream in the SFCC to further evaluate potential flow paths. A lift station was constructed to pump impacted groundwater to the 3&4 EHP (PPLM, 2005).

2004 - West Seep Area

In November 2004, water was observed issuing to the ground surface west of the 3&4 EHP at approximately 30 gpm. A dam was immediately built across the drainage a short distance downstream of the seep (West Diversion). Water collected by the diversion was pumped to the 3&4 EHP. Test pits were excavated at the point of issuance and water was observed flowing from the lower contact of the Rosebud clinker and underlying interburden. Monitoring wells were installed and several were converted for groundwater capture (Hydrometrics, 2005). Water monitoring and groundwater capture has been ongoing in this area.

4.3 WIND SUSPENSION (FUGITIVE DUST)

In the surface spill areas at the 3&4 EHP area, the potential exists for wind to suspend dry soil impacted with COIs, if present, from liquid waste, into the air as particulates (fugitive dust).

4.4 POTENTIALLY EXPOSED HUMAN RECEPTORS

Potential human receptors at the 3&4 EHP area were identified that might be exposed to constituents from the Colstrip SES Facility that originated from wastewater releases (see also Figure 8, the SCEM). Potential human receptors were limited to individuals who have access to the 3&4 EHP area as it is a controlled-access fenced area. Current land uses and areas at the 3&4 EHP area at which receptors could potentially be exposed are depicted in Figure 6. The fence at the 3&4 EHP area is depicted in Figure 2. Site access and current and reasonably anticipated future uses of the 3&4 EHP area were considered when identifying potential receptors. The following table presents the identified potential human receptors:

Table 4-1 Potential Human Receptors

Land Use	Receptor	On-Site*	
		Current	Future
Industrial*	Outdoor Worker	X	X
	Rancher	X	X
Construction	Construction Worker	X	X
Recreational Receptor	Adult* Hunter	X	X

Notes:

Industrial* Outdoor Industrial Workers include Colstrip SES Facility workers at areas beyond the ponds/cells, such as workers monitoring seeps or capture wells. Outdoor Industrial Workers also includes ranchers who have leased property for cattle grazing.

On-Site* Potential receptors on the controlled access areas of the 3&4 EHP area, but outside the areas of active operations, i.e., inside the fenced controlled-access 3&4 EHP boundary, but outside the immediate area of the ponds/cells.

Adult* Recreational receptors are limited to adult archery hunters accessing the area with permission.

- Adult Industrial Outdoor Workers
  - Adult Colstrip SES employees working outdoors at the 3&4 EHP area beyond the active operations area.
  - Adult ranchers working outdoors in leased 3&4 EHP areas.
- Adult Construction Workers (adults performing construction work at the 3&4 EHP area beyond the active operations area).
- Recreational Users (adults archery hunting in the controlled access areas of the 3&4 EHP area with permission).

Note that the 3&4 EHP Area is a controlled access area without residential areas. Although residential receptors were not identified, contaminant screening included residential screening values.

Also note that within the active operations area (i.e., pond/cell area), current potential worker exposures to constituent residuals in the 3&4 EHP ponds/cells would predominantly fall under the Occupational Safety and Health Administration (OSHA). At present, Talen has a robust worker safety program, including awareness training, spill response training, Hazardous Waste Operations and Emergency Response (HAZWOPER) training (for select employees), etc. As such, potential human exposures to constituents in the 3&4 EHP ponds/cells are presently managed through Talen's worker safety program and were not addressed in this CCRA.

4.5 POTENTIALLY COMPLETE EXPOSURE PATHWAYS

USEPA guidance (USEPA, 1989) defines a complete exposure pathway as consisting of four elements:

- A source and mechanism of chemical release;
- A retention or transport medium (or media in cases involving transfer of chemicals);
- A point of potential human contact with the contaminated medium (referred to as an exposure point); and
- An exposure route (such as ingestion or inhalation) at the contact point.

An exposure pathway is considered complete when it has all four factors. Designation of an exposure pathway as complete indicates that human exposure is possible, but does not necessarily mean that exposure will occur, or that exposure will occur at the levels to be estimated in this CCRA. When any one of the factors is missing in the pathway, it is considered incomplete. Incomplete exposure pathways do not pose a health hazard and were not evaluated further. A key step of the exposure analysis was to determine whether there were plausible routes of human exposure to COIs/COPCs at the 3&4 EHP area.

The SCEM for the 3&4 EHP area summarizes the information on sources of COIs/COPCs, affected environmental media, COI/COPC release and transport mechanisms, potentially exposed receptors, and potential exposure pathways for each potential receptor (see Figure 8). Figure 8 includes information on both human and ecological receptors and exposure pathways. The discussion of the SCEM presented in this Section primarily includes potential human exposures. Ecological pathways and exposures are discussed in detail in the Ecological Risk Assessment presented in Appendix C of this Report.

Potentially complete human exposure pathways associated with soil in the former seep/spill areas were identified in the SCEM:

- Soil
    - Incidental ingestion
    - Dermal contact
    - Inhalation (particulates)

Soil exposure pathways were subsequently eliminated because no human health COCs were retained in soil.

Potentially complete exposure pathways associated with groundwater and surface water were identified for the 3&4 EHP area and selected for comparison with DEQ-7 standards (DEQ, 2017c):

- Surface water (ephemeral surface water and private stock well tanks)
    - Ingestion
    - Dermal contact
- Groundwater
    - Ingestion
    - Dermal contact

DEQ-7 Standards apply to all state groundwaters and, therefore, apply to all aquifers at the Facility. Dermal contact with groundwater will be included as a potential exposure pathway for instances in which a construction worker may have contact with shallow groundwater. Per discussions with DEQ, the DEQ-7 Standards are considered protective of this infrequent exposure pathway (DEQ, 2017a).

Bioconcentration of surface water COPCs in fish tissue was not identified as an exposure pathway because surface water at the 3&4 EHP is ephemeral and does not sustain a fish population.

The basis for identifying each exposure pathway as complete or incomplete is summarized in Tables B-1.1 through B-1.3 of Appendix B (i.e., RAGS Part D Table 1).

5.0 RISK ASSESSMENT APPROACH AND GUIDELINES

Following the guidance of the AOC (DEQ/PPLM, 2012), as well as direction provided by DEQ in meetings (2017a), in which DEQ indicated that risks should be evaluated for the 3&4 EHP area without the operation of the capture well system, the following Risk Assessment approach was followed:

Human Health Risk Assessment

- Groundwater – forward calculations of human health risks associated with groundwater were not conducted for two main reasons. First, the capture well system presently minimizes migration of groundwater from the 3&4 EHP area and modeling of groundwater migration without the capture well system would need to be conducted adding substantial uncertainty into the forward calculation of human health risks associated with groundwater. Second, DEQ guidance indicates that groundwater risks should be evaluated qualitatively through the comparison to DEQ-7 Standards, rather than quantitatively through the forward calculation of human health risks. DEQ requested that human health Cleanup Criteria for groundwater be developed following the above described approach (DEQ, 2017a). Cleanup Criteria will be used in the Remedy Evaluation. Human health-based Cleanup Criteria for groundwater are discussed in Section 12.4.1.
- Surface water (ephemeral) – similar to groundwater, forward calculations of human health risks associated with surface water were not conducted.
- Soil – forward risk calculations of human health risks were not calculated because human health COCs were not retained in soil.

Ecological Risk Assessment

- Groundwater – one pathway was considered for ecological (livestock) exposure to groundwater, which is the potential future pathway of livestock consumption (i.e., pumping groundwater into a stock tank), as agreed to in DEQ meetings (DEQ, 2017a). Forward risk calculations were performed for this pathway because several stock wells are currently used for livestock watering (see Figure 4). In addition, ecological (livestock)-based Cleanup Criteria for groundwater were developed for this potential future pathway (see Section 12.4.2).
- Surface Water and soil – forward risk calculations for ecological risks were calculated if COPCs were identified. Ecological Cleanup Criteria for surface water and soil were not necessary, as discussed in Sections 12.1 and 12.2, respectively.

5.1 HUMAN HEALTH RISK ASSESSMENT APPROACH

As previously described in Section 1.0, the DEQ requested that the CCRA include DEQ's new Risk Assessment Scope of Work guidance (DEQ, 2017a, 2017b). This 3&4 EHP CCRA Report follows DEQ's Risk Assessment guidance for both the Human Health Risk Assessment (HHRA) and Ecological Risk Assessment (ERA). DEQ's Risk Assessment guidance largely follows the USEPA Risk Assessment guidance.

Overviews of the frameworks for both the USEPA and DEQ Human Health Risk Assessment Process are presented in the following sections.

5.1.1 Framework of the USEPA Human Health Risk Assessment Process

The methods used to conduct the HHRA are based on USEPA guidance (USEPA, 1989, 2001, 2009a et al.) and DEQ guidance (DEQ, 2009, 2017b). The framework for a HHRA is presented in "Risk Assessment Guidance for Superfund (RAGS), Volume I, Human Health Evaluation Manual (Part A; USEPA, 1989) and consists of the following six main steps:

- Conceptual Site Exposure Model (also referred to as the Site Conceptual Exposure Model [SCEM] by DEQ) – during this step, contaminant sources, affected environmental media, release and transport mechanisms, potential human receptors and exposure pathways to the COPCs are identified for current and future site conditions.
- Data Evaluation and Selection of COPCs – during this step, the analytical data are evaluated for usability in the HHRA. In addition, the data are grouped by location and medium and COPCs are selected for each applicable site media.
- Exposure Assessment – during this step, exposures for identified potentially complete exposure pathways to the COPCs are quantified. Exposure Point Concentrations (EPCs) are estimated, generally using a statistical approach, for each of the COPCs in each media. Pathway-specific intakes are estimated using human exposure parameters for the current and future potential human receptors.
- Toxicity Assessment – during this step, toxicity values that characterize potential adverse health effects for the COPCs are compiled.
- Risk Characterization – during this step, information from the previous steps is used to characterize potential risks to human health associated with exposure to COPCs. Both potential cancer risks and non-cancer hazard indices are evaluated.
- Uncertainly Analysis - during this final step, the major uncertainties associated with the risks are evaluated.

5.1.2 Framework of DEQ's Human Health Risk Assessment Process

For the risk assessment portion of the CCRA, DEQ requested that the DEQ's new Risk Assessment Scope of Work guidance be followed (DEQ, 2017a, 2017b). The DEQ has defined the following required components of a Risk Assessment:

1. History and setting of the Facility, including demographic information
2. Data evaluation and selection of COPCs
    a. Data Summary
    b. Data Evaluation
    c. Selection of COPC(s) for each media
3. Human health risk assessment
    a. Exposure assessment
        i. Site conceptual exposure model
        ii. Potential receptors and exposure pathways
        iii. Exposure assumptions

iv. Definitions of exposure areas and calculations of exposure point concentrations
v. Calculations of chronic daily intakes

b. Toxicity assessment
   i. Definitions of carcinogenic and non-carcinogenic risks
   ii. Carcinogenic slope factors and inhalation unit risks
   iii. Non-carcinogenic reference doses and reference concentrations
   iv. Uncertainties associated with toxicity assessment

c. Risk characterization
   i. Calculation and discussion of the carcinogenic risk estimates
   ii. Calculation and discussion of the non-carcinogenic risk estimates
   iii. Evaluation and discussion of uncertainties

d. Ecological risk assessment

4. Fate and Transport Analysis
5. Calculation of Site-Specific Cleanup Levels (SSCLs)
   a. Human health-based SSCLs
   b. SSCLs based on groundwater protection
   c. Ecological risk-based SSCLs
6. Completed tables 1-10 of EPA's Risk Assessment Guidance for Superfund (RAGS) Part D.
7. Summary table and figure of media, receptors, and exposure areas that exceed SSCLs. (This information will be presented in the Remedy Evaluation as it requires groundwater modeling).

Per DEQ guidance, the following steps were included within the CCRA Work Plan (Canty, 2018c) and are also presented herein:

- SCEM;
- Data Evaluation and Selection of COPCs;
- Exposure Assessment; and
- Toxicity Assessment.

Within the CCRA Report, the remaining steps of the HHRA were completed and are presented herein.

The data, assumptions, and calculations associated with steps are provided in Appendix B of this CCRA Report in RAGS Part D tabular format, Tables 1 through 10 (USEPA, 2001).

The Human Health Risk Assessment is presented in Sections 6.0 thru 9.0.

5.2 ECOLOGICAL RISK ASSESSMENT APPROACH

Montana DEQ follows the 8-Step Ecological Risk Assessment (ERA) process developed by USEPA and detailed in *Ecological Risk Assessment Process for Superfund: Process for Designing and Conducting Ecological Risk Assessments, Interim Final* (USEPA, 1997b) and *Guidelines for Ecological Risk Assessment* (USEPA, 1998). Montana DEQ recognizes that not all sites will need to utilize the full 8-Step process identified by USEPA, and has further tailored the process to identify four different levels of ecological risk assessment based on site location, activities, habitats, and chemicals potentially present at the Site

(DEQ, 2017b). The simplest of these, a Level 1 ERA, is for sites where no long-term ecological habitat is present, and simply requires documentation of site conditions (e.g., lack of ecological habitat) and consideration of future site use. The most complex, a Level 4 ERA, is for sites that represent critical ecological habitat, and requires the implementation of the full 8-Step Process.

Steps 1 and 2 of the USEPA process represent the screening phase of the ecological risk assessment. Step 1 is the Screening Level Problem Formulation and Ecological Effects Evaluation to identify site ecological receptors, exposure pathways, endpoints for evaluation, and ecological toxicity information, while Step 2 provides the Screening-level Exposure Estimates and Risk Calculations. The screening-level ecological risk assessment (SLERA) for the 3&4 EHP area is included as part of this CCRA Report and is presented herein (Appendix C).

Steps 3 through 8 comprise the baseline ecological risk assessment (BERA), though an informal "Step 3a", in which the list of COPCs identified in Step 2 is refined prior to development of the BERA problem formulation, is often included as part of the SLERA. The steps of the BERA are:

- Step 3: BERA Problem Formulation;
- Step 4: Study Design and Data Quality Objectives;
- Step 5: Field Verification of Sampling Design;
- Step 6: Site Investigation;
- Step 7: Risk Characterization; and
- Step 8: Risk Management.

Because of the presence of aquatic features (ephemeral surface water) at the 3&4 EHP area, a (DEQ) Level 3 Ecological Risk Assessment was required. The results of the SLERA indicated a Level 4 Assessment was not necessary.

The Ecological Risk Assessment is presented in Appendix C.

5.3 STATISTICAL DATA ANALYSIS

A comprehensive statistical analysis of the data was conducted to support the risk assessment process and is presented in Appendix D. The statistical data analysis includes exploratory data analyses and estimations of EPCs of the surface water and soil data to support both the HHRA and the ERA. Statistical analyses were performed using R statistical software (R Core Team, 2016), which allows for flexibility in exploratory data analysis and in methods for calculating EPCs beyond the abilities of the USEPA's ProUCL software. Note that the data set contains a significant amount of data that were below the analytical laboratory detection limits ("non-detects"), which are referred to as "censored" data in statistical terms.

6.0 HUMAN HEALTH DATA EVALUATION, DATA GROUPING, AND CHEMICALS OF POTENTIAL CONCERN

Within this section, the process used to evaluate and group the analytical data for both quantitative and qualitative evaluation in this CCRA is presented. This section also discusses the process used to identify additional COIs/COPCs beyond the constituents listed in Appendices III and IV of the Federal CCR Rule.

6.1 EVALUATION OF SITE DATA

Data were available from the following media.

- Surface water (various ephemeral locations) – In accordance with Talen's Groundwater Monitoring Plan (Talen, 2015), surface water samples are analyzed for dissolved metals. As such, limited total recoverable metal surface water samples were available (please see Section 10.1 for a detailed discussion).
- Soil (associated with various seeps/spills)
- Groundwater

Potential sources of contaminants were identified and discussed in Section 4.1.

The available surface water, soil, and groundwater data for the 3&4 EHP area were reviewed, as well as the list of Appendices III and IV CCR constituents, and used in the identification of Exposure Units (EUs) and additional COIs/COPCs.

6.1.1 Description of an Exposure Unit

A location at which a human receptor may be exposed to a medium, such as soil, surface water or groundwater, is referred to as an Exposure Unit (EU). EUs were defined using the following information:

- 3&4 EHP area Land Use (see Figure 6);
- Identified Potential Receptors (see Figure 8);
- Potential Chemical Releases and Migration from the Facility Wastewater System; and
- Available Site Data.

The identified EUs for the 3&4 EHP area are presented in Table 6-1 below. The soil EUs (EU 9 thru EU 14) are depicted in Figure 9. The surface water EU (EU 15) is depicted in Figure 5. Note that the EU for groundwater (EU 16) was not defined for the HHRA as forward risk calculations were not prepared for human groundwater exposure. Rather, EU 16 was established for livestock consumption from the various stock wells (see Figure 4). As directed by DEQ (2017a), Cleanup Criteria for groundwater were developed for use in the Remedy Evaluation.

Table 6-1 3&4 EHP Exposure Units

Exposure Unit	Description
EU 9	Drain Pit 3 Seep Area
EU 10	Drain Pit 5 Former Spill Area
EU 11	West Seep Area
EU 12	Main Dam Seep Area
EU 13	Saddle Dam Seep Area
EU 14	SFCC Seep Area
EU 15	Various Surface Water Locations (Ephemeral)
EU 16	Livestock Water (Stock Wells)

6.1.2 Description of Data used in the HHRA, by Exposure Unit

Data for each of the EUs are described in Table 6-2 below. The human health risk assessment data are summarized in Tables B-2.1 through B-2.8 (RAGS Part D Table 2) located in Appendix B. In addition, tables of the data used in the risk assessment are presented in Appendix E.

Table 6-2 Data Description by Exposure Unit

Exposure Unit	Media	Sample Locations	Sampling Dates	Description
EU 9 Drain Pit 3 Seep Area	Soil	DP3-1 through DP3-16 (Figures 9 & 10; Table E-3, Appendix E)	May 2018	Soil samples collected from various intervals(1) from surface to 7 feet below ground surface (bgs)
EU 10 Drain Pit 5 Former Spill/Seep Area	Soil	DP5-1 through DP5-9 (Figures 9 & 11; Table E-4, Appendix E)	May 2018	Soil samples collected from various intervals(1) from surface to 7 feet bgs
EU 11 West Seep Area	Soil	WS-1 through WS-6 (Figures 9 & 12; Table E-5, Appendix E)	May 2018	Soil samples collected from various intervals(1) from surface to 2 feet bgs
EU 12 Main Dam Seep Area	Soil	MD-1 through MD-11 (Figures 9 & 13; Table E-6, Appendix E)	May 2018	Soil samples collected from various intervals(1) from surface to 7 feet bgs
EU 13 Saddle Dam Seep Area	Soil	SD-1 through SD-20 (Figures 9 & 14; Table E-7, Appendix E)	May 2018	Soil samples collected from various intervals(1) from surface to 7 feet bgs
EU 14 South Fork Cow Creek Seep Area	Soil	SFCC-1 through SFCC-25 (Figures 9 & 15; Table E-8, Appendix E)	May 2018	Soil samples collected from various intervals(1) from surface to 7 feet bgs
EU 15 Surface Water (various ephemeral sites)	Surface Water	CC2 through CC7, CCCG, NP Cut, PSW-4 Overflow Pond, SFCC Diversion, SFCC1 through SFCC3, SP-14, West Seep Diversion (Figure 5; Table E-1, Appendix E	3/5/2014 to 10/11/2017	Various ephemeral surface water sites(2,3) located at the 3&4 EHP AOC Area (see Figure 5).
EU 16 Private Stock Wells (livestock watering)	Livestock Water	PSW-1 through PSW-3, PSW-4A, PSW-6, PSW-7, PSW-9, PSW-11 (Figure 4, Table E-2, Appendix E)	5/28/2014 to 10/27/2017	Private Stock Wells located at the 3&4 EHP AOC Area (see Figure 4)

Notes:

bgs below ground surface

(1) Soil sampling depth intervals were selected based on the type of spill or seep. If a spill or seep was more likely to infiltrate into deeper soil, then soil samples were collected from deeper soil intervals. If a spill or seep was largely overland flow with less likelihood to infiltrate into deeper soils, then soil samples were collected from shallower soil intervals.

(2) Some of the surface water sites in Cow Creek (i.e., CC2, CCCG, CC5, CC6, and CC7) have not been sampled due to the ephemeral nature of Cow Creek and the lack of water present during sampling events. These sites have hence been used as observation points and not surface water sampling sites.

(3) In accordance with Talen's Groundwater Monitoring Plan (Talen, 2015), surface water samples are analyzed for dissolved metals. As such, limited total recoverable metal surface water samples were available (please see Section 10.1 for a detailed discussion).

Surface water data were limited to the three most recent years (i.e., 2014 to 2017) because surface water at the 3&4 EHP Area is ephemeral. As such, COI/COPC concentrations in the ephemeral surface water are expected to be dynamic and changing frequently. Please note that fewer analytes were measured in surface water at the 3&4 EHP Area than at the Plant Site or SOEP/STEP area because the surface water is ephemeral.

Soil data were limited to those collected during the May 2018 soil investigation of the historic seep/spill release (Hydrometrics, 2018b).

Groundwater data were not directly used as forward calculations of human health risks associated with groundwater were not performed. Rather, per DEQ's request, human health and ecological (livestock) Cleanup Criteria for groundwater were developed (see Section 12.4.1) for use in the Remedy Evaluation. Ecological (livestock) Cleanup Criteria for groundwater were limited to one scenario (livestock consumption via groundwater pumping into stock tanks).

6.1.3 Reference/Background Samples

Surface Water

Surface water reference/background sample data were very limited for comparison to the ephemeral surface water data at the 3&4 EHP area. Although not directly applicable because East Fork Armells Creek does not flow through the 3&4 EHP area, the following surface water reference/background data were included for comparison.

- Upstream surface water background data were available to estimate the Background Screening Levels (BSLs) for the Colstrip SES (Neptune, 2017). The surface water BSLs were based on three East Fork Armells Creek upstream sampling locations (AR-12, SW-55, and SW-75) over a temporal span from February 1981 to October 2014. The sampling locations for the estimation of surface water BSLs were limited to three locations because the statistical approach required a sufficient number of unfiltered (i.e., total) samples be available over time from each location, as well as continuous creek flow. In addition, spring water monitoring sites were not included in the calculation of the surface water BSLs; rather, spring water monitoring sites were included in the groundwater BSL calculations (Neptune, 2017). Please refer to the BSL document (Neptune, 2017) for a detailed discussion of the surface water BSLs. Surface water sampling locations AR-12 and SW-55 are located immediately upstream of the Plant Site AOC boundary, while SW-75 is located approximately 8 miles upstream of the boundary. Because of the lack of background surface water data for the 3&4 EHP area, the surface water BSLs based on East Fork Armells Creek were included as background/reference data in the data screening to identify potential COPCs (Table B-2.1, Appendix B).

Soil

Soil background data, referred to as the Background Threshold Values (BTVs) for Inorganics in Montana Soils, were available from DEQ (Project Report Background Concentrations of Inorganic Constituents in Montana Surface Soils, 2013). The BTVs for Inorganics in Montana Soils were included as background/reference data in Tables B-2.3 through B-2.8 (Appendix B).

Groundwater

Groundwater background data were available from the 2017 BSL Report for the Colstrip SES (Neptune, 2017). BSLs were not available for all of the Federal CCR Rule constituents (e.g., Radium 226/228). The

BSLs developed in 2016 (Neptune) were revised in 2017 (Neptune) to incorporate comments following DEQ's review. At the time the BSLs were revised, the Plant Site CCRA Report (Canty, 2018a) had already been prepared and submitted to DEQ. As such, in a meeting held on June 29, 2017 between DEQ and Talen, it was discussed and agreed that the 2016 BSLs would apply to the Plant Site CCRA and the 2017 BSLs would apply to the SOEP/STEP and 3&4 EHP CCRA Reports (DEQ, 2017d). Table 6-3 below compares the 2016 and 2017 BSLs for the groundwater COIs/COCs.

Table 6-3 BSL Comparison for the 3&4 EHP Groundwater COIs/COCs

COI/COC	Alluvium (mg/L)		Spoils (mg/L)		Clinkers (mg/L)		Coal-Related (mg/L)		SubMcKay (mg/L)	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
CCR Appendix III Constituents										
Boron	1.6	1.6	0.818	0.8	4	3.9	1.1	1	1.3	1.2
Sulfate	2,600	2,530	3,045	2,841	3,160	3,140	2,061	2,150	2,200	2,190
CCR Appendix IV Constituents										
Cobalt	0.02	0.02	0.0232	0.0232	NA	NA	0.0034	0.0034	0.00066	0.00066
Lithium	0.092	0.12	0.09	0.09	NA	NA	0.072	0.072	NA	NA
Selenium	0.009	0.009	0.0023	0.0024	0.01	0.01	0.005	0.01	0.005	0.005
Other Potential 3&4 EHP Constituents										
Manganese	0.6	0.61	2.79	2.48	0.67	0.67	0.54	0.48	0.27	0.26

Notes:
2016 Neptune, 2016. BSLs prepared in 2016 and used for the Plant Site CCRA (DEQ, 2017e).
2017 Neptune, 2017. Revised BSLs and used for the 3&4 EHP CCRA (DEQ, 2017e).
CCR Coal Combustion Residuals
COC Chemical of Concern
COI Constituent of Interest
mg/L milligrams per liter
NA Not analyzed

Overall, the changes to the revised 2017 BSLs in comparison to the 2016 BSLs for the COIs/COCs were minimal (if at all). For example, the 2016 and 2017 BSLs for cobalt were the same in all the hydrostratigraphic units. For several COIs/COCs the changes to the revised 2017 BSLs were very minor with the difference similar to merely significant digits (e.g., boron in the clinkers layer of 4 mg/L and 3.9 mg/L). The largest BSL change was for selenium in the coal-related layer of 0.005 mg/L (2016) to 0.01 mg/L (2017).

6.2 DATA GROUPING

Data were grouped by each EU (e.g., EU 9 data were grouped separately from EU 10 data) and sample medium (e.g., surface water data were grouped separately from soil data). Data for soil were not grouped by depth interval because screening of the soil data (RAGS Part D Tables 2.3 thru 2.8 located in Appendix B) did not retain any human health COCs in soil.

6.3 IDENTIFYING HUMAN HEALTH COPCS

Data were screened using the flow charts and screening process described by the DEQ (2017b). Data were also screened against background concentrations described in Section 6.1.3. Specifically, data for each media were screened as summarized in Table 6-3 below to further identify COIs/COPCs, beyond the list of COIs identified thru screening of the Federal CCR Rule Appendices III and IV (see Report Table 3, located in the Tables section).

Table 6-3 Summary of Screening Values and Human Health COPCs

Media	Screening Values	Identified Human Health COPCs/ Rationale
Soil EU 9 EU 10 EU 11 EU 12 EU 13 EU 14	• USEPA RSLs (USEPA, 2018a) for Residential and Industrial Soil (following the DEQ screening process in which non-carcinogenic RSLs are reduced by a factor of 10 to account for cumulative health effects, [DEQ, 2017b]). • BTVs for Inorganics in Montana Soils (DEQ, 2013) • Calculated Preliminary Remediation Goals (PRGs) for radium (USDOE RAIS, 2018). • USEPA Remediation Goals for Radionuclides (PRGs; USEPA, 2000).	**Arsenic**: > BTV **Barium**: >1/10th USEPA Residential RSL, >BTV **Cobalt**: >1/10th USEPA Residential RSL, >BTV **Lithium**: >1/10th USEPA Residential RSL **Manganese**: >1/10th USEPA Residential RSL, >BTV **Radium**: >Residential PRG **None of the human health COPCs were retained as COCs** (see Section 10.4)*
Surface Water EU 15	• DEQ-7, which include USEPA MCLs (DEQ, 2017c). • If no DEQ-7 (DEQ, 2017c), USEPA RSL for Tapwater was used. • BSLs (Neptune, 2017).	**Boron**: > USEPA RSL for Tapwater **Boron was not retained as a human health COC** (see Section 10.1).
Livestock Water EU16	• DEQ-7, which include USEPA MCLs (DEQ, 2017c). • If no DEQ-7 (DEQ, 2017c), USEPA Regional Screening Level (RSL) for Tapwater was used. • See Ecological Risk Assessment (App C).	**No human health COPCs were identified and, therefore, no COCs were retained. No ecological COCs were retained (see Appendix C).**

Notes:

* For arsenic, barium, cobalt, lithium, and manganese, 95 percent Upper Confidence Limits (95 UCL) concentrations in soil were estimated. Because the 95 UCLs (i.e., Exposure Point Concentrations) were below screening levels for these five soil COPCs, human health risk calculations were unnecessary and they were not retained as COCs. Radium soil concentrations were below USEPA Remediation Goals and appeared consistent with background. Please see Section 10.4 for a detailed discussion.

Data screening is presented in Tables B-2.1 through B-2.8 (RAGS Part D Table 2) located in Appendix B. The COPC column flags chemicals with either a "Y" for yes or an "N" for no. The chemicals flagged with an "N" were excluded from further human health risk evaluation.

If a surface water chemical was flagged with a "Y" in the COPC column, it was identified as a COPC. Following DEQ guidance (2017b), surface water COPCs are evaluated qualitatively in the risk evaluation through comparison to DEQ-7 standards (or USEPA MCLs and USEPA RSLs, if DEQ-7 standards were not available). Please note that fewer analytes were measured in surface water at the 3&4 EHP Area than at the Plant Site or SOEP/STEP area because the surface water is ephemeral. Boron was initially identified as a surface water COPC (Appendix B, Table B-2.1). Based on an additional evaluation, boron was not retained as a surface water human health COC (see Section 10.1).

If soil chemicals were flagged with a "Y" in the COPC column, they were identified as COPCs. Following DEQ guidance (2017b), soil data were compared to appropriate screening levels to identify potential human health COPCs. Six human health COPCs were initially identified in soil (Appendix B, Table B-2.3

thru B-2.8). Based on additional evaluation, no COPCs were retained as soil human health COC (see Section 10.4).

6.3.1 Groundwater COIs/COPCs

The groundwater COIs/COPCs for the 3&4 EHP area, in general, were identified through a screening process of the constituents listed in Appendices III and IV of the Federal CCR Rule (USEPA, 2017) as previously presented in Section 3.0. The identified 3&4 EHP area groundwater COIs/COPCs are presented in Table 3, located in the Tables section.

In addition, groundwater data for several stock wells (EU16; see Figure 4) that are presently used for livestock watering were reviewed for identification of COIs/COPCs (see Table 6-3 in the previous section).

6.3.2 Uncertainties in Identifying Human Health COIs/COPCs

The following uncertainties in the identification of human health COIs/COPCs are as follows.

- The AOC (DEQ/PPLM, 2012) regulated substances include sulfate, boron, selenium, potassium, sodium, magnesium, TDS, and salinity. Human health toxicity values have not been established for sulfate, potassium, sodium, magnesium, TDS, and salinity. These constituents were not identified as human health COPCs. (Sulfate was identified as an ecological [livestock] COPC). Uncertainty exists regarding the potential toxicity of constituents without human toxicity values to human receptors.
- Similarly, human health toxicity values have not been established for the following Appendix III and Appendix IV CCR Rule constituents: calcium, sulfate, TDS, and pH. These constituents were not identified as human health COPCs. Uncertainty exists regarding the human health concerns potentially posed by these constituents.
- True background samples and sampling locations for surface water were not available because East Fork Armells Creek does not flow through the 3&4 EHP area and ephemeral background surface water data were not available. Uncertainty exists regarding the comparison of surface water data to “background” concentrations.
- The CCR well data was used in the screening process to assist in the identification of COIs/COPCs. However, the CCR well data are total recoverable concentrations as required by the Federal CCR Rule. Total recoverable concentrations are not directly comparable to groundwater standards and screening levels that are based on dissolved concentrations. Uncertainty exists in using total recoverable concentrations as proxy dissolved concentrations. Specifically, because the CCR well data are generally total recoverable concentrations, comparisons of CCR well data to screening levels based on dissolved concentrations results in a conservative bias. Please note, however, screening levels for radium are based on total concentrations and, therefore, a conservative bias does not apply to radium.

6.4 IDENTIFYING LEACHING COI/COPCS

Soil chemicals were also compared to the USEPA Soil Screening Levels (SSLs) for groundwater protection (USEPA, 2018a) that were modified following the DEQ Soil Screening Process (DEQ, 2016) to identify leaching COPCs. If soil chemicals were flagged with a "Y" in the Leaching COPC column, they were identified as a potential leaching COPC. Several chemicals (arsenic, barium, boron, cobalt, and manganese) were identified as possible leaching COPCs (see Tables B-2.3 thru B-2.8 in Appendix B). However, after a more detailed data comparison, these chemicals were not retained as leaching COCs. Please see Section 10.2 for additional information regarding leaching COIs/COPCs.

6.4.1 Vertical Connectivity between Hydrostratigraphic Units

As described previously in Section 2.3.2, various lithological units are present at the 3&4 EHP area. These are, in ascending order; sub-McKay, McKay Coal, Rosebud-McKay Interburden (interburden), Rosebud Coal, clinker (laterally equivalent to the Rosebud Coal), spoil, overburden, and alluvium. Only the alluvium, McKay Coal, and sub-McKay could accurately be referred to as aquifers. Intervals that are not aquifers in the 3&4 EHP area include the overburden due to its limited extent and general absence of producible quantities of water; spoil because it is generally absent except near the edges of the area; the Rosebud Coal/clinker because it is discontinuous and drained; and the interburden due to its limited water content.

The interburden which underlies the former Rosebud Coal is comprised of very fined grained rock (e.g. siltstone and claystone or shale). These sedimentary rocks exhibit low permeability. Even though the permeability of the interval is low, the vertical permeability is even lower due to anisotropy caused during deposition and subsequent loading. Flatter elongated grains tend to lay flat creating preferential flow in the horizontal direction. Loading from increased sediment deposition further exaggerates this condition. The permeability of the units is very low which inhibits horizontal flow and renders vertical flow negligible. The interburden contains very little water and would not sustain production as an aquifer.

Hydraulic conductivity of the spoil is similar both vertically and horizontally. Water entering the spoil will move vertically to the level of saturation (water table, if present). Groundwater then flows in the spoil in a downgradient direction. Minimal water moves vertically into the interburden. As mentioned previously, the amount of water in the interburden is not sufficient to act as an aquifer and it is not uncommon for the interburden to be dry. These conditions cause water that enters the spoil to stay in that interval with horizontal flow.

The McKay Coal is a cleated coal. Cleats are basically joints that form perpendicular to the bedding planes. Groundwater flows through the cleats with hydraulic conductivity being determined by the size and interconnectivity of the cleats. In general, the hydraulic conductivity of the coal in the 3&4 EHP area is between about 1 and 3 feet per day. Strata immediately below the coal is typically comprised of clayey siltstone to mudstone. The fine-grained nature of the sedimentary rock below the McKay Coal limits vertical flow of groundwater to the deeper sub-McKay strata.

7.0 HUMAN HEALTH EXPOSURE ASSESSMENT

The Human Health Exposure Assessment provides a description of the potential human health exposure to wastewater-related chemicals at the 3&4 EHP area, including exposure routes, magnitudes, frequencies, and durations for both current and future Facility use. The exposure assessment identifies the reasonable maximum exposures (RME) that are reasonably expected to occur at the uncontrolled access areas of the Plant Site area (USEPA, 1989).

7.1 EXPOSURE POINTS AND EXPOSURE POINT CONCENTRATIONS

Present and anticipated future land use and human activity patterns are used to identify potential exposure points for human receptors and contaminated media. The exposure point is the location at which a human receptor might contact contaminated media. Potential exposures to identified COPCs are assumed to occur uniformly throughout each exposure point (or EU).

The concentration of a COPC at an exposure point is referred to as an Exposure Point Concentration (EPC). The description of the approach used to statistically assess the data and calculate EPCs is included in Appendix D. In some instances, the calculation of EPCs was used to assess if a COPC was retained as a COC.

One human health COPC, boron, was initially identified in surface water, but was not retained as a COC during further evaluation, see Section 10.1 and Appendix B, Table B-2.1.

Six human health COPCs were initially identified in soil (arsenic, barium, cobalt, lithium, manganese, and radium); but, were not retained as COCs during further evaluation. For arsenic, barium, cobalt, lithium, and manganese, 95 percent Upper Confidence Limit (95 UCL) concentrations in soil were estimated. Because the 95 UCL concentrations (i.e., EPCs) were below screening levels for these five soil COPCs, human health risk calculations were unnecessary and they were not retained as COCs. Radium soil concentrations were below USEPA Remediation Goals and appeared consistent with background. Please see Section 10.4 for a detailed discussion, as well as Appendix B, Tables B-2.3 to B-2.8 and Appendix D.

7.2 CHEMICAL INTAKE ESTIMATES

Calculations of the non-carcinogenic average daily dose (ADD) and the carcinogenic lifetime average daily doses (LADD) for the HHRA are performed for complete exposure pathways using the equations available from the USEPA (1989, 2004, and 2009a). Numerous updates have been made to the intake equations and exposure parameters since the initial publication of USEPA's Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual, Part A (RAGS; USEPA, 1989), including, but not limited to, those listed below:

- Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment, 2004);
- Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part F, Supplemental Guidance for Inhalation Risk Assessment, 2009a);
- Exposure Factors Handbook: 2011 Edition (USEPA, 2011); and

- Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors (USEPA, 2014).

In addition, DEQ has specific guidance for risk assessments available on their web-page (DEQ, 2017b).

The EPCs, scenario-specific assumptions, and intake parameters are used to estimate exposures (or intakes), which are expressed in terms of milligrams of chemical per kilogram body weight per day (mg/kg-day). Intakes are calculated for the RME, which is the highest exposure reasonably expected to occur.

The USEPA (1989) has developed equations for calculating human intake doses for non-carcinogenic and carcinogenic COCs.

No human health soil COCs were retained and consequently the calculation of intake doses was unnecessary.

8.0 TOXICITY ASSESSMENT

The Toxicity Assessment follows the USEPA recommended approach (USEPA, 1989, et al). The toxicity assessment identifies, as necessary, the Reference Doses (RfDs), the Reference Concentrations (RfCs), cancer Slope Factors (SFs), and Inhalation Unit Risks (IURs) that will be used to evaluate adverse non-cancer health effects and cancer risks. Toxicity values for COPCs follows the hierarchy of human health toxicity (USEPA, 2003), which is also recommended by DEQ (2017b), as described below with the highest priority source listed first.

1. USEPA's Integrated Risk Information System (IRIS). IRIS is an on-line database that presents the latest EPA-approved RfDs, RfCs, SFs, and IURs as well as uncertainty and modifying factors (USEPA, 2018b). The toxicity values available from IRIS are recognized as USEPA-wide consensus information.
2. USEPA's Provisional Peer Reviewed Toxicity Values (PPRTV) Database. Similar to IRIS, the PPRTVs are USEPA-approved RfDs, RfCs, SFs, and IURs that have undergone peer review and recognized as consensus information (USEPA, 2013).
3. Other USEPA and non-USEPA toxicity values, such as:
    a. USEPA's Health Effects Assessment Summary Tables (HEAST; USEPA, 1997a);
    b. USEPA's National Center for Environmental Assessment (NCEA) papers, which are chemical-specific references (USEPA, 2013); and
    c. California Environmental Protection Agency's (Cal/EPA) Office of Environmental Health Hazard Assessment (OEHHA) on-line database, which contains approved, peer-reviewed toxicity criteria (Cal/EPA OEHHA, 2017).

No human health soil COCs were retained and consequently a toxicity assessment was unnecessary.

9.0 RISK CHARACTERIZATION

For complete exposure pathways, risk characterization is performed to combine the exposure and toxicity assessments to produce quantitative estimates of potential non-cancer health hazards associated with the identified COCs.

No human health soil COCs were retained and consequently risk characterization was unnecessary.

9.1 RISK ASSESSMENT GUIDANCE FOR SUPERFUND PART D TABLES

Following DEQ Guidance (DEQ, 2017b), the table format from RAGS Part D are used for the risk assessment tables. This CCRA includes RAGS Part D Tables 1 through 10, which are included in Appendix B.

10.0 COMPARISON OF DATA TO MEDIUM-SPECIFIC STANDARDS AND SCREENING LEVELS

10.1 COMPARISON OF SURFACE WATER COPC CONCENTRATIONS TO DEQ-7 STANDARDS

DEQ guidance (2017b) indicates surface water concentrations of COPCs should be compared to DEQ-7 standards, rather than being quantitatively evaluated in the HHRA. DEQ-7 (2017c) indicates that for metals in surface water, total recoverable concentrations (excluding aluminum) should be used in the comparison. However, in accordance with Talen's Groundwater Monitoring Plan (Talen, 2015), surface water samples were analyzed for dissolved metals. As such, a very limited number of total recoverable samples were available in the surface water dataset. Specifically, 5 samples for total recoverable concentrations of the metals were available that largely had non-detectable concentrations. Conversely, 42 samples analyzed for dissolved metal concentrations were available in the surface water dataset. Hence, both the total and dissolved metal concentration data were screened (see Appendix B, Table B-2.1). The dissolved metal concentrations were determined to be more representative of the surface water at the 3&4 EHP because of their spatial variability and number of samples. An insufficient number of total recoverable metals data were available to perform statistical analysis. As such, dissolved metal concentrations underwent statistical analyses (see Appendix D).

In summary, surface water concentrations, including both total recoverable metals and dissolved metals, from various ephemeral locations at the 3&4 EHP area were compared to DEQ-7 standards, or other appropriate screening levels if DEQ-7 standards were not available, and are presented in Table B-2.1 (RAGS Table 2) in Appendix B. Following DEQ guidance (DEQ, 2017c) and the AOC (DEQ/PPLM, 2012), if a DEQ-7 Human Health Standard (HHS) was not available, the USEPA MCL, or the USEPA Tapwater RSL (Traditional RSL Tables) was used.

Five of 42 dissolved boron concentrations ranging from 4.7 mg/L to 8.9 mg/L measured in the West Seep Diversion, which is an ephemeral surface water body at the 3&4 EHP area, were greater than the USEPA Tapwater RSL for boron of 4.0 mg/L. Neither a DEQ-7 Standard, nor a USEPA MCL have been established for boron. In addition, a background surface water boron value for the 3&4 EHP area has not been established due to the ephemeral nature of the surface water. However, East Fork Armells Creek surface water BSLs (Neptune, 2017) were available that were used in the Plant Site and SOEP/STEP CCRAs (Canty, 2018a, 2018b). Although not directly applicable because East Fork Armells Creek does not flow through the 3&4 EHP area, these surface water BSLs were used for comparison purposes in the data screening to identify potential COPCs because of the lack of background surface water data for the 3&4 EHP area (see also Table B-2.1 in Appendix B). Water quality in ephemeral drainages, such as Cow Creek and South Fork Cow Creek, would be expected to have more variable water quality than perennial streams. As such, the use of East Fork Armells Creek BSLs was a conservative approach.

Boron was not retained as a human health COC for the following reasons.

- Surface water is present at the 3&4 EHP area solely in various ephemeral locations and for only limited times during the year typically associated with spring run-off and storm events.
- The ephemeral surface water at the 3&4 EHP area is not used as a potable water source.

- The only human health screening level available for comparison is the USEPA RSL for Tapwater for boron, which is based on default USEPA human health exposure parameters, including an exposure frequency of 350 days/year (USEPA, 2018a). Ephemeral surface water at the 3&4 EHP is present for only limited times in any given year making the USEPA Tapwater RSL inappropriate for comparison.
- The estimated 95% Upper Confidence Limit on the mean (95 UCL) for boron of 2.50 mg/L (see Appendix D) was below the USEPA Tapwater RSL of 4 mg/L.

Boron was also not retained as a surface water ecological COC (see Appendix C).

10.2 COMPARISON OF LEACHING COPCS TO USEPA SSLS FOR GROUNDWATER PROTECTION

Soil concentrations of chemicals measured in the soil samples collected from the six seep/spill areas at the 3&4 EHP area were compared to the USEPA Soil Screening Levels (SSLs) for Protection of Groundwater as modified per the DEQ Soil Screening Process (DEQ, 2016), as well as to their respective BTVs for Montana Soils (DEQ, 2013), as appropriate. Five soil chemicals were identified as leaching COPCs (see Tables B-2.3 through B-2.8 in Appendix B), as follows:

- Arsenic
  - EU 9 (Drain Pit 3 Seep)
  - EU 10 (Drain Pit 5 Spill/Seep)
  - EU 12 (Main Dam Seep)
  - EU 14 (South Fork Cow Creek Seep)
- Barium
  - EU 9 (Drain Pit 3 Seep)
  - EU 10 (Drain Pit 5 Spill/Seep)
  - EU 12 (Main Dam Seep)
  - EU 13 (Saddle Dam Seep)
  - EU 14 (South Fork Cow Creek Seep)
- Boron
  - EU 13 (Saddle Dam Seep)
- Cobalt
  - EU 10 (Drain Pit 5 Spill/Seep)
  - EU 12 (Main Dam Seep)
  - EU 14 (South Fork Cow Creek Seep)
- Manganese
  - EU 12 (Main Dam Seep)
  - EU 14 (South Fork Cow Creek Seep)

Table 10-1 below presents of summary of the identified leaching COPCs and appropriate screening levels.

Table 10-1 Comparison of Leaching COPC Concentrations
Sample Dates: 5/8/2018 to 5/10/2018

COPC	Minimum Value (mg/kg)	Average (mg/kg)	Maximum Value (mg/kg)	Concentrations in Other Soil Intervals at Max Conc. Location (mg/kg)	BTV (mg/kg)	USEPA SSL for Groundwater Protection (mg/kg)
EU 9 – Drain Pit 3 Seep						
As	<2 DP3-5, 6-7 ft	7.1	47 DP3-2, 1-2 ft	18 DP3-2, 3-4 ft	22.5	2.9
Ba	35 DP3-5, 6-7 ft	190	787 DP3-3, 1-2 ft	153 DP3-3, 3-4 ft	429	421
EU 10 – Drain Pit 5 Spill/Seep						
As	4 DP5-1, 4-5 ft DP5-2, 0-6 in	9	47 DP5-3, 6-7 ft	8 DP5-3, 0-6 in 10 DP5-3, 1-2 ft	22.5	2.9
Ba	43 DP5-1, 4-5 ft	314	2,530 DP5-2, 0-6 in	183 DP5-2, 1-2 ft	429	421
Co	5 several	7	15 DP5-3, 6-7 ft	7 DP5-3, 0-6 in 7 DP5-3, 1-2 ft	10.0	2.7
EU 12 – Main Dam Seep						
As	2 several	7	38 MD-3, 6-7 ft	5 MD-3, 0-6 in MD-3, 1-2 ft	22.5	2.9
Ba	20 MD-1, 1-2 ft	231	931 M-7, 0-6 in	165 MD-7, 1-2 ft 443 MD-7, 6-7 ft	429	421
Co	5 several	7	11 MD-7, 6-7 ft	5 MD-7, 0-6 in 7 MD-7, 1-2 ft	10.0	2.7
Mn	98 MD-2, 7-8 ft	427	2,410 MD-4, 6-7 ft	195 MD-4, 0-6 in 263 MD-4, 1-2 ft	880	280
EU 13 – Saddle Dam Seep						
Ba	28 SD-20, 1-2 ft	154	510 SD-14, 0-6 in	174 SD-14, 1-2 ft	429	421
B	<5 SD-14, 1-2 ft	27	155 SD-2, 1-2 ft	29 SD-2, 6-7 ft	NA	130
EU 14 – South Fork Cow Creek Seep						
As	5 SFCC-7, 1-2 ft	9.5	24 SFCC-18, 4-5 ft	7 SFCC-18, 0-6 in 6 SFCC-18, 1-2 ft	22.5	2.9
Ba	70 SFCC-21, 0-6 in	167	583 SFCC-24, 1-2 ft	248 SFCC-24, 0-6 in	429	421
Co	5 SFCC-7, 1-2 ft	7.2	13 SFCC-18, 4-5 ft	7 SFCC-18, 0-6 in 6 SFCC-18, 1-2 ft	10.0	2.7
Mn	230 SFCC-1, 0-6 in	390	944 SFCC-24, 1-2 ft	519 SFCC-24, 0-6 in	880	280

Notes:
BTV Background Threshold Value for Inorganics in Montana Soil (DEQ, 2013)
mg/kg milligrams per kilogram
NA Not Available
SSL USEPA Soil Screening Level modified following the DEQ Soil Screening Process (DEQ, 2016)

To further evaluate the leaching COPCs, Synthetic Precipitation Leaching Procedure (SPLP) analyses were performed on select soil samples and site-specific standards were calculated following DEQ guidance (NJDEP, 2013; DEQ, 2016). DEQ guidance refers to the New Jersey Department of Environmental Protection (NJDEP) guidance for evaluating soil leaching through SPLP analysis (NJDEP, 2013). The NJDEP guidance includes an Excel© worksheet that calculates Site-Specific Impact to Groundwater Soil Remediation Standards and determines if individual samples pass or fail the Standard. The worksheet calculation outputs are presented in Appendix H. The SPLP analytical results are presented in Appendix I.

Various leaching COPC soil samples were selected for SPLP analysis. Generally, as a worst-case evaluation, samples with the highest COPC concentrations were selected, which (generally) exceeded their respective BTVs. In addition, samples were selected at locations for which deeper soil interval samples were not available to assess if leaching was occurring. Lastly, it should be noted that SPLP results for at least three samples were necessary to run the NJDEP SPLP worksheet calculations. In some cases, samples with concentrations that did not exceed either their respective SSL or BTV underwent SPLP analysis to ensure that three samples were run per the NJDEP SPLP worksheet requirements.

Default values in the NJDEP SPLP worksheet that are specific to conditions and regulations for the state of New Jersey were changed to values applicable to the state of Montana. The following default values were changed in the SPLP worksheet:

- Dilution Attenuation Factor (DAF) was changed from 20 (unitless) to 10 per DEQ guidance (2017b).
- The New Jersey health-based Groundwater Quality Criteria were changed to DEQ-7 standards (where available) per the request of DEQ (2019e). If a DEQ-7 standard was not available, the USEPA MCL or Secondary Maximum Contaminant Level (SMCL), or the USEPA Tapwater RSL was used. Specifically, the following standards were used:
    - Arsenic DEQ-7: 10 µg/L
    - Barium DEQ-7: 1,000 µg/L
    - Boron Tapwater RSL: 4,000 µg/L (DEQ-7 was not available)
    - Cobalt Tapwater RSL: 6 µg/L (DEQ-7 was not available)
    - Manganese USEPA SMCL: 50 µg/L (DEQ-7: was not available)

Tables 10-2 through 10-6 below present summaries of the SPLP analyses and site-specific standards.

Table 10-2 Summary of SPLP Analyses for Leaching COPCs - Arsenic

Leaching COPC	Sample Field ID	Soil Interval	Soil Concentration (mg/kg)	SPLP Result* (mg/L)	DAF	Leachate Criterion µg/L	Site-Specific* Standard (mg/kg)	Pass or Fail
Arsenic								
EU 9	DP3-2	0-6 in	18	0.007	10	0.1	47	Pass
Drain Pit 3	DP3-2	1-2 ft	47	0.004				Pass
Seep	DP3-2	3-4 ft	18	0.001				Pass
EU 10	DP5-3	1-2 ft	10	0.005	10	0.1	47	Pass
Drain Pit 5	DP5-3	6-7 ft	47	0.002				Pass
Spill/Seep	DP5-4	1-2 ft	10	0.006				Pass
EU 12	MD-3	6-7 ft	38	<0.001	10	0.1	38	Pass
Main Dam	MD-7	6-7 ft	14	0.002				Pass
Seep	MD-11	1-2 ft	18	0.006				Pass
EU 14	SFCC-6	1-2 ft	17	<0.001	10	0.1	24	Pass
SFCC	SFCC-18	4-5 ft	24	<0.001				Pass
Seep	SFCC-24	1-2 ft	21	0.005				Pass

Notes:

DAF	Dilution Attenuation Factor – DEQ default (DEQ, 2017b).
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
Site-Specific*	Site-Specific Impact to Groundwater Soil Remediation Standard based on NJDEP guidance (2013) per DEQ guidance (2016). In all cases the Site-Specific Standard is the maximum measured soil concentration for each leaching COPC.
SPLP Result*	The SPLP Result is the leachate concentration measured in the SPLP method. For non-detects, the laboratory reporting limit was conservatively used as a proxy value.
µg/L	micrograms per liter

Table 10-3 Summary of SPLP Analyses for Leaching COPCs - Barium

Leaching COPC	Sample Field ID	Soil Interval	Soil Concentration (mg/kg)	SPLP Result* (mg/L)	DAF	Leachate Criterion µg/L	Site-Specific* Standard (mg/kg)	Pass or Fail
Barium								
EU 9 Drain Pit 3 Seep	DP3-3	1-2 ft	787	<0.05	10	1.00E+04	787	Pass
	DP3-5	0-6 in	489	<0.05				Pass
	DP3-5	1-2 ft	498	0.06				Pass
EU 10 Drain Pit 5 Spill/Seep	DP5-1	0-6 in	772	0.10	10	1.00E+04	2,530	Pass
	DP5-2	0-6 in	2,530	0.19				Pass
	DP5-3	6-7 ft	449	0.05				Pass
EU 12 Main Dam Seep	MD-6	0-6 in	634	0.09	10	1.00E+04	931	Pass
	MD-6 (dup)	0-6 in	543	0.10				Pass
	MD-7	0-6 in	931	0.11				Pass
	MD-7	6-7 ft	443	<0.05				Pass
	MD-11	1-2 ft	537	0.15				Pass
EU 13 Saddle Dam Seep	SD-2	1-2 ft	314	<0.05	10	1.00E+04	510	Pass
	SD-3	0-6 in	429	0.07				Pass
	SD-14	0-6 in	510	0.12				Pass
EU 14 SFCC Seep	SFCC-7	0-6 in	519	0.64	10	1.00E+04	583	Pass
	SFCC-11	0-6 in	394	0.22				Pass
	SFCC-24	1-2 ft	583	0.10				Pass

Notes:

DAF	Dilution Attenuation Factor – DEQ default (DEQ, 2017b).
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
Site-Specific*	Site-Specific Impact to Groundwater Soil Remediation Standard based on NJDEP guidance (2013) per DEQ guidance (2016). In all cases the Site-Specific Standard is the maximum measured soil concentration for each leaching COPC.
SPLP Result*	The SPLP Result is the leachate concentration measured in the SPLP method. For non-detects, the laboratory reporting limit was conservatively used as a proxy value.
µg/L	micrograms per liter

Table 10-4 Summary of SPLP Analyses for Leaching COPCs - Boron

Leaching COPC	Sample Field ID	Soil Interval	Soil Concentration (mg/kg)	SPLP Result* (mg/L)	DAF	Leachate Criterion µg/L	Site-Specific* Standard (mg/kg)	Pass or Fail
Boron								
EU 13 Saddle Dam Seep	SD-2	1-2 ft	155	5.81	10	4.00E+04	155	Pass
	SD-3	0-6 in	125	3.76				Pass
	SD-7	0-6 in	70	2.51				Pass

Notes:

DAF	Dilution Attenuation Factor – DEQ default (DEQ, 2017b).
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
Site-Specific*	Site-Specific Impact to Groundwater Soil Remediation Standard based on NJDEP guidance (2013) per DEQ guidance (2016). In all cases the Site-Specific Standard is the maximum measured soil concentration for each leaching COPC.
SPLP Result*	The SPLP Result is the leachate concentration measured in the SPLP method. For non-detects, the laboratory reporting limit was conservatively used as a proxy value.
µg/L	micrograms per liter

Table 10-5 Summary of SPLP Analyses for Leaching COPCs - Cobalt

Leaching COPC	Sample Field ID	Soil Interval	Soil Concentration (mg/kg)	SPLP Result* (mg/L)	DAF	Leachate Criterion µg/L	Site-Specific* Standard (mg/kg)	Pass or Fail
Cobalt								
EU 10	DP5-1	4-5 ft	10	<0.005				Pass
Drain Pit 5	DP5-3	6-7 ft	15	<0.005	10	60	15	Pass
Spill/Seep	DP5-5	3-4 ft	8	<0.005				Pass
EU 12	MD-7	6-7 ft	11	<0.005				Pass
Main Dam	MD-9	3.3-4.3 ft	10	<0.005	10	60	11	Pass
Seep	MD-11	1-2 ft	10	<0.005				Pass
EU 14	SFCC-18	4-5 ft	13	<0.005				Pass
SFCC	SFCC-20	3-4 ft	10	<0.005	10	60	13	Pass
Seep	SFCC-24	1-2 ft	10	<0.005				Pass

Notes:

DAF	Dilution Attenuation Factor – DEQ default (DEQ, 2017b).
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
Site-Specific*	Site-Specific Impact to Groundwater Soil Remediation Standard based on NJDEP guidance (2013) per DEQ guidance (2016). In all cases the Site-Specific Standard is the maximum measured soil concentration for each leaching COPC.
SPLP Result*	The SPLP Result is the leachate concentration measured in the SPLP method. For non-detects, the laboratory reporting limit was conservatively used as a proxy value.
µg/L	micrograms per liter

Table 10-6 Summary of SPLP Analyses for Leaching COPCs - Manganese

Leaching COPC	Sample Field ID	Soil Interval	Soil Concentration (mg/kg)	SPLP Result* (mg/L)	DAF	Leachate Criterion µg/L	Site-Specific* Standard (mg/kg)	Pass or Fail
Manganese								
EU 12	MD-4	6-7 ft	2,410	<0.001				Pass
Main Dam	MD-6	3.3-4.3 ft	822	0.014	10	500	2,410	Pass
Seep	MD-11	1-2 ft	1,790	0.160				Pass
EU 14	SFCC-10	1-2 ft	619	0.023				Pass
SFCC	SFCC-20	3-4 ft	890	0.116	10	500	944	Pass
Seep	SFCC-24	1-2 ft	944	0.182				Pass

Notes:

DAF	Dilution Attenuation Factor – DEQ default (DEQ, 2017b).
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
Site-Specific*	Site-Specific Impact to Groundwater Soil Remediation Standard based on NJDEP guidance (2013) per DEQ guidance (2016). In all cases the Site-Specific Standard is the maximum measured soil concentration for each leaching COPC.
SPLP Result*	The SPLP Result is the leachate concentration measured in the SPLP method. For non-detects, the laboratory reporting limit was conservatively used as a proxy value.
µg/L	micrograms per liter

The SPLP results for arsenic, barium, boron, cobalt, and manganese soil concentrations measured in the various seep/spill area samples all resulted in "Pass" results indicating that the concentrations of the leaching COPCs in soil do not pose a leaching concern. The program defaulted to the maximum measured soil concentrations for the five leaching COPCs as the Site-Specific Impact to Groundwater Soil Remediation Standard. In other words, the actual site-specific soil concentrations for these five leaching COPCs that could potentially result in leaching to groundwater are estimated to be values greater than the measured soil concentrations.

In summary, the SPLP results indicated that the leaching COPCs do not pose a leaching to groundwater concern and were not retained as leaching COCs.

10.3 COMPARISON OF GROUNDWATER COPC CONCENTRATIONS TO DEQ-7 STANDARDS

DEQ guidance (2017b) indicates groundwater concentrations should be compared to DEQ-7 Standards, rather than being quantitatively evaluated in the human health risk assessment. DEQ-7 (2017c) indicates that for metals, dissolved concentrations (i.e., the portion that passes through a 0.45 micron filter) should be used in the comparison. In addition, DEQ-7 (2017c) indicates that for alpha emitters, beta emitters and gamma emitters (such as radium), unfiltered samples should be used for comparison.

As previously described in Section 5.0, forward calculations of human health risks associated with groundwater were not conducted. Instead, the DEQ requested that human health Cleanup Criteria for groundwater be developed, which involved the comparison of source concentrations (i.e., 3&4 EHP area pond data) and groundwater data from the CCR wells to DEQ-7 Standards, as well as other screening levels (see Table 3 located behind the Tables tab). Human health-based Cleanup Criteria for groundwater are discussed in Section 12.5.1.

10.4 EVALUATION OF SOIL CONCENTRATIONS

The following six metals were initially flagged as soil COPCs during the screening process because each had a limited number of samples in one or more of the historic seep/spill release areas that exceeded their respective screening levels (see Appendix B Tables B-2.3 through B-2.8).

- Arsenic
- Barium
- Cobalt
- Lithium
- Manganese
- Radium

Subsequently, the above six metals were further evaluated as presented within the sections below. None were retained as soil COCs.

10.4.1 Arsenic

A summary of the arsenic soil concentrations exceeding screening levels is presented in Table 10-7 below.

Table 10-7 Summary of Arsenic Soil Concentrations Exceeding Screening Levels

Soil COPC/ EU	Sample Field ID	Soil Interval	Soil Conc. (mg/kg)	Frequency of Samples Exceeding Screening Levels	RSLs - Carcinogens Residential Industrial (mg/kg)	RSLs - Non-carcinogens Residential Industrial 1/10th (mg/kg)	BTV for Inorganics in Montana Soils (mg/kg)	95 UCLs Surface Soil (0-2 ft)/ All Soil Depths (mg/Kg)
EU 9 Drain Pit 3 Seep	DP3-2	1-2 ft	47	1/39	NA	NA	22.5	12.4/ 11.1
EU 10 Drain Pit 5 Spill/Seep	DP5-3	6-7 ft	47	1/23				8.3/ 13.5
EU 12 Main Dam Seep	MD-3	6-7 ft	38	1/33				7.9/ 10.0
EU 14 SFCC Seep	SFCC-18	4-5 ft	24	1/58				10.2/ 10.6

Notes:

BTV	Background Threshold Value for Inorganic Constituents in Montana Soils (DEQ, 2013).
COPC	Chemical of Potential Concern
EU	Exposure Unit
In	inches
ft	feet
mg/kg	milligrams per kilogram
NA	Not Available/ Not Applicable
RSL	United States Environmental Protection Agency Regional Screening Level. For non-carcinogens, 1/10th of the RSL is used for screening following DEQ guidance (2017b).
UCL	Upper Confidence Level on the mean (see Appendix D).

As shown in Table 10-7 above, the number of soil samples containing arsenic concentrations above the applicable screening level (i.e., the arsenic BTV in Montana soils of 22.5 mg/kg) was very limited. In addition, the arsenic 95 UCLs were below the applicable screening level. Based on this further evaluation, arsenic was not retained as a human health soil COC.

10.4.2 Barium

A summary of the barium soil concentrations exceeding screening levels is presented in Table 10-8 below.

Table 10-8 Summary of Barium Soil Concentrations Exceeding Screening Levels

Soil COPC/ EU	Sample Field ID	Soil Interval	Soil Conc. (mg/kg)	Frequency of Samples Exceeding Screening Levels	RSLs - Carcinogens Residential Industrial (mg/kg)	RSLs - Non-carcinogens Residential Industrial 1/10th (mg/kg)	BTV for Inorganics in Montana Soils (mg/kg)	95 UCLs Surface Soil (0-2 ft)/ All Soil Depths (mg/kg)
EU 10 Drain Pit 5 Spill/Seep	DP5-2	0-6 in	2,530	1/23	NA	1,500 22,000	429	707/ 525

Notes:

BTV	Background Threshold Value for Inorganic Constituents in Montana Soils (DEQ, 2013).
COPC	Chemical of Potential Concern
EU	Exposure Unit
Ft	feet
in	inches
mg/kg	milligrams per kilogram
NA	Not Available/ Not Applicable
RSL	United States Environmental Protection Agency Regional Screening Level. For non-carcinogens, 1/10th of the RSL is used for screening following DEQ guidance (2017b).
UCL	Upper Confidence Level on the mean (see Appendix D).

As shown in Table 10-8 above, only one soil sample contained a barium concentration above the applicable screening levels (i.e., 1/10th the residential RSL of 1,500 mg/kg and the BTV in Montana soils of 429 mg/kg). None of the soil concentrations exceeded the residential RSL for barium of 15,000 mg/kg. In addition, none of the soil concentrations exceeded either 1/10th the industrial RSL of 22,000 mg/kg or the industrial RSL of 220,000 mg/kg. Lastly, the barium 95 UCLs were below the applicable screening levels. Based on this further evaluation, barium was not retained as a human health soil COC.

10.4.3 Cobalt

A summary of the cobalt soil concentrations exceeding screening levels is presented in Table 10-9 below.

Table 10-9 Summary of Cobalt Soil Concentrations Exceeding Screening Levels

Soil COPC/ EU	Sample Field ID	Soil Interval	Soil Conc. (mg/kg)	Frequency of Samples Exceeding Screening Levels	RSLs - Carcinogens Residential Industrial (mg/kg)	RSLs - Non-carcinogens Residential Industrial 1/10th (mg/kg)	BTV for Inorganics in Montana Soils (mg/kg)	95 UCLs Surface Soil (0-2 ft)/ All Soil Depths (mg/kg)
EU 10 Drain Pit 5 Spill/Seep	DP5-3	6-7 ft	15	1/23	NA	2.3 35	10.0	6.8/ 7.7
EU 12 Main Dam Seep	MD-7	6-7 ft	11	1/33				7.0/ 7.2
EU 14 SFCC Seep	SFCC-18	4-5 ft	13	1/58				7.4/ 7.5

Notes:

BTV	Background Threshold Value for Inorganic Constituents in Montana Soils (DEQ, 2013).
COPC	Chemical of Potential Concern
EU	Exposure Unit
In	inches
ft	feet
mg/kg	milligrams per kilogram
NA	Not Available/ Not Applicable
RSL	United States Environmental Protection Agency Regional Screening Level. For non-carcinogens, 1/10th of the RSL is used for screening following DEQ guidance (2017b).
UCL	Upper Confidence Level on the mean (see Appendix D).

As shown in Table 10-9 above, the number of soil samples containing cobalt concentrations above the applicable screening levels (i.e., 1/10th the residential RSL of 2.3 mg/kg and the BTV for Montana soils of 10 mg/kg) was very limited. None of the soil concentrations exceeded the residential RSL of 23 mg/kg. In addition, none of the soil concentrations exceeded either 1/10th the industrial RSL of 35 mg/kg or the industrial RSL of 350 mg/kg. Lastly, the cobalt 95 UCLs were below the applicable screening levels. Based on this further evaluation, cobalt was not retained as a human health soil COC.

10.4.4 Lithium

A summary of the lithium soil concentrations exceeding screening levels is presented in Table 10-10 below.

Table 10-10 Summary of Lithium Soil Concentrations Exceeding Screening Levels

Soil COPC/ EU	Sample Field ID	Soil Interval	Soil Conc. (mg/kg)	Frequency of Samples Exceeding Screening Levels	RSLs - Carcinogens Residential Industrial (mg/kg)	RSLs - Non-carcinogens Residential Industrial 1/10th (mg/kg)	BTV for Inorganics in Montana Soils (mg/kg)	95 UCLs Surface Soil (0-2 ft)/ All Soil Depths (mg/kg)
EU 9 Drain Pit 3 Seep	DP3-5	12-24 in	17	1/39	NA	16 230	NA	11.8/ 11.5
EU 10 Drain Pit 5 Spill/Seep	DP5-1	12-24 in	22	2/23				15.2/ 13.9
	DP5-2	0-6 in	29					
EU 12 Main Dam Seep	MD-7	0-6 in	18	1/33				11.6/ 11.2
EU 13 Saddle Dam Seep	SD-1	0-6 in	19	10/48				15.1/ 14.9
		12-24 in	18					
	SD-2	12-24 in	30					
		6-7 ft	18					
	SD-3	0-6 in	23					
	SD-4	0-6 in	17					
		12-24 in	17					
	SD-5 & Dup	0-6 in	17					
		0-6 in	18					
	SD-7	0-6 in	19					
	SD-12	6-7 ft	18					
EU 14 SFCC Seep	SFCC-1	12-24 in	19	6/58				13.5/ 13.3
	SFCC-2	12-24 in	23					
		6-7 ft	21					
	SFCC-13	0-6 in	17					
	SFCC-20	0-6 in	18					
	SFCC-21	0-6 in	20					

Notes:

BTV	Background Threshold Value for Inorganic Constituents in Montana Soils (DEQ, 2013).
COPC	Chemical of Potential Concern
EU	Exposure Unit
In	inches
ft	feet
mg/kg	milligrams per kilogram
NA	Not Available/ Not Applicable
RSL	United States Environmental Protection Agency Regional Screening Level. For non-carcinogens, 1/10th of the RSL is used for screening following DEQ guidance (2017b).
UCL	Upper Confidence Level on the mean (see Appendix D).

As shown in Table 10-10 above, several soil samples contained lithium concentrations slightly above the 1/10th residential RSL of 16 mg/kg, but none exceeded the residential RSL of 160 mg/kg. None of the soil concentrations exceeded either 1/10th the industrial RSL of 230 mg/kg or the industrial RSL of 2,300 mg/kg. A BTV in Montana soils is not available for lithium. The USGS (1984) indicates that based on 1,258 soil samples, the average lithium concentration for the United States is 24 mg/kg with a range of < 5 to 140 mg/kg. Two lithium soil concentrations were slightly greater than the average lithium concentration for the United States. Lastly, the lithium 95 UCLs were below 1/10th the residential RSL. Based on this further evaluation, lithium was not retained as a human health soil COC.

10.4.5 Manganese

A summary of the manganese soil concentrations exceeding screening levels is presented in Table 10-11 below.

Table 10-11 Summary of Manganese Soil Concentrations Exceeding Screening Levels

Soil COPC/ EU	Sample Field ID	Soil Interval	Soil Conc. (mg/kg)	Frequency of Samples Exceeding Screening Levels	RSLs - Carcinogens Residential Industrial (mg/kg)	RSLs - Non-carcinogens Residential Industrial 1/10th (mg/kg)	BTV for Inorganics in Montana Soils (mg/kg)	95 UCLs Surface Soil (0-2 ft)/ All Soil Depths (mg/kg)
EU 12 Main Dam Seep	MD-4	6-7 ft	2,410	2/33	NA	180 2,600	880	568/ 637.3
	MD-11	12-24 in	1,790					
EU 14 SFCC Seep	SFCC-20	3-4 ft	890	2/58				421.9/ 433.3
	SFCC-24	12-24 in	944					

Notes:

BTV	Background Threshold Value for Inorganic Constituents in Montana Soils (DEQ, 2013).
COPC	Chemical of Potential Concern
EU	Exposure Unit
In	inches
ft	feet
mg/kg	milligrams per kilogram
NA	Not Available/ Not Applicable
RSL	United States Environmental Protection Agency Regional Screening Level. For non-carcinogens, 1/10th of the RSL is used for screening following DEQ guidance (2017b).
UCL	Upper Confidence Level on the mean (see Appendix D).

As shown in Table 10-11 above, the number of soil samples containing manganese concentrations above the applicable screening levels (i.e., 1/10th the residential RSL of 180 mg/kg and the BTV for Montana soils of 880 mg/kg) were very limited. None of the soil concentrations exceeded either 1/10th the industrial RSL of 2,600 mg/kg or the industrial RSL of 26,000 mg/kg. Lastly, the manganese 95 UCLs were below the applicable screening levels. Based on this further evaluation, manganese was not retained as a human health soil COC.

10.4.6 Radium

DEQ guidance (2017b) indicates soil concentrations for carcinogens should be compared to the USEPA Residential and Industrial Soil RSLs (USEPA, 2018a). However, the USEPA has not established RSLs for Radium 226/228. Rather, the USEPA provides a Preliminary Remediation Goal (PRG) calculator to develop screening levels for radionuclides (USEPA, 2018a). Similarly, the United States Department of Energy (USDOE) Risk Assessment Information System (RAIS) provides the USEPA's PRG calculator, but includes additional receptor scenarios (e.g., excavation worker scenario; USDOE RAIS, 2018). The default exposure frequencies used in the PRG calculator were modified to the Montana-specific exposure frequencies provided by DEQ (2017b). The PRG calculation worksheets are presented in Appendix G.

BTVs for Inorganics in Montana Soils (DEQ/Hydrometrics, 2013) have not been established for Radium 226/228. In addition, USEPA protection of groundwater Soil Screening Levels (SSLs) have not been established for Radium 226/228 (USEPA, 2018a).

To evaluate Radium 226/228 soil concentrations measured at the historic seep/spill release sites at the 3&4 EHP areas, the screening levels, remediation goals, and background concentrations presented in Table 10-12 below were identified.

Table 10-12 Radium Comparison Concentrations

	Radium 226	Radium 228
Soil Investigation Areas*/Exposure Units	**Range of Measured Concentrations (pCi/g)**	
Drain Pit 3 (EU 9)	0.1 – 0.8	0.3 – 1.2
Drain Pit 5 (EU 10)	0.3 – 0.6	0.3 – 1.6
West Seep (EU 11)	0.4 – 0.7	0.5 – 0.9
Main Dam (EU 12)	0.2 – 0.7	0.4 – 1.1
Saddle Dam (EU 13)	0.2 -0.8	0.3 – 1.9
South Fork Cow Creek (EU 14)	0.3 – 0.9	0.4 - 3.4
USDOE RAIS PRG Calculator (USDOE RAIS, 2018)	**Screening Level* (pCi/g)**	
Residential PRG	0.124	0.147
Outdoor Worker PRG	4.73	10.0
Excavation PRG	71.2	38.6
USEPA Remediation Goals for Radioactively Contaminated CERCLA Sites (USEPA, 2000)	**Remediation Goal (pCi/g)**	
Surface Soil (0 to 15 cm, 6 inches)	5	5
Subsurface Soil (below 15 cm, 6 inches)	15	15
Background	**Background Concentrations (pCi/g)**	
Surface Soil (0 to 6 cm; Myrick et al., 1981 as cited in ATSDR, 1990)	1.1	NA
Surface and Subsurface Soil (ATSDR, 1990)	1.0	1.0

Notes:

Areas*	Soil Investigation Areas of historic seep/spill releases (Hydrometrics, 2018b)
ATSDR	Agency for Toxic Substances and Disease Registry
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
EU	Exposure Unit
pCi/g	picoCuries per gram
PRG	Preliminary Remediation Goal
Screening Level*	Site-specific screening levels were calculated using Montana-specific exposure frequencies (DEQ, 2017b). Use of site-specific exposure frequencies in the PRG model requires the use of a site-specific area correction factor from the model's default of an "infinite slab". Per USEPA guidance (2018a), an aerial extent of 1,000 m^2 was used, which the USEPA considers comparable to that of an infinite slab.
USDOE RAIS	United States Department of Energy Risk Assessment Information System

Based on the identified background concentrations, the calculated USDOE RAIS Residential PRGs appear to be concentrations less than background concentrations. Radium 226/228 soil concentrations measured at the various historic seep/spill release sites at the 3&4 EHP area did not exceed the outdoor worker PRGs, the excavation worker PRGs, or the USEPA Remediation Goals for surface and subsurface soil (see Appendix B Tables B-2.3 through B-2.8). Radium 226/228 soil concentrations measured at the various historic seep/spill release sites at the 3&4 EHP area appear to be consistent with background concentrations and were not retained as human health soil COCs.

10.5 EVALUATION OF RADIUM CONCENTRATIONS IN GROUNDWATER

Radium was initially flagged as a groundwater COPC during the screening process for COIs (see Sections 1.3 and 3.0 and Table 3). Radium concentrations in two sets of water samples from the 3&4 EHP process ponds (Hydrometrics, 2017b, 2018b) were well below the DEQ-7 standard of 5 picoCuries per liter (pCi/L) for total recoverable concentrations of Radium 226/228 (the MCL is also 5 pCi/L for

Radium 226/228). However, various groundwater samples collected from wells located around the process pond perimeter and used as part of the Federal CCR Rule compliance monitoring had concentrations of Radium 226/228 that were above the DEQ-7 standard. Subsequently, radium was further evaluated as presented within this section.

Previous Evaluation and Approval of Radiological Content in Ash

In 2004, an Environmental Assessment was prepared and approved by the DEQ for the use of Units 1&2 and 3&4 bottom ash for on- and off-site construction projects (DEQ, 2004). The Environmental Assessment concluded the following.

- The measured radiological content of bottom ash (alpha, beta, and gamma radiological characteristics) was within the range of naturally occurring soil and geological materials in the Colstrip area. Please note that radium was only one contributor to the total radiological content.
- No land-use controls over development, population, waste disposal, or special safeguards or monitoring were required for radiation impacts associated with the bottom ash.

Radium 226/228 Concentrations in 3&4 EHP Process Pond Water

Following the COI/COPC identification approach described in Section 3.0, 3&4 EHP process pond water Radium 226/228 concentrations were assumed to be the source, as a worst-case scenario, of Radium 226/228 in groundwater surrounding the ponds. Pond water samples were collected from the 3&4 EHP process ponds in April 2017 and May 2018 using a depth-integrated sampling technique to allow for the collection of samples representative of the water column (Hydrometrics, 2017b, 2018b). Samples were collected from the following 3&4 EHP process ponds and analyzed for Radium 226/228.

- Units 3&4 EHP – C Cell
- Units 3&4 EHP – F Cell
- Units 3&4 EHP New Clearwell (B Cell)
- Units 3&4 EHP – G Cell
- Units 3&4 EHP – H Cell

Radium 226/228 concentrations measured in the 3&4 EHP process ponds were well below the DEQ-7/MCL of 5 pCi/L (a summary, which includes CCR Well data, is presented in Table 10-13 below).

Table 10-13 Summary of Radium Concentrations at the 3&4 EHP Pond Water and Groundwater

	Radium 226+228 Maximum (pCi/L)	Radium 226+228* Average (pCi/L)
Units 3&4 EHP – C Cell	1.2	1.2
Units 3&4 EHP – New Clearwell (B Cell)	1.7	1.2
Units 3&4 EHP – G Cell	1.6	1.2
Units 3&4 EHP – H Cell	0.98	0.6
CCR Wells		
3&4 EHP Area CCR Wells	**13.8**	3.39
3&4 EHP CCR Background Wells	**8**	2.23
Groundwater Standards		
DEQ-7/MCL	5.0	5.0

Notes:

BOLD	Measured concentration exceeds relevant screening level or standard.
DEQ-7	Montana Department of Environmental Quality Water Quality Standards
MCL	Maximum Contaminant Level
pCi/L	picoCuries per liter
*	If Ra 226 or Ra 228 concentration was less than zero (negative value), then zero used as a proxy value.

Radium 226/228 Concentrations in the Colstrip SES Pond Solids (Fly Ash) and Paste

Because the radium concentrations measured in the 3&4 EHP process pond water were well below the DEQ-7/MCL of 5 pCi/L, radium concentrations measured in groundwater were not sourced from the process ponds. In June 2018, a meeting was held with DEQ to discuss the radium in groundwater issue (DEQ, 2018b). DEQ subsequently requested that samples be collected and analyzed for radium from the following locations to evaluate the source of the radium.

1. Pond solids (fly ash) from the bottom of the Colstrip SES ponds (i.e., Plant Site ponds, STEP ponds and the 3&4 EHP ponds).
2. Paste from the Paste Plants.

On July 10, 2018, samples of the pond solids and plant paste were collected at the Facility, as described below.

Pond Solids

Five-part composite samples were collected from various Plant Site ponds, STEP ponds, and the 3&4 EHP cells as follows.

Plant Site

- Units 1&2 Bottom Ash Pond – bottom ash is directed to this pond and solids are periodically removed and placed in the 3&4 EHP. Solids drop out quickly and the water decants to the adjacent clearwell. Samples were collected at five locations from below the water level at the edge of the water.
- Units 1&2 B Pond – B Pond receives return water from the STEP Clearwell. Flyash is only placed in B Cell during upset conditions. As such, flyash is limited to the NW corner of the pond. Samples were collected from below the water at five locations.

- Units 3&4 Bottom Ash Pond – Bottom ash is directed to one of two active cells. Solids quickly drop out and the water is decanted to adjacent cells. Bottom ash is periodically removed and placed in the 3&4 EHP. Samples were collected with a shovel by digging at five locations around the perimeter of the active cell.

STEP

- STEP A Cell – A Cell no longer receives scrubber slurry. Samples were collected from near the surface at five locations by excavating into the flyash at five locations.
- STEP E Cell – E Cell is the current active cell. Samples were collected by digging to below the water level at five locations along the edge of the ponded area.

3&4 EHP

- 3&4 EHP C Cell – samples were collected by digging holes below the water level and collecting a saturated sample.
- 3&4 EHP B Cell (New Clearwell) – B Cell has been used as a clearwell. However, a minor amount of paste was directed to B Cell during upset conditions. This flyash is limited to near the discharge point in the northeast corner of the cell. Samples were collected from five locations from below the water level.
- 3&4 EHP G Cell – A small amount of water is present in the southwest corner of G Cell. This water is contained within a small berm and is periodically pumped into C Cell. Solids samples were collected from below water along the inside of the north side of the berm

Solids collected at each of the areas were mixed thoroughly, placed in sample containers, and shipped to Energy Laboratories for analysis.

Paste Plants

Solids in scrubber slurry are concentrated to develop a “paste” for placement in the disposal cells. Samples can be collected in the Paste Plant from a hopper (referred to as Gob Hopper) after the paste has been formed and prior to pumping it to the destination cell. Samples were collected as “grab” samples from the hopper, placed in sample bottles, and delivered to Energy Laboratories for analysis from the two paste plants:

- 3&4 EHP Paste Plant; and
- STEP Paste Plant.

Radium concentrations measured in the pond solids and paste were all very low (< 1.0 picoCuries per gram [pCi/g]). The background radium concentration in United States soils is approximately 2 pCi/g for Radium 226 + 228 (ATSDR, 1990), indicating that the measured concentrations in the fly ash and paste are well below background. A summary of the radium concentrations in solids is presented in Table 10-14 below.

Table 10-14 Summary of Radium Concentrations in the Colstrip SES Pond Solids and Paste

	Radium 226	Radium 228
Pond Solids (Fly Ash)	**pCi/g**	
Plant Site – Units 1&2 Bottom Ash Pond	0.2	0.2
Plant Site – Units 1&2 B Pond	0.09	0.2
Plant Site – Units 3&4 Bottom Ash Pond	0.2	0.2
STEP A Cell	0.2	0.2
STEP E Cell	0.2	0.4
3&4 EHP B Cell	0.2	0.3
3&4 EHP C Cell	0.2	0.4
3&4 EHP G Cell	0.2	0.4
Paste		
STEP Paste Plant	0.2	0.4
3&4 EHP Paste Plant	0.2	0.02
Soil Standards		
USDOE RAIS PRG Calculator (DOE RAIS, 2018)	**Screening Level* (pCi/g)**	
Outdoor Worker PRG	4.73	10.0
Excavation PRG	71.2	38.6
USEPA Remediation Goals for Radioactively Contaminated CERCLA Sites (USEPA, 2000)	**Remediation Goal (pCi/g)**	
Surface Soil (0 to 15 cm, 6 inches)	5	5
Subsurface Soil (below 15 cm, 6 inches)	15	15
Background	**Background Concentrations (pCi/g)**	
Surface Soil (0 to 6 cm; Myrick et al., 1981 as cited in ATSDR, 1990)	1.1	NA
Surface and Subsurface Soil (ATSDR, 1990)	1.0	1.0

Notes:
Pond Solids and Plant Paste Samples were collected in July 2018.

BOLD	Measured concentration exceeds relevant screening level or standard.
ATSDR	Agency for Toxic Substances and Disease Registry
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
pCi/g	picoCuries per gram
PRG	Preliminary Remediation Goal
Residential PRG	Calculated Residential PRGs were concentrations below background – Ra 226 (0.124 pCi/g), Ra 228 (0.147 pCi/g)
Screening Level*	Site-specific soil screening levels were calculated using Montana-specific exposure frequencies (DEQ, 2017b). Use of site-specific exposure frequencies in the PRG model requires the use of a site-specific area correction factor from the model's default of an "infinite slab". Per USEPA guidance (2018a), an aerial extent of 1,000 m^2 was used, which the USEPA considers comparable to that of an infinite slab.
USDOE RAIS	United States Department of Energy Risk Assessment Information System

Summary

Based on further evaluation of Radium 226/228 groundwater concentrations presented within this section, Radium 226/228 groundwater concentrations at the 3&4 EHP area appear to be consistent with background concentrations. Consequently, Radium 226/228 was not retained as a groundwater COI; however, it will remain a COPC while additional radium groundwater data are collected. The further evaluation of Radium 226/228 groundwater concentrations is summarized below.

- A previous Environmental Assessment concluded the radiological content of the Units 1&2 and 3&4 bottom ash was within background for soil and geological materials in the Colstrip area.
- Following the COI/COPC identification approach, the Radium 226/228 concentrations in the process ponds were assumed to be the source, as a worst-case scenario, of Radium 226/228 in groundwater surrounding the 3&4 EHP process ponds. The scrubber slurry that is piped to the ponds is well mixed having been subjected to physical mixing, pressure, and temperature changes. Furthermore, the process water is continuously circulated through the scrubber process under these conditions (i.e., process water is circulated from the scrubbers through the pipelines to the ponds and then back to the scrubbers). Hence, the process water through its exposure to these conditions numerous times results in a "worst-case" condition. Radium 226/228 concentrations in the scrubber slurry, and in free water derived from the scrubber slurry, are expected to be uniform and representative of maximum possible levels.
    - The Radium 226/228 concentrations measured in the 3&4 EHP ponds (assumed worst-case concentrations) were generally less than groundwater concentrations and well below the DEQ-7 standard. Therefore, pond water does not appear to be the source of radium concentrations measured in groundwater.
    - Radium 226/228 concentrations measured in ponds solid samples (i.e., fly ash) collected from the 3&4 EHP B, C, and G cells, as well as 3&4 Paste Plant samples, were very low at concentrations below appropriate soil screening levels and well below background. Therefore, the fly ash does not appear to be the source of radium measured in groundwater.
    - The assumption that Radium 226/228 concentrations in groundwater were attributable to seepage from the process ponds was not validated.

In conclusion, there is no evidence to substantiate that the source of radium in groundwater is the process pond water, bottom ash, fly ash, or plant paste. Radium concentrations in groundwater at the 3&4 EHP area appear to be consistent with background levels and radium was not identified as a groundwater COI. However, because a radium groundwater BSL was not available for comparison, as a conservative measure radium will remain a COPC while additional groundwater data are collected. Radium will continue to be monitored and evaluated in groundwater. In addition, radium will be monitored in groundwater as part of the Federal CCR Rule compliance monitoring and continue to be reviewed under the AOC.

10.6 EVALUATION OF THALLIUM CONCENTRATIONS IN GROUNDWATER

Thallium was not flagged as a groundwater COPC during the screening process for COIs (see Sections 1.3 and 3.0 and Table 3). However, because a limited number of groundwater samples collected from wells located around the process pond perimeter and used as part of the Federal CCR Rule compliance monitoring had total thallium concentrations greater than the MCL, thallium concentrations in groundwater were further evaluated as presented within this section.

Groundwater samples collected under the Federal CCR Rule compliance monitoring were largely analyzed for total thallium concentrations in accordance with that Rule. However, note that a limited number of samples were analyzed for dissolved thallium concentrations, which did not exceed the DEQ-7 Standard for thallium.

As shown in Table 3 in the "Rationale for Selection or Deletion" column, thallium data were evaluated as follows.

- The available pond water data (a total concentration) was greater than the MCL. Dissolved concentrations in the pond water data were not available for comparison to the DEQ-7 Standard.
- The available pond water data point (0.0048 mg/L [total thallium]) was determined to be approximately equal to the BSLs, which ranged from 0.0003 to 0.05 mg/L (dissolved concentrations; Neptune, 2017). Dissolved concentrations in the pond water data were not available for comparison to the BSLs, which resulted in a conservative bias in determining the representativeness of background.
- The dissolved thallium concentrations available in the CCR Well data set were less than the DEQ-7 Standard.
- The dissolved thallium concentrations available in the CCR Well data set, which ranged from 0.0005 to 0.0018 mg/L were roughly equal to the BSLs, which ranged from 0.0003 to 0.05 mg/L. Note that the dissolved thallium concentrations in the CCR Well data set were less than the pond water total thallium concentration.
- The comparison of the pond water and CCR well data indicated thallium was not migrating from the 3&4 EHP to groundwater.

Thallium BSLs

A review of the data used to develop the thallium BSLs was necessary to appropriately compare 3&4 EHP pond water and CCR Well data to background data. Thallium BSLs were developed by hydrostratigraphic unit (Neptune, 2017). A summary of the data used to develop the thallium BSLs is presented in Table 10-15 below. The following should be noted:

- Thallium BSLs were based on dissolved concentrations;
- Thallium was not present in the background data at detectable concentrations; however, the laboratory detection limits were wide-ranging;
- The laboratory detection limits ranged approximately four orders of magnitude from 0.0003 mg/L to 1.0 mg/L; and
- Statistical approaches were used to establish thallium BSLs based on the laboratory detection limits, but generally were established near the lower end of the detection limit ranges.

Table 10-15 Summary of Data* Used to Develop the Thallium BSLs and Comparison to 3&4 EHP Data

Hydrostratigraphic Unit	Alluvium	Spoils	Clinker	Coal-Related	SubMcKay
Number of Wells	11	12	0	12	6
Number of Samples	30	23	0	38	42
Detection Frequency (%)	0	0	NA	0	0
Range of Detection Limits (dissolved)	0.0003 – 0.5	0.001-0.05	NA	0.0002 – 0.005	0.0003 – 1.0
BSL (mg/L) (dissolved)	0.0005	0.05	NA	0.0003	0.0003
3&4 EHP Pond Water (total)	0.0048				
CCR Well Data (dissolved)	0.0005* – 0.0018				
MCL (mg/L) (total)	0.002				
DEQ-7 (mg/L) – (dissolved)	0.002				

Notes:
BSL Baseline Screening Level
Data* Final Report on Updated Background Screening Levels (Neptune, 2017)
DEQ-7 Montana Department of Environmental Quality Groundwater Standard
MCL Maximum Contaminant Limit
mg/L milligrams per liter
NA Not Available/Not Applicable
0.0005* Note that the laboratory detection limit in the CCR Well data of 0.0005 mg/L is greater than the lowest detection limit in the data used to develop the BSL, as well as lower than the Coal- Related and SubMcKay BSLs.

The pond water data and the CCR Well data were both determined to be equal to the thallium BSLs for the following two main reasons.

- Neither the pond water, nor the CCR well data, exceeded the upper end of the thallium BSL range of 0.05 mg/L.
- The thallium BSLs were based on laboratory detection limits that ranged widely, rather than on actual detectable background concentrations.

Summary of Findings for Thallium under the Federal CCR Rule

Groundwater data are collected and evaluated at the 3&4 EHP in accordance with the Federal CCR Rule and those data were used to supplement the selection of groundwater COPCs/COIs under the AOC (see Section 1.3). Statistical procedures were used to evaluate the groundwater data collected under the Federal CCR Rule. All statistical procedures used in evaluating groundwater monitoring data collected at the Colstrip SES CCR units were conducted in a manner consistent with the USEPA's Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance (USEPA, 2009b) and the

Electric Power Research Institute's (EPRI) Groundwater Monitoring Guidance for the Coal Combustion Residuals Rule (EPRI, 2015).

Statistical methods conducted in 2018 included those used to establish background concentrations of Appendix IV constituents [§257.93(d)]; establish a groundwater protection standard for each detected Appendix IV constituent [§257.95(h)]; and determine whether a statistically significant level (SSL) occurred, as evidenced by concentrations of Appendix IV constituents in excess of groundwater protection standards (GWPS) at downgradient wells [§257.95(g)]. Confidence intervals around the mean are the method of statistical choice when compliance point data are to be compared to a fixed standard (e.g., a MCL or GWPS), as confidence intervals contain the true average of the underlying population and account for variability in sample data (USEPA 2009b). A 95% (α = 5% significance) lower confidence limit (LCL) on the mean was calculated for each well/constituent pair for normally distributed Appendix IV constituents with ample detection frequency for statistical evaluation. Non-parametric statistics, typically a confidence interval on the median, were used to establish levels of Appendix IV constituents that were not normally distributed and that could not be normalized, (potentially due to high fractions of non-detectable concentrations). A desired confidence level of 95% (α = 5% significance) was targeted; but actual confidence intervals for non-parametric LCLs were calculated based on sample size and rank. As noted in Unified Guidance (USEPA 2009b), it is possible or even likely for non-parametric confidence limits (upper or lower) to be equal to the reporting limit (RL) used for non-detects.

Thallium was detected in one sample collected from one of the McKay background wells (WM-127) but went undetected in all samples collected from the other two McKay background wells (601M and 1182M-CCR). Similarly, thallium was detected in a single sample at one sub-McKay background well (1020D) but not the other (1138D). None of the thallium concentrations at the CCR Rule background wells were above the MCL of 0.002 mg/L at the 3&4 EHP; thus, the GWPS was established as the MCL for statistical comparison to compliance well data.

Statistical comparisons of thallium confidence limits to the GWPS were made on an individual well basis. The detection frequency of thallium ranged from 0% (all non-detects) to 50% at well 622D-P. Non-detects were reported for every sample (0% detects) in 13 of the 32 compliance wells. Another 15 of the 32 3&4 EHP compliance wells only had one detectable concentration of thallium (6 – 7% detection frequency). Given the extremely low detection frequencies at individual wells, nearly all of the 95% non-parametric confidence intervals (LCLs and UCLs) were equivalent to the reporting limit, which was typically 0.0005 mg/L. The exception was well 622D-P, where the detection frequency (50%) allowed for the mean and standard deviation of the data-set to be estimated using the Kaplan Meier censored estimation technique; and a 95% parametric LCL was calculated to be 0.00062 mg/L. Thus, the highest LCL calculated for any of the compliance wells was still much less than the GWPS and no SSLs were determined for thallium. As such, no remedial action is required for thallium in groundwater under the CCR Rule (although thallium will continue to be monitored under the CCR Rule compliance monitoring).

Summary

In summary, thallium was not retained as a groundwater COI; however, it will remain a COPC while additional thallium groundwater data are collected. The further evaluation of thallium groundwater concentrations is summarized below.

- Thallium was not found to be migrating from pond water to groundwater because the pond water was greater than the MCL (and conservatively also greater than the DEQ-7 Standard), but the CCR Well groundwater data (dissolved concentrations) were less than the DEQ-7 Standard.
- The pond water and CCR Well groundwater data were both determined to be representative of background concentration ranges (i.e., BSLs).
- Thallium had a very low detection frequency in the CCR Well groundwater samples (6 – 7%).
- Thallium was not found to have a statistically significant level indicating no remedial action is required under the CCR Rule (although thallium will continue to be monitored under the CCR Rule compliance monitoring).

In conclusion, because a limited number of groundwater samples collected from wells located around the process pond perimeter and used as part of the Federal CCR Rule compliance monitoring had total thallium concentrations greater than the MCL, as a conservative measure thallium will remain a COPC while additional groundwater data are collected. Thallium will continue to be monitored and evaluated in groundwater. In addition, thallium will be monitored in groundwater as part of the Federal CCR Rule compliance monitoring and continue to be reviewed under the AOC.

11.0 FATE AND TRANSPORT ANALYSIS

The AOC (Article VI.B) requires the CCRA Report to identify transport mechanisms for the COIs. In Section 4.2 Chemical Releases and Transport Mechanisms, various transport mechanisms were discussed that largely consisted of the following.

- Seepage losses from the 3&4 EHP ponds that are presently mitigated by an extensive capture well system. Comprehensive groundwater sampling is conducted regularly to evaluate groundwater quality trends and evaluate the effectiveness of the capture well system. Groundwater analytical results are compared to the BSLs as part of this evaluation. The groundwater BSLs are not clean-up levels, but are used as one criterion for evaluating capture well or monitoring well data when baseline specific data are not available.
- Historical surface releases to soil (pipeline/pond releases).

A fate and transport analysis of COIs potentially leaching through the soil column was performed through the comparison of soil chemicals (i.e., metals) to the USEPA SSLs for Groundwater Protection (USEPA, 2018a) that were modified following the DEQ Soil Screening Process (DEQ, 2017b). Leaching COPCs were further evaluated by conducting SPLP analyses and calculating site-specific soil standards following DEQ guidance (NJDEP, 2013; DEQ, 2016). Leaching COPCs were not retained as COCs (see Section 10.2).

In addition, extensive fate and transport modeling has been conducted in support of the 3&4 EHP Remedy Evaluation. The Units 3 &4 Effluent Holding Pond Site Fate and Transport Model Development and Remedial Alternatives Analysis, as well as the Units 3 &4 Effluent Holding Pond Remedy Evaluation Report, which are both in development, will also present information on fate and transport information.

12.0 DEVELOPMENT OF CLEANUP CRITERIA

The methods used to develop the Cleanup Criteria (also referred to as Site-Specific Cleanup Levels [SSCL]) are described in the sections below.

12.1 SURFACE WATER CLEANUP CRITERIA

One human health COPC in surface water, boron, was initially identified, but not retained as a human health COC at the 3&4 EHP area (see Section 10.1). Three ecological COPCs, boron, selenium and sulfate, were identified in surface water during the screening phase of the ERA, but not retained as COCs in the Baseline ERA at the 3&4 EHP area (see Appendix C). Therefore, surface water was not found to pose either a human health or ecological risk. Cleanup Criteria for surface water were not developed.

12.2 SOIL CLEANUP CRITERIA

Six human health COPCs (arsenic, barium, cobalt, lithium, manganese, and radium) were initially flagged as soil COPCs in the former seep/spill areas at the 3&4 EHP area, but not retained as human health COCs (see Appendix B, Tables B-2.3 thru B-2.8 and Section 10.4). Eight ecological COPCs (antimony, arsenic, barium, boron, cadmium, manganese, selenium and Radium 228) were identified in the former seep/spill areas at the 3&4 EHP area at the initial screening phase of the Ecological Risk Assessment (initial SLERA), but not retained as COCs in the BERA (see Appendix C). Therefore, soil was not found to pose either a human health or ecological risk. No action is required in the Remedy Evaluation regarding soil in the spill areas.

12.3 LEACHING TO GROUNDWATER CLEANUP CRITERIA

Leaching COPCs were evaluated by conducting SPLP analyses and calculating site-specific soil standards following DEQ guidance (NJDEP, 2013; DEQ, 2016). Leaching COIs/COCs were not retained for the spill areas of the 3&4 EHP area (see Section 10.2). Therefore, leaching to groundwater Cleanup Criteria in soil were not developed.

12.4 GROUNDWATER CLEANUP CRITERIA

The groundwater COCs/COIs were identified through a detailed screening process presented in Section 3.0 and shown in Table 3, located in the Tables section. Both human health and ecological (livestock) risks were considered for the development of the groundwater Cleanup Criteria. Groundwater standards, screening levels, and proposed Cleanup Criteria by hydrostratigraphic layer are presented in Table 12-1.

12.4.1 Groundwater Human Health Cleanup Criteria

Following DEQ guidance, human health risks were not forward calculated for groundwater. Rather, groundwater concentrations were compared to the DEQ-7 Standards as a qualitative evaluation of risk. If a DEQ-7 Standard was not available, groundwater concentrations were compared to the USEPA MCL (if available) and the USEPA Tapwater RSL (if available) in accordance with the AOC. In addition, the

AOC indicates that Cleanup Criteria may not be more stringent than background concentrations (i.e., the BSLs).

12.4.2 Groundwater Ecological (Livestock) Cleanup Criteria

Groundwater data were not directly used for forward calculations of human health risks associated with groundwater. However, forward risks were evaluated for the private stock wells currently used to water livestock located at the 3&4 EHP area (see Figure 4 and Appendix C). Per DEQ's request, human health and ecological (livestock) Cleanup Criteria for groundwater were developed. Ecological (livestock) Cleanup Criteria for groundwater were limited to one scenario (livestock consumption via groundwater pumping into stock tanks; see Appendix C).

12.4.3 Cleanup Criteria Discussion

The proposed Cleanup Criteria are discussed within this section.

Boron
A DEQ-7 Standard has not been established for boron. A USEPA Tapwater RSL for boron of 4 mg/L is available, which is a conservative value as the groundwater is classified as Class III and pre-treatment would be necessary for the groundwater to be potable. An ecological (livestock) Cleanup Criterion for boron of 39 mg/L was calculated, which is conservatively based on the protection of the most sensitive livestock receptor (calves) using the No Observed Adverse Effect Level (NOAEL; the level at which no adverse effects have been observed in the livestock receptor). The boron BSL is less than both of these values.

The proposed groundwater Cleanup Criterion for boron in all hydrostratigraphic units was selected as 4 mg/L, which is the USEPA Tapwater RSL.

Sulfate
Neither a DEQ-7 Standard, nor a USEPA Tapwater RSL has been established for sulfate. An ecological (livestock) Cleanup Criterion for sulfate was established at 3,000 mg/L, which represents the upper end of the "marginal" sulfate range of 1,500 to 3,000 mg/L for livestock as established by United States Department of Agriculture (USDA) and Montana State University Agricultural Experiment Station (USDA-ARS, 2009). The "marginal" sulfate range was selected because the groundwater is classified as Class III indicating it must be maintained at least marginally suitable as drinking water for some livestock.

The proposed groundwater Cleanup Criterion for sulfate was selected as either the livestock Cleanup Criterion of 3,000 mg/L or the BSL, depending on the hydrostratigraphic unit. According to the AOC (DEQ/PPLM, 2012), a Cleanup Criterion may not be more stringent than background. For hydrostratigraphic units in which the BSL is less than the livestock Cleanup Criterion, then the livestock Cleanup Criterion was selected as the proposed Cleanup Criterion. Conversely, for hydrostratigraphic units in which the BSL is greater than the livestock Cleanup Criterion, then the BSL was selected as the proposed Cleanup Criterion.

Cobalt

A DEQ-7 Standard has not been established for cobalt. A USEPA Tapwater RSL for cobalt of 0.006 mg/L has been established, which is a conservative value as the groundwater is classified as Class III and pre-treatment would be necessary for the groundwater to be potable. An ecological (livestock) Cleanup Criterion for cobalt of 0.03 mg/L was calculated, which is conservatively based on the protection of the most sensitive livestock receptor (calves) using the NOAEL (the level at which no adverse effects have been observed in the livestock receptor).

The proposed groundwater Cleanup Criterion for cobalt was selected as either the USEPA Tapwater RSL of 0.006 mg/L or the BSL, depending on the hydrostratigraphic unit. According to the AOC (DEQ/PPLM, 2012), a Cleanup Criterion may not be more stringent than background. For hydrostratigraphic units in which the BSL is less than the RSL, then the USEPA Tapwater RSL was selected as the proposed groundwater Cleanup Criterion. Conversely, for hydrostratigraphic units in which the BSL is greater than the RSL, then the BSL was selected as the proposed groundwater Cleanup Criterion.

Lithium

A DEQ-7 Standard has not been established for lithium. A USEPA Tapwater RSL for lithium of 0.04 mg/L has been established, which is a conservative value as the groundwater is classified as Class III and pre-treatment would be necessary for the groundwater to be potable. The RSL of 0.04 mg/L is more stringent than background. According to the AOC (DEQ/PPLM, 2012), a Cleanup Criterion may not be more stringent than background. An ecological (livestock) Cleanup Criterion could not be calculated because a mammalian Toxicity Reference Value (TRV) has not been established for lithium.

The proposed groundwater Cleanup Criterion for lithium was selected as the BSL for all hydrostratigraphic units.

Selenium

DEQ-7 Standards apply to all waters of the State of Montana. According to the AOC (DEQ/PPLM, 2012), a Cleanup Criterion may not be more stringent than background. The DEQ-7 for selenium of 0.05 mg/L is not more stringent than the BSLs. A USEPA Tapwater RSL for selenium of 0.1 mg/L has been established, which is a conservative value as the groundwater is classified as Class III and pre-treatment would be necessary for the groundwater to be potable. An ecological (livestock) Cleanup Criterion for selenium of 0.28 mg/L was calculated, which is conservatively based on the protection of the most sensitive livestock receptor (calves) using the NOAEL (the level at which no adverse effects have been observed in the livestock receptor).

The proposed groundwater Cleanup Criterion for selenium was selected as the DEQ-7 Standard of 0.05 mg/L for all hydrostratigraphic units.

Table 12-1 Groundwater Standards, Screening Levels and Proposed Cleanup Criteria – 3&4 EHP Area

COI/COC	Ground-water DEQ-7/MCL (mg/L)	USEPA Tapwater RSL (mg/L)	BSL Range (mg/L)	Ecological (Livestock) Cleanup Criterion (mg/L)	Cleanup Criterion Source	Proposed Cleanup Criteria				
						Alluvium (mg/L)	Spoils (mg/L)	Clinker (mg/L)	Coal-Related (mg/L)	SubMcKay (mg/L)
CCR Appendix III Constituents										
Boron	NA[5]	4	0.8 – 3.9	39 [1]	RSL	4 (RSL)	4 (RSL)	4 (RSL)	4 (RSL)	4 (RSL)
Sulfate	NA[5]	NA	2,150 – 3,140	3,000 [2]	Livestock/ BSL	3,000 (livestock)	3,000 (livestock)	3,140 (BSL)	3,000 (livestock)	3,000 (livestock)
CCR Appendix IV Constituents										
Cobalt	NA[5]	0.006	0.00066 – 0.0232	0.03 [1]	RSL/BSL	0.02 (BSL)	0.0232 (BSL)	0.0232 [4] (BSL)	0.006 (RSL)	0.006 (RSL)
Lithium	NA[5]	0.04	0.072 – 0.12	NA [3]	BSL	0.12 (BSL)	0.09 (BSL)	0.09 [4] (BSL)	0.072 (BSL)	0.072 [4] (BSL)
Selenium	0.05[6]	0.1	0.0024 – 0.01	0.28 [1]	DEQ-7	0.05 (DEQ-7)	0.05 (DEQ-7)	0.05 (DEQ-7)	0.05 (DEQ-7)	0.05 (DEQ-7)
Other Potential 3&4 EHP Constituents										
Manganese	NA[5]	0.43	0.26 – 2.48	61 [1]	RSL/BSL	0.61 (BSL)	2.48 (BSL)	0.67 (BSL)	0.48 (BSL)	0.43 (RSL)

Notes:

BSL Background Screening Level (Neptune, 2017)
CCR Coal Combustion Residual
COI Constituent of Interest
COC Chemical of Concern
MCL Maximum Contaminant Level
mg/L Milligrams per liter
NA Not available/not applicable
RSL Regional Screening Level

(1) Calculated Cleanup Criterion protective of livestock (calf), see Appendix C
(2) Upper limit of "marginal" sulfate range for livestock (USDA-ARS, 2009)
(3) Cleanup Criterion could not be calculated – no mammalian Toxicity Reference Value (TRV) available, see Appendix C
(4) BSL not available. BSL for adjacent hydrostratigraphic layer used as a proxy value.
(5) Neither a DEQ-7, nor an MCL has been established.
(6) Value is both the DEQ-7 and the MCL.

Manganese

A DEQ-7 Standard has not been established for manganese. A USEPA Tapwater RSL for manganese of 0.43 mg/L has been established, which is a conservative value as the groundwater is classified as Class III and pre-treatment would be necessary for the groundwater to be potable. An ecological (livestock) Cleanup Criterion for manganese of 61 mg/L was calculated, which is conservatively based on the protection of the most sensitive livestock receptor (calves) using the NOAEL (the level at which no adverse effects have been observed in the livestock receptor).

The proposed groundwater Cleanup Criterion for manganese was selected as either the USEPA Tapwater RSL or the BSL, depending on the hydrostratigraphic unit. According to the AOC (DEQ/PPLM, 2012), a Cleanup Criterion may not be more stringent than background. For hydrostratigraphic units in which the BSL is less than the RSL, then the USEPA Tapwater RSL was selected as the proposed groundwater Cleanup Criterion. Conversely, for hydrostratigraphic units in which the BSL is greater than the RSL, then the BSL was selected as the proposed groundwater Cleanup Criterion.

12.4.4 Cleanup Criteria Comparison of the Plant Site, SOEP/STEP and 3&4 EHP Areas

As previously discussed in Section 6.1.3, the groundwater BSLs (Neptune, 2016) were revised in 2017 (Neptune). Per a discussion and agreement between DEQ and Talen (DEQ, 2017d), the 2016 BSLs were applicable to the Plant Site CCRA, while the revised 2017 BSLs were applicable to the SOEP/STEP and the 3&4 EHP CCRAs. The BSLs were used in the development of the groundwater Proposed Cleanup Criteria for instances when the DEQ-7 standard, or other appropriate screening levels, were lower than background levels. Under the AOC, cleanup criteria may not be more stringent than background (DEQ/PPLM, 2012). As a result of the 2017 revisions to the BSLs, the groundwater Proposed Cleanup Criteria varied slightly for three of the SOEP/STEP and 3&4 EHP COIs/COCs in comparison to the Plant Site as shown in Table 12-2 below.

Table 12-2 Groundwater Proposed Cleanup Criteria Comparison between the SOEP/STEP and 3&4 EHP Areas and the Plant Site

COI/COC	Alluvium (mg/L)		Spoils (mg/L)		Clinkers (mg/L)		Coal-Related (mg/L)		SubMcKay (mg/L)	
	Plant Site	STEP/ 3&4 EHP	Plant Site	STEP/ 3&4 EHP	Plant Site	STEP/ 3&4 EHP	Plant Site	STEP/ 3&4 EHP	Plant Site	STEP/ 3&4 EHP
CCR Appendix III Constituents										
Boron	4	4	4	4	4	4	4	4	4	4
Sulfate	3,000	3,000	**3,045**	**3,000**	**3,160**	**3,140**	3,000	3,000	3,000	3,000
CCR Appendix IV Constituents										
Cobalt	0.02	0.02	0.0232	0.0232	0.0232	0.0232	0.006	0.006	0.006	0.006
Lithium	**0.092**	**0.12**	0.09	0.09	0.09	0.09	0.072	0.072	0.072	0.072
Selenium	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Other Potential Constituents										
Manganese	**0.6**	**0.61**	**2.79**	**2.48**	0.67	0.67	**0.54**	**0.48**	0.43	0.43

Notes:
Bold SOEP/STEP and 3&4 EHP Groundwater Proposed Cleanup Criterion differed from the Plant Site.
CCR Coal Combustion Residuals
COC Chemical of Concern
COI Constituent of Interest
mg/L milligrams per liter

In summary, the groundwater proposed cleanup criteria for three of the COIs/COCs varied slightly between the Plant Site and the SOEP/STEP and 3&4 EHP areas as follows:

- **Sulfate** - slightly lower proposed cleanup criteria in SOEP/STEP and 3&4 EHP areas for two hydrostratigraphic units.
    - Spoils: 3,045 mg/L (Plant Site) versus 3,000 mg/L (SOEP/STEP and 3&4 EHP areas); however, spoils are generally not present at the SOEP/STEP area.
    - Clinkers: 3,160 mg/L (Plant Site) versus 3,140 mg/L (SOEP/STEP and 3&4 EHP areas).
- **Lithium** – slightly higher proposed cleanup criteria in the SOEP/STEP and 3&4 EHP areas for one hydrostratigraphic unit.
    - Alluvium: 0.092 mg/L (Plant Site) versus 0.12 mg/L (SOEP/STEP and 3&4 EHP areas).
- **Manganese** - slightly higher and lower proposed cleanup criteria in SOEP/STEP and 3&4 EHP areas for three hydrostratigraphic units.
    - Alluvium: 0.6 mg/L (Plant Site) versus 0.61 mg/L (SOEP/STEP and 3&4 EHP areas).
    - Spoils: 2.79 mg/L (Plant Site) versus 2.48 mg/L (SOEP/STEP and 3&4 EHP areas); however, spoils are generally not present at the SOEP/STEP area.
    - Coal-Related: 0.54 mg/L (Plant Site) versus 0.48 mg/L (SOEP/STEP and 3&4 EHP areas).

As noted in the site report (Hydrometrics, 2017), some areas with naturally occurring elevated levels of constituents, which are also process water indicators, seem to exist in the 3&4 EHP Area. As such, the proposed cleanup criteria should be used with caution when applying them to the McKay Coal in the 3&4 EHP Area. One example is the McKay Coal Seam in the area directly south of the 3&4 EHP at former wells 571M, 586M and 589M. Wells 571M, 586M and 589M were installed in 1982, 1984 and 1986, respectively. Pond operations began in 1983.

Water quality and level data were reviewed to further evaluate if the groundwater quality observed at these three wells was naturally occurring. Aerial photographs, that were considered to have sufficient

resolution, were used to estimate water levels in the 3&4 EHP at various times during early pond operations as follows.

- Well 571M was completed in the McKay Coal inside of the cutoff wall. A 1982 photograph with sufficient elevation to observe water levels in the 3&4 EHP could not be located. However, a 1983 photograph clearly illustrates the presence of water behind the Starter Dam and in the original clearwell at the 3&4 EHP. Topographical lines from a USGS map were laid over the aerial photograph using the cutoff wall for alignment. The underdrain system, which was installed below an elevation of 3,200 feet above mean sea level (ft amsl), was also superimposed on the aerial photograph and topographical map. Elevations were adjusted to match the NAD 83 datum currently in use at the facility.

Water levels at the 3&4 EHP, observed in the 1983 aerial photograph, were estimated to be at about 3180 ft amsl +/- about 10 feet based on the elevation contours. Groundwater at well 571M, a week following its installation in 1982, was at an elevation of 3224 ft amsl, well above the water levels within the pond. Groundwater at 571M could not have been impacted by the water within the 3&4 EHP since the water level elevations at the well were higher than the water in the pond. The initial water quality sample from 571M contained 7,050 mg/L TDS, 5,010 mg/L sulfate, and 9.6 mg/L boron, as well as low calcium to magnesium ratio. All are indicators of process pond water. However, based on the elevation relationships at the time, it is unlikely that the 3&4 EHP had affected water quality.

- Wells 586M and 589M were installed south of the cutoff wall. An aerial photograph from 1986 was used to evaluate water levels in the pond. It was assumed that water levels within the 3&4 EHP were rising, therefore the 1986 water levels would be reflective of the highest water levels that had been realized at that point in the operation. Estimated elevations using the same methodology as previously described were on the order of 3,200 ft amsl +/- about 10 feet. Water level elevations in the two wells in 1986 were on the order of 3,217 and 3,224 ft amsl, above those in the 3&4 EHP. Based on the water level relationship, it seems unlikely that groundwater at these wells was affected by the 3&4 EHP.

Water at both of these wells showed elevated levels of constituents which are also process water indicators. For example, boron concentrations in the initial samples collected from 586M were 3.6 to 8.6 mg/L and those from 589M were 13.1 to 13.2 mg/L. Note also, that water quality at well 589M was consistent during the first 18 years of its life, a fact that would not have occurred had it been affected by process water from the 3&4 EHP. Well 675M was installed to replace 589M. Groundwater quality at 675M has been consistent with the first 18 years of data from 589M, further supporting that process pond indicators are naturally elevated at this location. Water in well 586M actually showed a water quality improvement, also a trend that would not have occurred had the 3&4 EHP been contributing water to the well.

Note, that all three of the wells (571M, 586M and 589M) required abandonment after it was discovered that the annular seals were not effective. That said, the base of the clinker unit is at an elevation of about 3,235 ft amsl, well above the water levels observed in the pond during early operations. For this reason, process water would not have been migrating through the clinker and then down the well annulus.

Other McKay wells in the area show better water quality. The apparent variations in water quality over relatively close distances in the 3&4 EHP area should be noted when evaluating cleanup in various areas.

13.0 APPLICATION OF THE CCRA RESULTS TO THE REMEDY EVALUATION

Within this section, the CCRA results are discussed as they apply to the remedial evaluation.

13.1 SURFACE WATER

No action is required in the Remedy Evaluation regarding surface water.

13.2 SOIL

No action is required in the Remedy Evaluation regarding soil in the pipeline seep/spill areas.

13.3 GROUNDWATER

Cleanup Criteria for the groundwater COIs/COPCs were presented in Section 12.4. The groundwater Cleanup Criteria should be used in the Remedy Evaluation to develop remedial alternatives to address COI/COPC groundwater concentrations that exceed these values, including after the capture system is shut down. In addition, the remedial actions should include all the regulated substances listed in the AOC Control Action definition (Section IV.B.; DEQ/PPLM, 2012), which include three of the COIs/COPCs (sulfate, boron, selenium), as well as potassium, sodium, magnesium, TDS, and salinity. Lastly, radium and thallium concentrations in groundwater at the 3&4 EHP area appear to be consistent with background levels and neither was identified as a groundwater COI/COC. However, because a radium groundwater BSL was not available for comparison, as a conservative measure radium will remain a COPC while additional radium groundwater data are collected. Similarly, because a limited number of groundwater samples collected from wells located around the process pond perimeter and used as part of the Federal CCR Rule compliance monitoring had total thallium concentrations greater than the MCL, as a conservative measure thallium will remain a COPC while additional groundwater data are collected. Radium and thallium will continue to be monitored and evaluated as part of the Federal CCR Rule compliance monitoring and continue to be reviewed under the AOC.

Marietta Canty, LLC
Environmental Consulting

CLEANUP CRITERIA AND RISK ASSESSMENT REPORT

Wastewater Facilities Comprising the Closed-Loop System
Plant Site Area
COLSTRIP STEAM ELECTRIC STATION

Pursuant to: ADMINISTRATIVE ORDER ON CONSENT REGARDING IMPACTS RELATED TO WASTEWATER FACILITIES COMPRISING THE CLOSED-LOOP SYSTEM AT COLSTRIP STEAM ELECTRIC STATION, COLSTRIP, MONTANA SECTION XI – SUBMISSIONS

CERTIFICATION:
I, the undersigned, hereby certify that this document was prepared under my direction and to the best of my knowledge the information contained herein is correct and accurate.

Gordon Criswell Director, Environmental + Compliance 8/29/19
Name Title Date

Project No. 17-1006

REFERENCES

REFERENCES

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TABLES

Table 1A
Preliminary Screening of 3&4 EHP Wastewater CCR Rule Appendix III Constituents
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP Pond Water, Colstrip Steam Electric Station, Colstrip, Montana

	Sampling Period	Boron (Dissolved)		Boron (Total)		Calcium (Dissolved)		Calcium (Total)		Fluoride		Sulfate (SO_4)		pH (lab)*		Total Dissolved Solids (TDS)	
Groundwater DEQ-7 (mg/L)		**NA**		**NA**		**NA**		**NA**		**4**		**NA**		**NA**		**NA**	
MCL (mg/L)		**NA**		**NA**		**NA**		**NA**		**4**		**NA**		**NA**		**NA**	
RSL (mg/L)		**4**		**4**		**NA**		**NA**		**0.8**		**NA**		**NA**		**NA**	
BSL (mg/L)		**0.8 - 3.9**		**0.8 - 3.9**		**303 - 477**		**303 - 477**		**0.4 - 2.11**		**2,150 - 3,140**		**7.8 - 8.27 s.u.**		**3,445 - 5,010**	
Values (units)		Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)	Max (s.u.)	Mean (s.u.)	Max (mg/L)	Mean (mg/L)
Site Descriptor																	
Units 3&4 Effluent Holding Pond - C Cell	5/2002 - 5/2015	259	186	247	247	557	536	NA	NA	25	25	37,400	25,983	7.8	7.05	50,100	33,800
Units 3&4 EHP E Cell	5/1999	125	125	NA	NA	612	612	NA	NA	NA	NA	14,600	14,600	6	6	23,200	23,200
Units 3&4 EHP F Cell	9/2009 - 5/2015	285	184	303	303	570	522	NA	NA	38	38	47,400	31,500	7.4	7.3	62,600	38,975
Units 3&4 Effluent Holding Pond Clearwell (Old)	6/1984 - 7/2012	168	110	126	126	623	518	NA	NA	13.8	7.52	25,200	17,493	8.4	7.46	35,200	25,269
Units 3&4 Effluent Holding Pond New Clearwell (B Pond)	9/2009 - 5/2015	281	266	296	296	588	532	NA	NA	28	28	41,200	36,775	7.2	5.75	54,700	45,925
Units 3&4 Effluent Holding Pond Main Dam Sump (3&4 MDS)	8/1986 - 10/2015	92.4	60	NA	NA	584	475	NA	NA	1.15	0.653	14,900	11,173	7.9	7.6	19,900	16,748
Units 3&4 SDS (Saddle Dam Sump)	9/1999 - 8/2015	74.6	8.66	NA	NA	636	382	NA	NA	NA	NA	12,500	3,818	8	7.64	19,000	5,911
Units 3&4 EHP G Cell	10/1996 - 5/2015	159	118	NA	NA	484	452	NA	NA	NA	NA	20,800	17,000	8.5	7.5	30,000	24,567
Units 3&4 EHP H Cell	7/1993 - 5/2015	293	186	NA	NA	568	550	NA	NA	20.2	18.1	41,600	26,833	6.7	6.37	53,500	36,100

Notes:
* - pH measurement reported in standard units (s.u.)
NA - Not Available/Not Applicable

DEQ - Montana Department of Environmental Quality (2017c)
MCL - Maximum Contaminant Level
RSL - USEPS Tapwater Regional Screening Level (USEPA, 2017b)
BSL - Background Screening Level (Neptune, 2017)
mg/L - milligrams per liter

Table 1B
Preliminary Screening of 3&4 EHP Wastewater CCR Rule Appendix IV Constituents
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP Pond Water, Colstrip Steam Electric Station, Colstrip, Montana

	Sampling Period	Antimony (Dissolved)		Antimony (Total)		Arsenic (Dissolved)		Arsenic (Total)		Barium (Dissolved)		Barium (Total)		Beryllium (Total)	
Groundwater DEQ-7		**0.006**		**0.006**		**0.01**		**0.01**		**1**		**1**		**0.004**	
MCL (mg/L)		**0.006**		**0.006**		**0.01**		**0.01**		**2**		**2**		**0.004**	
RSL (mg/L)		**0.0078**		**0.0078**		**$5.2X10^{-5}$**		**$5.2X10^{-5}$**		**3.8**		**3.8**		**0.025**	
BSL (mg/L)		**0.15 - 0.4**		**0.15 - 0.4**		**0.005**		**0.005**		**0.024 - 0.27**		**0.024 - 0.27**		**0.0002 - 0.02**	
Values (units)		Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)
Site Descriptor															
Units 3&4 Effluent Holding Pond - C Cell	5/2002 - 5/2015	NA	NA	0.051	0.051	NA	NA	0.011	0.011	NA	NA	0.15	0.15	<0.001	<0.001
Units 3&4 EHP E Cell	5/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Units 3&4 EHP F Cell	9/2009 - 5/2015	NA	NA	0.079	0.079	NA	NA	0.015	0.015	NA	NA	0.09	0.09	<0.001	<0.001
Units 3&4 Effluent Holding Pond Clearwell (Old)	6/1984 - 7/2012	NA	NA	0.05	0.027	NA	NA	0.011	0.01	NA	NA	0.1	0.08	<0.001	<0.001
Units 3&4 Effluent Holding Pond New Clearwell (B Pond)	9/2009 - 5/2015	NA	NA	0.087	0.087	NA	NA	0.021	0.021	NA	NA	0.15	0.15	<0.001	<0.001
Units 3&4 Effluent Holding Pond Main Dam Sump (3&4 MDS)	8/1986 - 10/2015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Units 3&4 SDS (Saddle Dam Sump)	9/1999 - 8/2015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Units 3&4 EHP G Cell	10/1996 - 5/2015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Units 3&4 EHP H Cell	7/1993 - 5/2015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA

Notes:
* - pH measurement reported in standard units (s.u.)
**- Sum total of Radium 226 and 228
***- Ra 228 value less than zero, defaulted value of Ra 228 to zero
NA - Not Available/Not Applicable
(1) Samples for lithium and radium collected only on 4/27/2017 and 5/14/2018
(a) lead treatment technology action level is 0.015 mg/L
(b) value for inorganic mercury

DEQ - Montana Department of Environmental Quality (2017c)
MCL - Maximum Contaminant Level
RSL - USEPS Tapwater Regional Screening Level (USEPA, 2017b)
BSL - Background Screening Level (Neptune, 2017)
mg/L - milligrams per liter

Table 1B (Continued)
Preliminary Screening of 3&4 EHP Wastewater CCR Rule Appendix IV Constituents
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP Pond Water, Colstrip Steam Electric Station, Colstrip, Montana

	Sampling Period	Cadmium (Dissolved)		Cadmium (Total)		Chromium (Total)		Cobalt (Total)		Fluoride		Lead (Dissolved)		Lead (Total)	
Groundwater DEQ-7		**0.005**		**0.005**		**0.1**		**NA**		**4**		**0.015**		**0.015**	
MCL (mg/L)		**0.005**		**0.005**		**0.1**		**NA**		**4**		**0.015(a)**		**0.015(a)**	
RSL (mg/L)		**0.0092**		**0.0092**		**NA**		**0.006**		**0.8**		**0.015**		**0.015**	
BSL (mg/L)		**0.002 - 0.01**		**0.002 - 0.01**		**0.0146 - 0.1**		**0.00066 - 0.0232**		**0.4 - 2.11**		**0.01 - 0.08**		**0.01 - 0.08**	
Values (units)		Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)
Site Descriptor															
Units 3&4 Effluent Holding Pond - C Cell	5/2002 - 5/2015	NA	NA	0.015	0.015	<0.005	<0.005	0.119	0.119	25	25	NA	NA	NA	NA
Units 3&4 EHP E Cell	5/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Units 3&4 EHP F Cell	9/2009 - 5/2015	NA	NA	0.018	0.018	<0.01	<0.01	0.169	0.169	38	38	NA	NA	NA	NA
Units 3&4 Effluent Holding Pond Clearwell (Old)	6/1984 - 7/2012	0.054	0.022	0.006	0.004	0.02	0.008	0.05	0.03	13.8	7.52	0.04	0.015	NA	NA
Units 3&4 Effluent Holding Pond New Clearwell (B Pond)	9/2009 - 5/2015	NA	NA	0.028	0.028	0.026 (dis-solved)	0.026 (dis-solved)	0.236	0.236	28	28	NA	NA	NA	NA
Units 3&4 Effluent Holding Pond Main Dam Sump (3&4 MDS)	8/1986 - 10/2015	0.021	0.008	NA	NA	NA	NA	NA	NA	1.15	0.653	<0.02	<0.01	NA	NA
Units 3&4 SDS (Saddle Dam Sump)	9/1999 - 8/2015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Units 3&4 EHP G Cell	10/1996 - 5/2015	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Units 3&4 EHP H Cell	7/1993 - 5/2015	0.036	0.022	NA	NA	NA	NA	NA	NA	20.2	18.1	<0.01	<0.01	NA	NA

Notes:
* - pH measurement reported in standard units (s.u.)
**- Sum total of Radium 226 and 228
***- Ra 228 value less than zero, defaulted value of Ra 228 to zero
NA - Not Available/Not Applicable
(1) Samples for lithium and radium collected only on 4/27/2017 and 5/14/2018
(a) lead treatment technology action level is 0.015 mg/L
(b) value for inorganic mercury

DEQ - Montana Department of Environmental Quality (2017c)
MCL - Maximum Contaminant Level
RSL - USEPS Tapwater Regional Screening Level (USEPA, 2017b)
BSL - Background Screening Level (Neptune, 2017)
mg/L - milligrams per liter

Table 1B (Continued)
Preliminary Screening of 3&4 EHP Wastewater CCR Rule Appendix IV Constituents
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP Pond Water, Colstrip Steam Electric Station, Colstrip, Montana

	Sampling Period	Lithium[(1)] (Dissolved)		Lithium[(1)] (Total)		Mercury (Dissolved)		Mercury (Total)		Molybdenum (Dissolved)		Molybdenum (Total)	
Groundwater DEQ-7		**NA**		**NA**		**0.002**		**0.002**		**NA**		**NA**	
MCL (mg/L)		**NA**		**NA**		**0.002 (b)**		**0.002 (b)**		**NA**		**NA**	
RSL (mg/L)		**0.04**		**0.04**		**$6.3X10^{-4}$**		**$6.3X10^{-4}$**		**0.1**		**0.1**	
BSL (mg/L)		**0.072 - 0.12**		**0.072 - 0.12**		**0.001 - 0.005**		**0.001 - 0.005**		**0.004 - 0.1**		**0.004 - 0.1**	
Values (units)		Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)
Site Descriptor													
Units 3&4 Effluent Holding Pond - C Cell	5/2002 - 5/2015	7.3	6.7	8.1	7.5	<0.001	<0.001	<0.0001	<0.0001	NA	NA	2.22	2.22
Units 3&4 EHP E Cell	5/1999	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Units 3&4 EHP F Cell	9/2009 - 5/2015	10	9.0	9.8	9.2	<0.001	<0.001	<0.0001	<0.0001	NA	NA	NA	NA
Units 3&4 Effluent Holding Pond Clearwell (Old)	6/1984 - 7/2012	NA	NA	NA	NA	<0.001	0.001	<0.0001	<0.0001	NA	NA	2.02	1.51
Units 3&4 Effluent Holding Pond New Clearwell (B Pond)	9/2009 - 5/2015	10	8.3	11.6	9.3	<0.001	<0.001	0.0003	0.0003	NA	NA	2.15	2.15
Units 3&4 Effluent Holding Pond Main Dam Sump (3&4 MDS)	8/1986 - 10/2015	NA	NA	NA	NA	<0.001	<0.001	NA	NA	NA	NA	NA	NA
Units 3&4 SDS (Saddle Dam Sump)	9/1999 - 8/2015	NA	NA	NA	NA	0.001	0.001	NA	NA	NA	NA	NA	NA
Units 3&4 EHP G Cell	10/1996 - 5/2015	3.8	3.3	3.9	3.4	<0.001	<0.001	NA	NA	NA	NA	NA	NA
Units 3&4 EHP H Cell	7/1993 - 5/2015	7.6	6.5	8.4	7.1	<0.001	<0.001	NA	NA	NA	NA	NA	NA

Notes:
* - pH measurement reported in standard units (s.u.)
**- Sum total of Radium 226 and 228
***- Ra 228 value less than zero, defaulted value of Ra 228 to zero
NA - Not Available/Not Applicable
(1) Samples for lithium and radium collected only on 4/27/2017 and 5/14/2018
(a) lead treatment technology action level is 0.015 mg/L
(b) value for inorganic mercury

DEQ - Montana Department of Environmental Quality (2017c)
MCL - Maximum Contaminant Level
RSL - USEPS Tapwater Regional Screening Level (USEPA, 2017b)
BSL - Background Screening Level (Neptune, 2017)
mg/L - milligrams per liter

Table 1B (Continued)
Preliminary Screening of 3&4 EHP Wastewater CCR Rule Appendix IV Constituents
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP Pond Water, Colstrip Steam Electric Station, Colstrip, Montana

	Sampling Period	Radium 226/228[(1)]		Selenium (Dissolved)		Selenium (Total)		Thallium (Dissolved)		Thallium (Total)	
Groundwater DEQ-7		**5 pCi/L****		**0.05**		**0.05**		**0.002**		**0.002**	
MCL (mg/L)		**5 pCi/L****		**0.05**		**0.05**		**0.002**		**0.002**	
RSL (mg/L)		**NA**		**0.1**		**0.1**		**0.0002**		**0.0002**	
BSL (mg/L)		**NA**		**0.0024 - 0.01**		**0.0024 - 0.01**		**0.0003 - 0.05**		**0.0003 - 0.05**	
Values (units)		Max (pCi/L)	Mean (pCi/L)	Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)
Site Descriptor											
Units 3&4 Effluent Holding Pond - C Cell	5/2002 - 5/2015	1.2	1.2	0.812	0.494	0.583	0.583	NA	NA	<0.0005	<0.0005
Units 3&4 EHP E Cell	5/1999	NA	NA	0.443	0.443	NA	NA	NA	NA	NA	NA
Units 3&4 EHP F Cell	9/2009 - 5/2015	1.08	0.9	0.686	0.309	0.625	0.625	NA	NA	0.002	0.002
Units 3&4 Effluent Holding Pond Clearwell (Old)	6/1984 - 7/2012	NA	NA	0.48	0.234	0.18	0.095	NA	NA	<0.001	<0.001
Units 3&4 Effluent Holding Pond New Clearwell (B Pond)	9/2009 - 5/2015	1.7	1.2	1.74	1.13	1.4	1.4	NA	NA	0.0048	0.0048
Units 3&4 Effluent Holding Pond Main Dam Sump (3&4 MDS)	8/1986 - 10/2015	NA	NA	0.077	0.018	NA	NA	NA	NA	NA	NA
Units 3&4 SDS (Saddle Dam Sump)	9/1999 - 8/2015	NA	NA	0.09	0.015	NA	NA	NA	NA	NA	NA
Units 3&4 EHP G Cell	10/1996 - 5/2015	1.6	1.2	0.582	0.23	NA	NA	NA	NA	NA	NA
Units 3&4 EHP H Cell	7/1993 - 5/2015	0.2***	0.6	0.969	0.653	NA	NA	NA	NA	NA	NA

Notes:
* - pH measurement reported in standard units (s.u.)
**- Sum total of Radium 226 and 228
***- Ra 228 value less than zero, defaulted value of Ra 228 to zero
NA - Not Available/Not Applicable
(1) Samples for lithium and radium collected only on 4/27/2017 and 5/14/2018
(a) lead treatment technology action level is 0.015 mg/L
(b) value for inorganic mercury

DEQ - Montana Department of Environmental Quality (2017c)
MCL - Maximum Contaminant Level
RSL - USEPS Tapwater Regional Screening Level (USEPA, 2017b)
BSL - Background Screening Level (Neptune, 2017)
mg/L - milligrams per liter

Table 1C
Preliminary Screening of Other Potential 3&4 EHP Constituents
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP Pond Water, Colstrip Steam Electric Station, Colstrip, Montana

	Sampling Period	Manganese (Dissolved)		Manganese (Total)	
Groundwater DEQ-7		**NA**		**NA**	
MCL (mg/L)		**NA**		**NA**	
RSL (mg/L)		**0.43**		**0.43**	
BSL (mg/L)		**0.26 - 2.48**		**0.26 - 2.48**	
Values (units)		Max (mg/L)	Mean (mg/L)	Max (mg/L)	Mean (mg/L)
Site Descriptor					
Units 3&4 Effluent Holding Pond - C Cell	5/2002 - 5/2015	NA	NA	39	39
Units 3&4 EHP E Cell	5/1999	NA	NA	NA	NA
Units 3&4 EHP F Cell	9/2009 - 5/2015	NA	NA	59.8	59.8
Units 3&4 Effluent Holding Pond Clearwell (Old)	6/1984 - 7/2012	32	13.1	10	2.94
Units 3&4 Effluent Holding Pond New Clearwell (B Pond)	9/2009 - 5/2015	NA	NA	64.3	64.3
Units 3&4 Effluent Holding Pond Main Dam Sump (3&4 MDS)	8/1986 - 10/2015	<0.1	0.027	NA	NA
Units 3&4 SDS (Saddle Dam Sump)	9/1999 - 8/2015	NA	NA	NA	NA
Units 3&4 EHP G Cell	10/1996 - 5/2015	NA	NA	NA	NA
Units 3&4 EHP H Cell	7/1993 - 5/2015	25.4	22	NA	NA

Notes:
NA - Not Available/Not Applicable

DEQ - Montana Department of Environmental Quality (2017c)
MCL - Maximum Contaminant Level
RSL - USEPS Tapwater Regional Screening Level (USEPA, 2017b)
BSL - Background Screening Level (Neptune, 2017)
mg/L - milligrams per liter

Table 2
Summary of Background Screening Levels for Potential Constituents of Interest
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP Pond Water, Colstrip Steam Electric Station, Colstrip, Montana

Constituent	Alluvium (mg/L)		Spoils (mg/L)		Clinker (mg/L)		Coal-Related (mg/L)		SubMcKay (mg/L)	
	2016	2017	2016	2017	2016	2017	2016	2017	2016	2017
CCR Appendix III Constituents										
Boron	1.6	1.6	0.818	0.8	4	3.9	1.1	1	1.3	1.2
Calcium	378	379	495	477	367	367	351	360	313	303
Chloride	45	49	62	52	34	30	20	21	24	23
Fluoride	0.65	0.63	0.4	0.4	0.81	0.81	0.51	0.49	2.1	2.11
Sulfate	2,600	2,530	3,045	2,841	3,160	3,140	2,061	2,150	2,200	2,190
pH (lab)	7.8	7.8	7.88	7.8	8.2	8.2	7.8	8	8.2	8.27
Total Dissolved Solids	4,000	4,120	4,930	4,738	5,170	5,010	3,160	3,445	3,710	3,670
CCR Appendix IV Constituents										
Antimony	0.15	0.2	0.45	0.4	---	---	0.39	0.2	0.15	0.15
Arsenic	0.01	0.005	0.005	0.005	---	---	0.005	0.005	0.005	0.005
Barium	0.022	0.024	0.27	0.27	---	---	0.111	0.128	0.09	0.09
Beryllium	0.003	0.005	0.01	0.02	---	---	0.005	0.0005	0.003	0.0002
Cadmium	0.005	0.005	0.005	0.006	0.01	0.01	0.002	0.002	0.003	0.003
Chromium	0.1	0.1	0.0215	0.025	---	---	0.0146	0.0146	0.1	0.1
Cobalt	0.02	0.02	0.0232	0.0232	---	---	0.0034	0.0034	0.00066	0.00066
Fluoride	0.65	0.63	0.4	0.4	0.81	0.81	0.51	0.49	2.1	2.11
Lead	0.01	0.01	0.05	0.08	0.02	0.02	0.01	0.01	0.01	0.01
Lithium	0.092	0.12	0.09	0.09	---	---	0.072	0.072	---	---
Mercury	0.001	0.001	0.005	0.005	0.001	0.001	0.001	0.001	0.001	0.001
Molybdenum	0.04	0.1	0.048	0.059	---	---	0.02	0.02	0.004	0.004
Radium 226/228	---	---	---	---	---	---	---	---	---	---
Selenium	0.009	0.009	0.0023	0.0024	0.01	0.01	0.005	0.01	0.005	0.005
Thallium	0.5	0.0005	0.05	0.05	---	---	0.005	0.0003	0.5	0.0003
Other Potential Plant Site Groundwater Constituents										
Barium	0.022	0.024	0.27	0.27	NA	---	0.111	0.128	0.09	0.09
Manganese	0.6	0.61	2.79	2.48	0.67	0.67	0.54	0.48	0.27	0.26

Notes:

2016 Neptune, 2016. BSLs prepared in 2016 and used for the Plant Site CCRA (DEQ, 2017d).

2017 Neptune, 2017. Revised BSLs and used for the SOEP/STEP and 3&4 EHP Areas CCRA (DEQ, 2017d).

--- Not Analyzed

CCR - Coal Combustion Residuals

mg/L - milligrams per liter

BSL - Background Screening Level (Neptune, 2017)

Table 3
Screening for the Identification of Groundwater Constituents of Interest
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP Pond Water, Colstrip Steam Electric Station, Colstrip, Montana

Chemical	3&4 EHP Data				CCR Data					DEQ-7 Ground-water Standard (Dissolved) (mg/L)	MCL (mg/L)	USEPA Tapwater RSL (mg/L)	Background Screening Level Range [3] (Dissolved) (mg/L)	COI? (Y/N)	Rationale for Selection or Deletion
					CCR Wells			Background CCR Wells							
	Sampling Period (Maximum Concentration Location)	Pond (Maximum Concentration Location)	Maximum Dissolved [1] Conc (mg/L)	Mean Dissolved [1] Conc (mg/L)	Sampling Period	Total [2] Conc Range (mg/L)	Frequency of Detection	Total [2] Conc Range (mg/L)	Frequency of Detection						
CCR Rule Appendix III Constituents															
Boron	7/1993 - 5/2015	Units 3&4 EHP H Cell	293	186	2/4/2016 - 8/31/2017	0.31 - 88.4 Tot 0.83 - 3.11 Dis	408/408 22/22	0.36 - 1.94 Tot 1.12 Dis	78/78 1/1	NA	NA	4	0.8 to 3.9	Y	Ponds: >RSL, >BSL CCR Wells: <RSL, <BSL
Calcium	9/1999 - 8/2015	Units 3&4 SDS (Saddle Dam Sump)	636	382	2/4/2016 - 8/31/2017	26 - 736 Tot 32 - 633 Dis	408/408 20/20	150 - 519 Tot 214 Dis	78/78 1/1	NA	NA	NA	303 to 477	N	No standards or screening levels. No human health or ecological toxicity values
Fluoride [4]	9/2009 - 5/2015	Units 3&4 EHP F Cell	38	38	2/4/2016 - 8/31/2017	0.1 - 1.8	407/408	0.2 - 1.1	78/78	4	4	0.8	0.4 to 2.11	N	Ponds: >DEQ-7, >BSL CCR Wells: <DEQ-7, <BSL
Sulfate [4]	9/2009 - 5/2015	Units 3&4 EHP F Cell	47,400	31,500	2/4/2016 - 8/31/2017	705 - 14,300	408/408	788 - 5,640	78/78	NA	NA	NA	2,150 to 3,140	Y	Ponds: >BSL CCR Wells: >BSL No standards or screening levels. No human health toxicity values, but ecological toxicity values available.
pH (s.u.)	10/1996 - 5/2015	Units 3&4 EHP G Cell	8.5	7.5	2/4/2016 - 8/31/2017	6.8 - 8.0	408/408	6.8 -7.6	78/78	NA	NA	NA	7.8 to 8.27	N	Ponds: =BSL CCR Wells: <BSL No standards or screening levels.
TDS	9/2009 - 5/2015	Units 3&4 EHP F Cell	62,600	38,975	2/4/2016 - 8/31/2017	1,300 - 20,500	408/408	1,430 - 8,220	78/78	NA	NA	NA	3,445 to 5,010	N	Ponds: >BSL CCR Wells: >BSL No standards or screening levels. No human health or ecological toxicity values available.
CCR Rule Appendix IV Constituents															
Antimony	9/2009 - 5/2015	Units 3&4 Effluent Holding Pond New Clearwell (B Pond)	0.087 (total)	0.087 (total)	2/4/2016 - 8/31/2017	0.001-0.006 Tot 0.002 Dis	4/408 1/22	0.001-0.002 Tot <0.001 Dis	2/78 0/1	0.006	0.006	0.0078	0.15 to 0.4	N	Ponds: >DEQ-7, <BSL CCR Wells: <DEQ-7, <BSL Pond data and CCR Well data below background
Arsenic	9/2009 - 5/2015	Units 3&4 Effluent Holding Pond New Clearwell (B Pond)	0.021 (total)	0.021 (total)	2/4/2016 - 8/31/2017	0.001-0.010 Tot 0.001-0.008 Dis	78/408 4/22	0.001-0.006 Tot 0.002 Dis	11/78 1/1	0.01	0.01	5.2×10^{-5}	0.005	N	Ponds: >DEQ-7, >BSL CCR Wells: <DEQ-7, =BSL Pond data > DEQ-7 & BSL, but pond data are total values. Dissolved concentrations likely < DEQ-7 & BSL. CCR Wells dissolved concentrations below DEQ-7 and equal to BSL.
Barium	5/2002 - 5/2015 9/2009 - 5/2015	Units 3&4 Effluent Holding Pond - C Cell Units 3&4 Effluent Holding Pond Clearwell (New)	0.15 (total)	0.15 (total)	2/4/2016 - 8/31/2017	0.11 Tot <0.05 Dis	2/408 0/22	<0.05 Tot <0.05 Dis	0/78 0/1	1	2	3.8	0.024 to 0.27	N	Ponds: <DEQ-7, <BSL CCR Wells: <DEQ-7, <BSL
Beryllium	5/2002 - 5/2015 9/2009 - 5/2015 6/1984 - 7/2012 9/2009 - 5/2015	Units 3&4 Effluent Holding Pond - C Cell Units 3&4 EHP F Cell Units 3&4 Effluent Holding Pond Clearwell (Old) Units 3&4 Effluent Holding Pond New Clearwell (B Pond)	<0.001 (total)	<0.001 (total)	2/4/2016 - 8/31/2017	0.001 Tot <0.001 Dis	7/408 0/22	<0.001 Tot <0.001 Dis	0/78 0/1	0.004	0.004	0.025	0.0002 to 0.02	N	Ponds: <DEQ-7, <BSL CCR Wells: <DEQ-7, <BSL

Table 3
Screening for the Identification of Groundwater Constituents of Interest
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP Pond Water, Colstrip Steam Electric Station, Colstrip, Montana

Chemical	3&4 EHP Data				CCR Data					DEQ-7 Ground-water Standard (Dissolved) (mg/L)	MCL (mg/L)	USEPA Tapwater RSL (mg/L)	Background Screening Level Range [3] (Dissolved) (mg/L)	COI? (Y/N)	Rationale for Selection or Deletion
					CCR Wells			Background CCR Wells							
	Sampling Period (Maximum Concentration Location)	Pond (Maximum Concentration Location)	Maximum Dissolved [1] Conc (mg/L)	Mean Dissolved [1] Conc (mg/L)	Sampling Period	Total [2] Conc Range (mg/L)	Frequency of Detection	Total [2] Conc Range (mg/L)	Frequency of Detection						
Cadmium	6/1984 - 7/2012	Units 3&4 Effluent Holding Pond Clearwell (Old)	0.054	0.022	2/4/2016 - 8/31/2017	0.001 - 0.003 Tot <0.001 Dis	17/408 0/22	<0.001 Tot <0.001 Dis	0/78 0/1	0.005	0.005	0.0092	0.002 to 0.01	N	Ponds: >DEQ-7, >BSL CCR Wells: <DEQ-7, <BSL CCR data indicate Cd not migrating
Chromium	9/2009 - 5/2015	Units 3&4 Effluent Holding Pond New Clearwell (B Pond)	0.026	0.026	2/4/2016 - 8/31/2017	0.005 - 0.021 Tot <0.005 Dis	4/408 0/22	<0.005 Tot <0.005 Dis	0/78 0/1	0.1	0.1	NA	0.0146 to 0.1	N	Ponds: <DEQ-7, <BSL CCR Wells: <DEQ-7, <BSL
Cobalt	9/2009 - 5/2015	Units 3&4 Effluent Holding Pond New Clearwell (B Pond)	0.236 (total)	0.236 (total)	2/4/2016 - 8/31/2017	0.005 - 0.034 Tot <0.005 Dis	62/408 0/22	0.006-0.01 Tot <0.005 Dis	11/78 0/1	NA	NA	0.006	0.00066 to 0.0232	Y	Ponds: >RSL, >BSL CCR Wells: <RSL, =BSL
Fluoride [4]	9/2009 - 5/2015	Units 3&4 EHP F Cell	38	38	2/4/2016 - 8/31/2017	0.1 - 1.8	407/408	0.2 - 1.1	78/78	4	4	0.8	0.4 to 2.11	N	Ponds: >DEQ-7, >BSL CCR Wells: <DEQ-7, <BSL
Lead	6/1984 - 7/2012	Units 3&4 Effluent Holding Pond Clearwell (Old)	0.04	0.015	2/4/2016 - 8/31/2017	0.001 - 0.022 Tot <0.001 Dis	39/408 0/22	0.004 Tot <0.001 Dis	1/78 0/1	0.015	0.015	0.015	0.01 to 0.08	N	Ponds: >DEQ-7, =BSL CCR Wells: <DEQ-7, <BSL CCR Well data indicate Pb not migrating
Lithium	4/27/2017	Units 3&4 Effluent Holding Pond F Cell	8.0	6.4	2/4/2016 - 8/31/2017	0.1 - 1.2 Tot 0.1 - 0.3 Dis	302/408 19/22	0.1 - 0.3 Tot 0.2 Dis	36/78 1/1	NA	NA	0.04	0.072 to 0.12	Y	Ponds: >RSL, >BSL CCR Wells: >RSL, >BSL
Mercury	9/1999 - 8/2015	Units 3&4 SDS (Saddle Dam Sump)	0.001	0.001	2/4/2016 - 8/31/2017	0.0001 Tot <0.0001 Dis	2/408 0/20	<0.0001	0/78	0.002	0.002	6×10^{-4}	0.001 to 0.005	N	Ponds: <DEQ-7, <BSL CCR Wells: <DEQ-7, <BSL
Molybdenum	5/2002 - 5/2015	Units 3&4 Effluent Holding Pond - C Cell	2.22 (total)	2.22 (total)	2/4/2016 - 8/31/2017	0.001 - 0.072 Tot 0.002 - 0.007 Dis	114/407 4/23	0.001-0.006 Tot <0.001 Dis	41/78 0/1	NA	NA	0.1	0.004 to 0.1	N	Ponds: >RSL, >BSL CCR Wells: <RSL, <BSL CCR Well data indicate Mo not migrating.

Table 3
Screening for the Identification of Groundwater Constituents of Interest
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP Pond Water, Colstrip Steam Electric Station, Colstrip, Montana

Chemical	3&4 EHP Data				CCR Data					DEQ-7 Ground-water Standard (Dissolved) (mg/L)	MCL (mg/L)	USEPA Tapwater RSL (mg/L)	Background Screening Level Range [3] (Dissolved) (mg/L)	COI? (Y/N)	Rationale for Selection or Deletion
					CCR Wells			Background CCR Wells							
	Sampling Period (Maximum Concentration Location)	Pond (Maximum Concentration Location)	Maximum Dissolved [1] Conc (mg/L)	Mean Dissolved [1] Conc (mg/L)	Sampling Period	Total [2] Conc Range (mg/L)	Frequency of Detection	Total [2] Conc Range (mg/L)	Frequency of Detection						
Radium 226/228 (pCi/L)	4/27/2017	Units 3&4 Effluent Holding Pond New Clearwell (B Pond)	1.7 (total)	1.2 (total)	2/4/2016 - 8/31/2017	-1 to 13.8	408/408	-0.9 to 7.9	78/78	5 pCi/L	5 pCi/L	NA	NA	N[5]	Pond water: <DEQ-7, Pond Ash: <US background. CCR Wells: >DEQ-7 Pond data well below DEQ-7. Pond bottom ash well below background (<1.0 mg/kg). Some CCR Well data >DEQ-7. Site-specific BSLs not available.
Selenium	9/2009 - 5/2015	Units 3&4 Effluent Holding Pond New Clearwell (B Pond)	1.74	1.13	2/4/2016 - 8/31/2017	0.001 - 0.08 Tot 0.001 - 0.020 Dis	83/408 5/22	0.001 - 0.01 Tot 0.179 Dis	11/78 1/1	0.05	0.05	0.1	0.0024 to 0.01	Y	Ponds: >DEQ-7, >BSL CCR Wells: <DEQ-7, <BSL Although CCR data indicated Se not leaching, wells outside source area >DEQ-7
Thallium	9/2009 - 5/2015	Units 3&4 Effluent Holding Pond New Clearwell (B Pond)	0.0048 (total)	0.0048 (total)	2/4/2016 - 8/31/2017	0.0005-0.0067 Tot 0.0005-0.0018 Dis	29/408 3/22	0.0007-0.0009 Tot <0.0005 Dis	2/78 0/1	0.002	0.002	0.0002	0.0003 to 0.05	N[6]	Ponds: >MCL[7], =BSL CCR Wells: <DEQ-7, =BSL CCR Well data indicate Tl not migrating
Other Potential Plant Site Constituent															
Manganese	6/1984 - 7/2012	Units 3&4 Effluent Holding Pond Clearwell (Old)	32	13.1	2/4/2016 - 8/31/2017	0.001 - 3.85 Tot 0.069 - 0.949 Dis	404/408 22/22	0.001 - 1.5 0.501	74/78 1/1	NA	NA	0.43	0.26 to 2.48	Y	Ponds: >RSL, >BSL CCR Wells: >RSL, <BSL Mn also identified as a COI/COPC in the Human Health and Ecological Risk Assessments

Notes:

(1) Dissolved concentration unless otherwise noted.
(2) CCR data is reported as total recoverable concentrations, unless otherwise noted.
(3) Background Screening Levels for Colstrip Steam Electric Station (Neptune 2017).
(4) Concentration reported as neither dissolved or total recoverable.
(5) For a further discussion regarding Radium 226/228, please see Section 10.5.
(6) For a further discussion regarding thallium, please see Section 10.6.
(7) Dissolved concentrations of thallium in pond water were not available. The available (total) concentration was therefore compared to the MCL. Note that the total concentration exceeded the DEQ-7 Standard although not directly comparable.

BSL Background Screening Level (Neptune, 2017)
CCR Coal Combustion Residual
COI Constituent of Interest
DEQ-7 Montana Department of Environmental Quality Circular DEQ-7 Numerical Water Quality Standards (DEQ, 2017c)
MCL Maximum Contaminant Level
mg/L milligrams per liter
NA Not Available/Not Applicable
pCi/L picoCuries per liter
RSL USEPA Regional Screening Level
s.u. standard units
TDS Total Dissolved Solids
USEPA United States Environmental Protection Agency

FIGURES

UNITS 1 & 2 SOEP AND
STEP AOC AREA

PLANT SITE AOC AREA

UNITS 3 & 4 EHP AOC AREA

NORTH

SCALE
(In Feet)
0 3,000

LEGEND

- PROPERTY BOUNDARY
- UNITS 1 & 2 SOEP AND STEP AOC AREA
- PLANT SITE AOC AREA
- UNITS 3 & 4 EHP AOC AREA

Revised: June 1, 2018

CLEANUP CRITERIA AND RISK ASSESSMENT
WASTEWATER FACILITIES COMPRISING THE
CLOSED-LOOP 3&4 EHP AREA COLSTRIP STEAM
ELECTRIC STATION COLSTRIP, MONTANA

COLSTRIP WASTEWATER AOC AREAS

FIGURE
1

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MAIN ACCESS ROAD TO 3&4
(CONTROLLED ACCESS THROUGH
MAIN GUARD STATION)

DRAIN
PIT 3

DRAIN
PIT 5

HAUL ROAD
ACCESS

J CELL
A CELL
G CELL
C CELL
B CELL
F CELL
D CELL
E CELL
H CELL

APPROXIMATE BENTONITE AMENDED
CONCRETE CUTOFF WALL LOCATION

GATE
GATE
GATE

NORTH

SCALE
0 (In Feet) 1500

LEGEND

TALEN PROPERTY BOUNDARY

UNITS 3 & 4 EHP AOC AREA

FENCE

RAIL SPURLINE

Revised: June 1, 2018

CLEANUP CRITERIA AND RISK ASSESSMENT
WASTEWATER FACILITIES COMPRISING THE
CLOSED-LOOP 3&4 EHP AREA COLSTRIP STEAM
ELECTRIC STATION COLSTRIP, MONTANA

**UNITS 3 & 4 EHP AOC AREA
AND FENCELINE**

FIGURE
2

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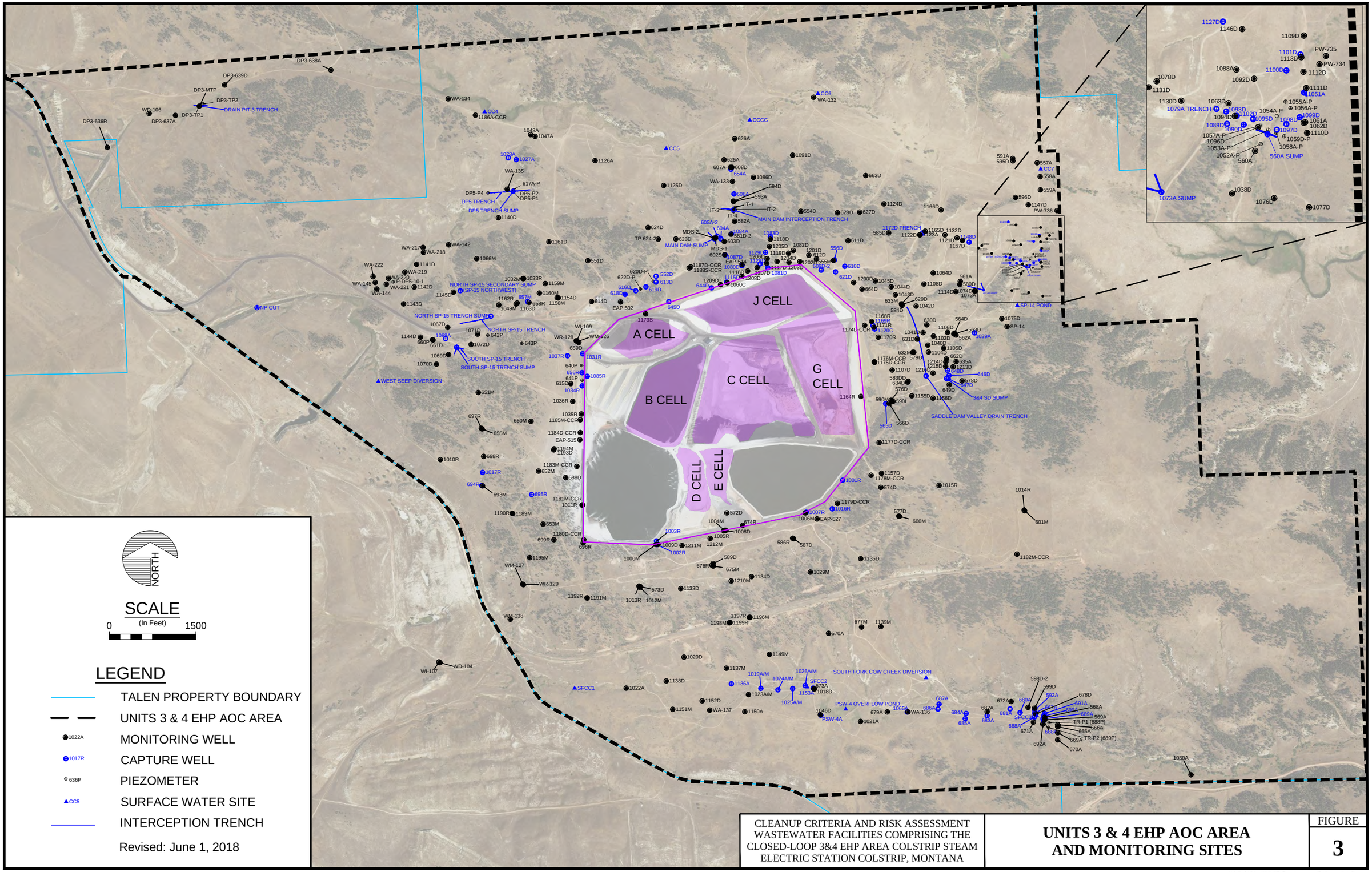

CLEANUP CRITERIA AND RISK ASSESSMENT WASTEWATER FACILITIES COMPRISING THE CLOSED-LOOP 3&4 EHP AREA COLSTRIP STEAM ELECTRIC STATION COLSTRIP, MONTANA

UNITS 3 & 4 EHP AOC AREA AND MONITORING SITES

FIGURE 3

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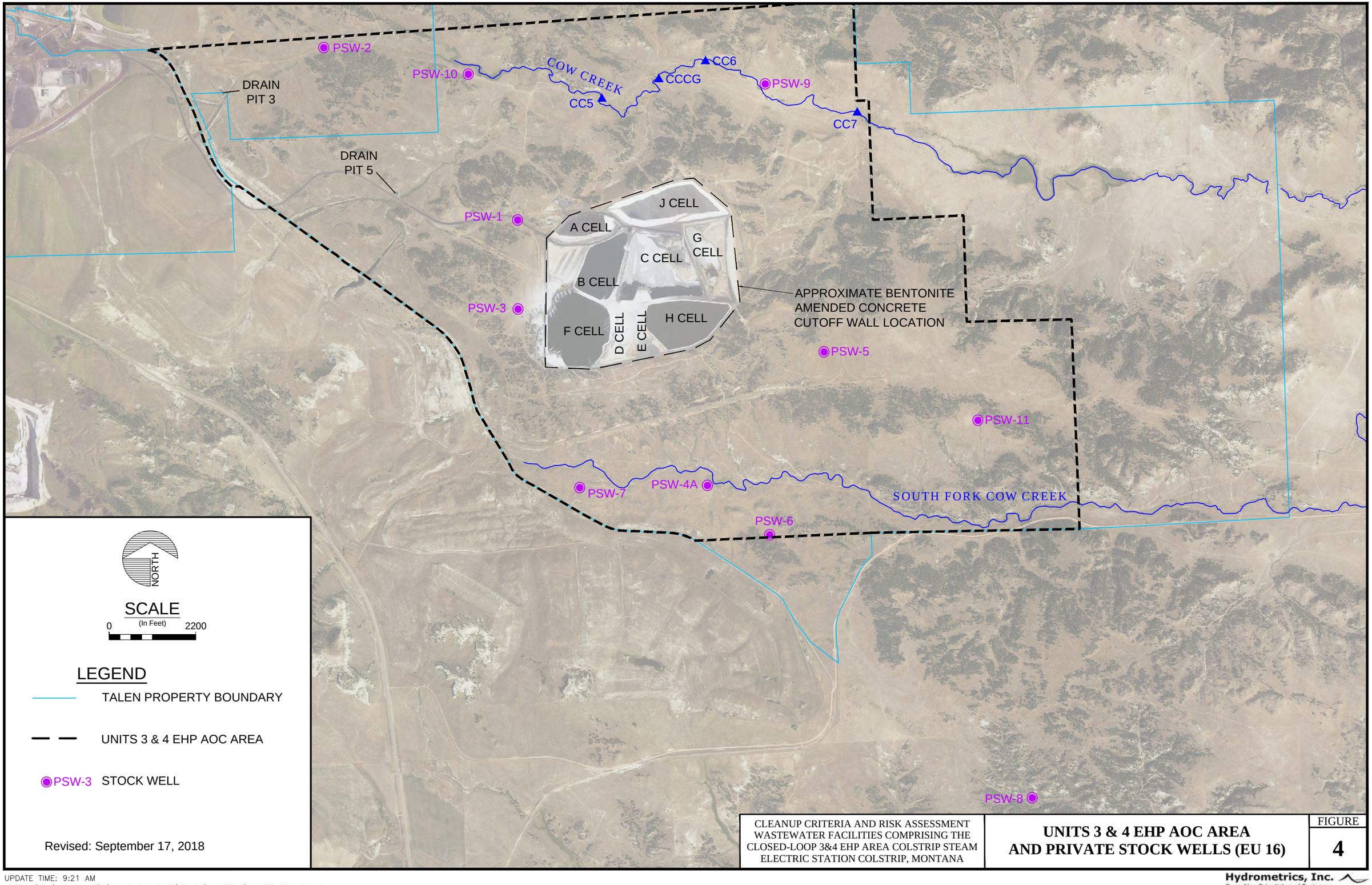

CLEANUP CRITERIA AND RISK ASSESSMENT
WASTEWATER FACILITIES COMPRISING THE
CLOSED-LOOP 3&4 EHP AREA COLSTRIP STEAM
ELECTRIC STATION COLSTRIP, MONTANA

UNITS 3 & 4 EHP AOC AREA
AND PRIVATE STOCK WELLS (EU 16)

FIGURE
4

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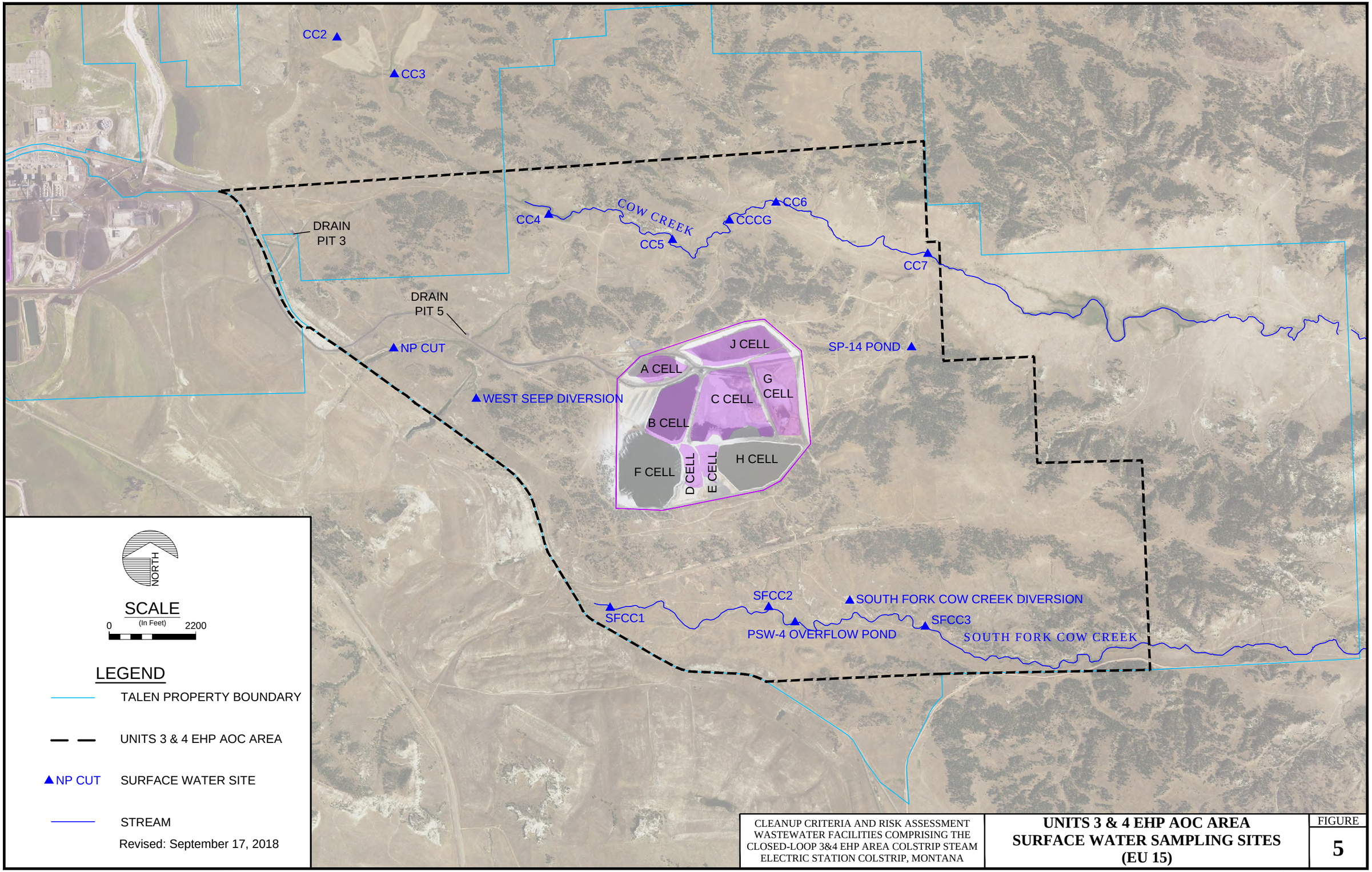

CLEANUP CRITERIA AND RISK ASSESSMENT WASTEWATER FACILITIES COMPRISING THE CLOSED-LOOP 3&4 EHP AREA COLSTRIP STEAM ELECTRIC STATION COLSTRIP, MONTANA

UNITS 3 & 4 EHP AOC AREA
SURFACE WATER SAMPLING SITES
(EU 15)

FIGURE
5

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COW CREEK

J CELL

A CELL

C CELL

G CELL

B CELL

ACTIVE OPERATIONS WITHIN FENCE

D CELL

E CELL

SOUTH FORK COW CREEK

SCALE
(In Feet)
0 1500
NORTH

LEGEND

- UNITS 3 & 4 EHP AOC AREA
- ACTIVE OPERATIONS
- GRAZING AREA TALEN
- GRAZING AREA BN
- GRAZING AREAS KLUVER
- GRAZING AREAS STATE
- CONTROLLED ACCESS HUNTING AREA

Revised: June 1, 2018

CLEANUP CRITERIA AND RISK ASSESSMENT WASTEWATER FACILITIES COMPRISING THE CLOSED-LOOP 3&4 EHP AREA COLSTRIP STEAM ELECTRIC STATION COLSTRIP, MONTANA

UNITS 3 & 4 EHP AOC AREA CURRENT LAND USES

FIGURE
6

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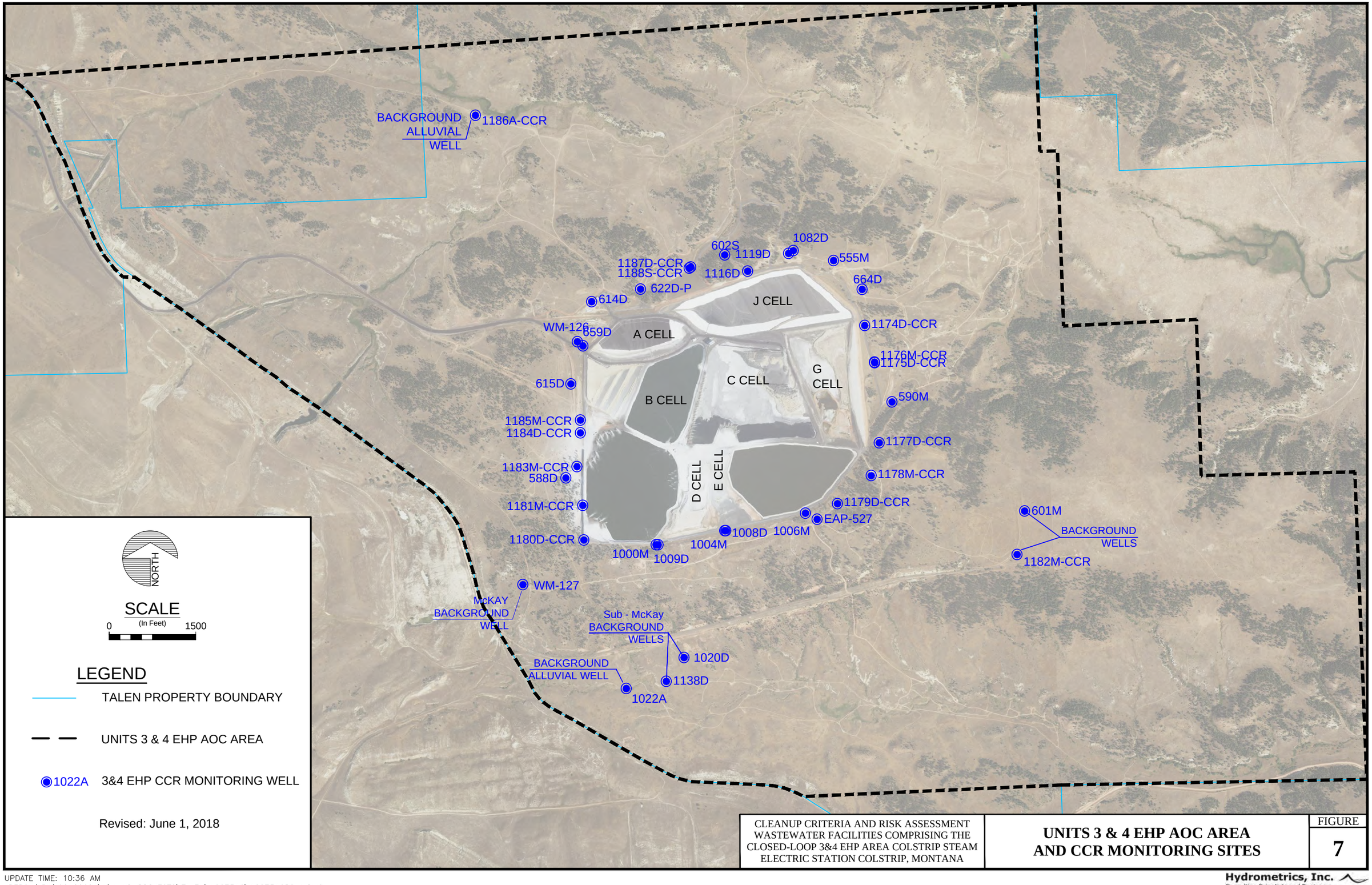

CLEANUP CRITERIA AND RISK ASSESSMENT
WASTEWATER FACILITIES COMPRISING THE
CLOSED-LOOP 3&4 EHP AREA COLSTRIP STEAM
ELECTRIC STATION COLSTRIP, MONTANA

UNITS 3 & 4 EHP AOC AREA AND CCR MONITORING SITES

FIGURE
7

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Primary Source	Primary Release Mechanism	Secondary Source	Secondary Release Mechanism	Media	Exposure Pathway	Current and Future Industrial Outdoor Workers	Current and Future Construction Worker	Current and Future Recreational User	Ecological Receptors: Terrestrial Ecological	Ecological Receptors: Aquatic Ecological
Water Based Liquid	Pond Overflow/ Pipeline Releases	Surface Soil	None	Surface Soil	Ingestion	•	•	•	•	o
					Dermal	•	•	•	•	o
			Migration	Ephemeral Surface Water	Ingestion	~	(2)	~	•	~
					Dermal	~	(2)	~	†	~
			Wind	Outdoor Air (Particulates)	Inhalation	•	•	•	†	o
	Pond Seepage	Groundwater	None	Groundwater	Ingestion	~	~	o	Δ	o
					Dermal	~	~	o	o	o
			Migration(1)	Ephemeral Surface Water	Ingestion	~	(2)	~	•	~
					Dermal	~	(2)	~	†	~
Background Geology	Leaching	Groundwater	None	Groundwater	Ingestion	~	~	o	Δ	o
					Dermal	~	~	o	o	o
			Migration	Ephemeral Surface Water	Ingestion	~	(2)	~	•	~
					Dermal	~	(2)	~	†	~

Notes:

- • Potentially complete exposure pathway; evaluated quantitatively
- ~ Potentially complete exposure pathway; evaluated qualitatively by comparison to DEQ-7
- † Minor pathway, not quantitatively evaluated
- o Incomplete exposure pathway
- (1) Groundwater migration to downgradient creeks is a hypothetical scenario to fulfill DEQ's request to evaluate the Facility without the capture system. At present, the capture system interupts this migration pathway.
- (2) Construction worker exposures to surface water are not required by DEQ (infrequent, minor pathways)
- Δ Livestock groundwater consumption (pumping of groundwater to stock tanks)

Marietta Canty, LLC
Environmental Consulting

Revised September 17, 2018

CLEANUP CRITERIA AND RISK ASSESSMENT WASTEWATER FACILITIES COMPRISING THE CLOSED-LOOP 3&4 EHP AREA COLSTRIP STEAM ELECTRIC STATION COLSTRIP, MONTANA

SITE CONCEPTUAL EXPOSURE MODEL

FIGURE **8**

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EU 9
DP-3 SEEP
DRAIN
PIT 3
EU 10
DP-5 SEEP
DRAIN
PIT 5
EU 11
WEST SEEP
SOIL AREA
MAIN DAM 2
EU 12
MAIN DAM 1
J CELL/
J1 CELL
A CELL
G CELL
B CELL
C CELL
F CELL
D CELL/
E CELL
H
CELL
EU 13
SADDLE DAM EAST 1
SADDLE DAM EAST 3
SADDLE DAM EAST 2
EU 14
SFCC SEEP

NORTH

SCALE
(In Feet)
600 0 600 1200 1800

LEGEND

APPROXIMATE TALEN PROPERTY BOUNDARY

SOIL SAMPLE INVESTIGATION AREA/ EU BOUNDARY

Hydrometrics, Inc.
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Billings, Montana 59106
5602 Hesper Road
(406) 656-1172

CLEANUP CRITERIA AND RISK ASSESSMENT
WASTEWATER FACILITIES COMPRISING THE
CLOSED-LOOP 3&4 EHP AREA COLSTRIP STEAM
ELECTRIC STATION COLSTRIP, MONTANA

EXPOSURE UNITS

DRAWING FILE NUMBER
1207318B014
AUTOCAD 2000 DRAWING (DWG)
EXHIBIT
9

UPDATE TIME: 3:20 PM
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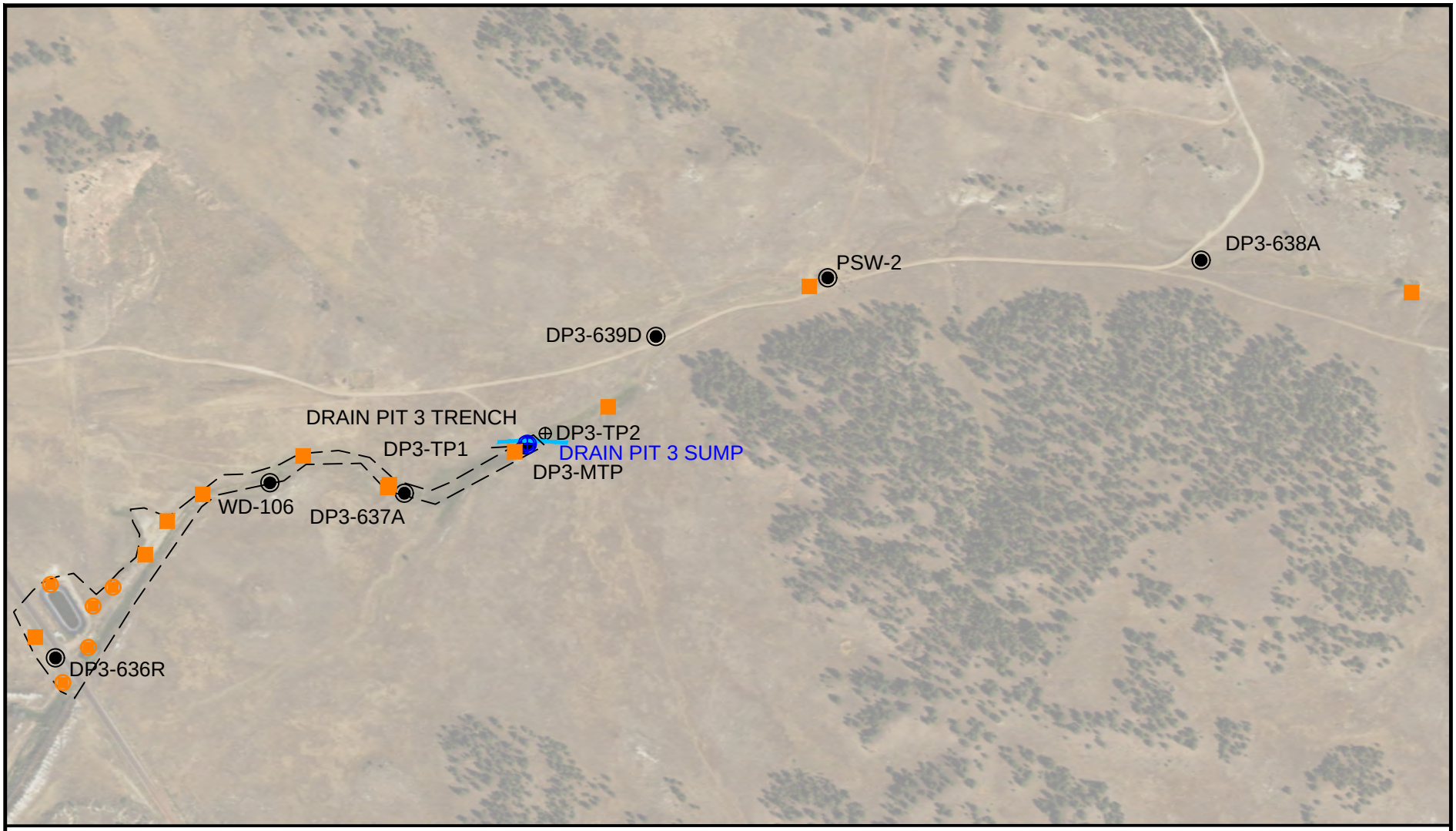

LEGEND

WD-106	MONITORING WELL
DRAIN PIT 3	CAPTURE WELL
WD-106	PIEZOMETER
	INTERCEPTION TRENCH
	APPROXIMATE EXTENT OF POTENTIALLY IMPACTED SOIL
	SOIL SAMPLE LOCATION
	DEEP SAMPLE LOCATION

NORTH

SCALE
(In Feet)
0 500

CLEANUP CRITERIA AND RISK ASSESSMENT
WASTEWATER FACILITIES COMPRISING THE
CLOSED-LOOP 3&4 EHP AREA COLSTRIP STEAM
ELECTRIC STATION COLSTRIP, MONTANA

DRAIN PIT 3
SOIL SAMPLING AREA (EU 9)

FIGURE
10

UPDATE TIME: 11:59 AM
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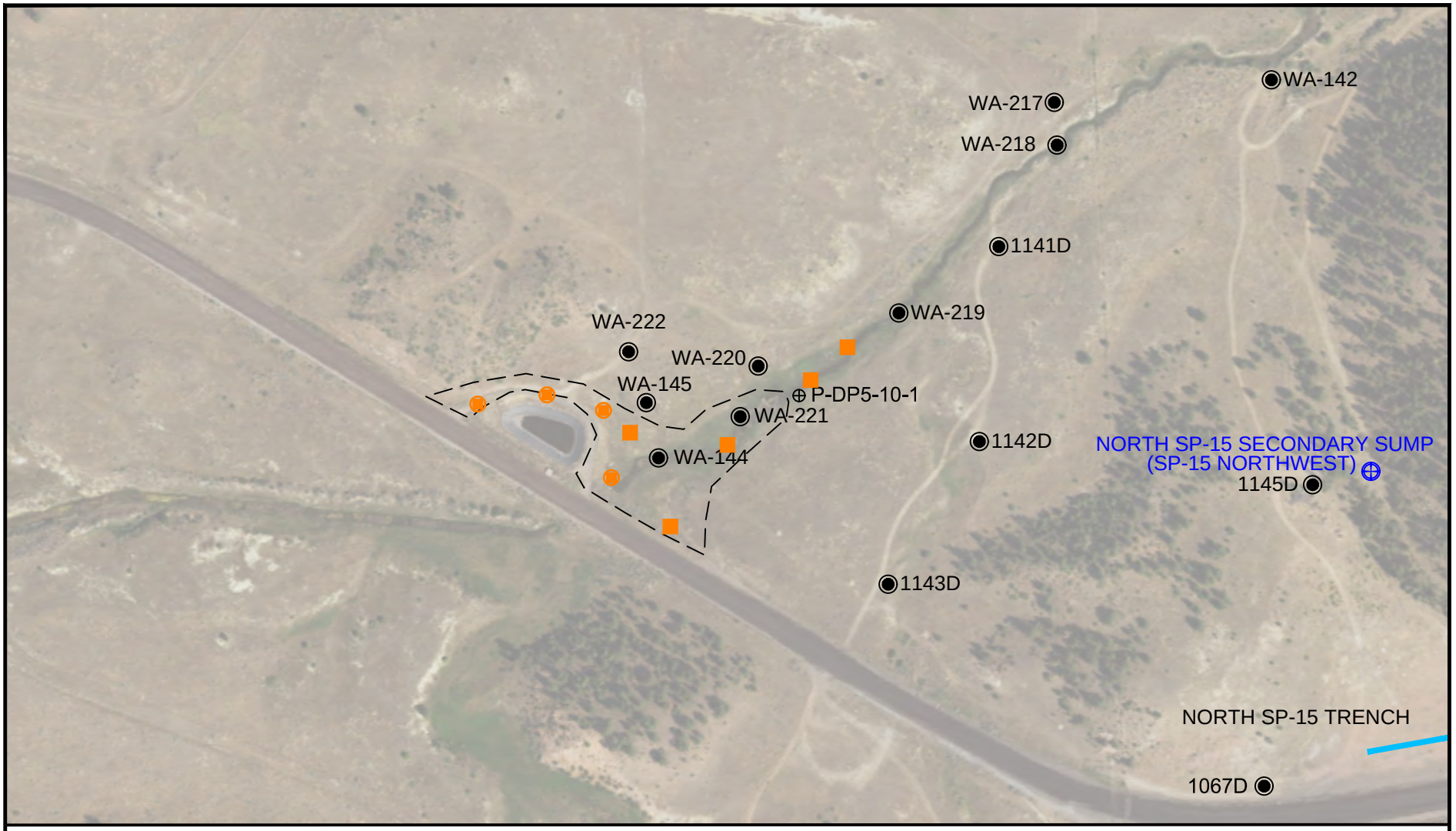

LEGEND

- WA-222 — MONITORING WELL
- SP-15 — CAPTURE WELL
- P-DP5-10-1 — PIEZOMETER
- INTERCEPTION TRENCH
- APPROXIMATE EXTENT OF POTENTIALLY IMPACTED SOIL
- SOIL SAMPLE LOCATION
- DEEP SAMPLE LOCATION

NORTH

SCALE
0 (In Feet) 300

CLEANUP CRITERIA AND RISK ASSESSMENT
WASTEWATER FACILITIES COMPRISING THE
CLOSED-LOOP 3&4 EHP AREA COLSTRIP STEAM
ELECTRIC STATION COLSTRIP, MONTANA

DRAIN PIT 5
SOIL SAMPLING AREA (EU 10)

FIGURE
11

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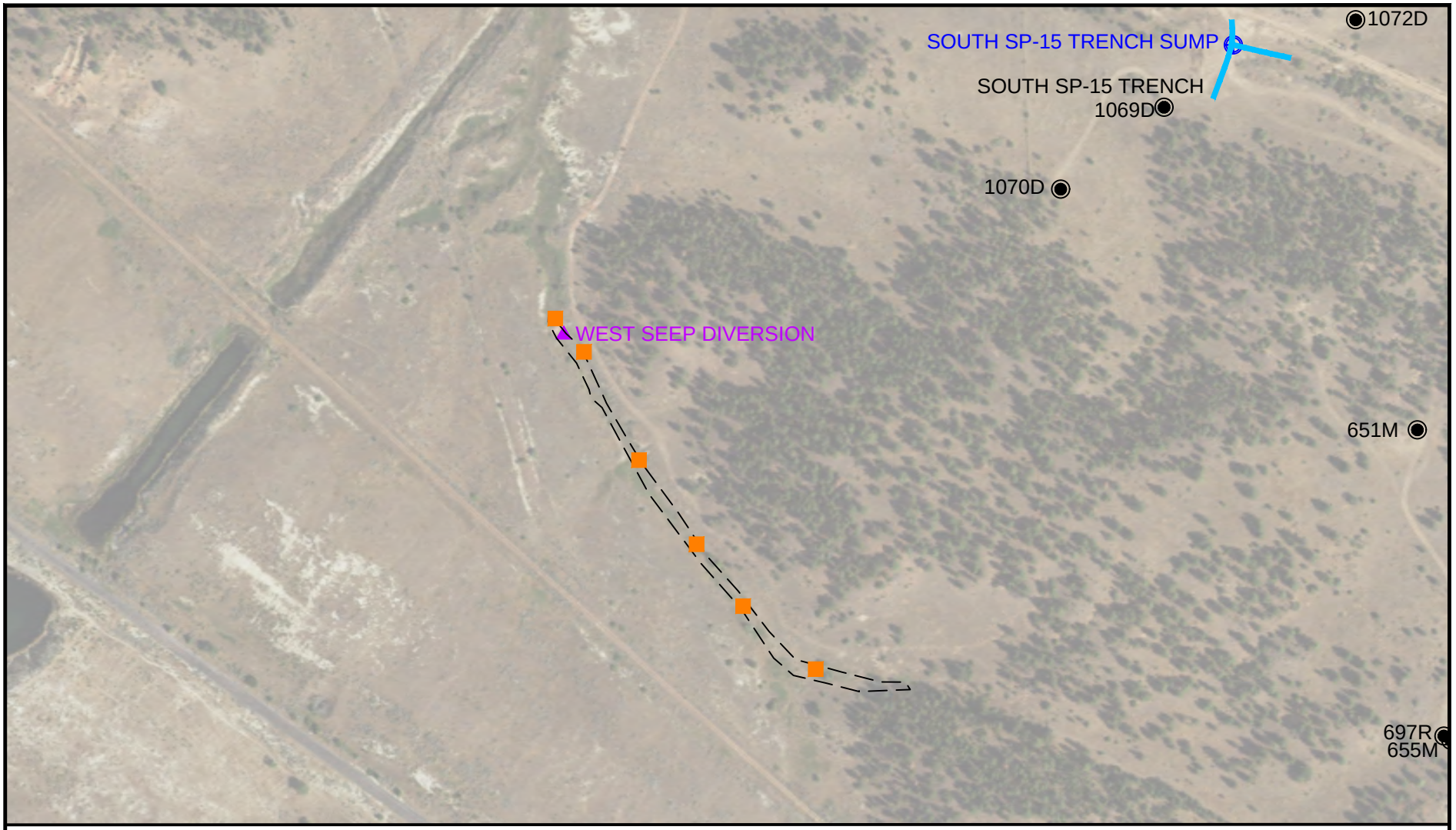

LEGEND

1070D	MONITORING WELL
SP-15	CAPTURE WELL
WEST SEEP	SURFACE WATER SITE
	INTERCEPTION TRENCH
	APPROXIMATE EXTENT OF POTENTIALLY IMPACTED SOIL
	SOIL SAMPLE LOCATION

NORTH

SCALE
0 (In Feet) 300

CLEANUP CRITERIA AND RISK ASSESSMENT
WASTEWATER FACILITIES COMPRISING THE
CLOSED-LOOP 3&4 EHP AREA COLSTRIP STEAM
ELECTRIC STATION COLSTRIP, MONTANA

WEST SEEP
SOIL SAMPLING AREA (EU 11)

FIGURE
12

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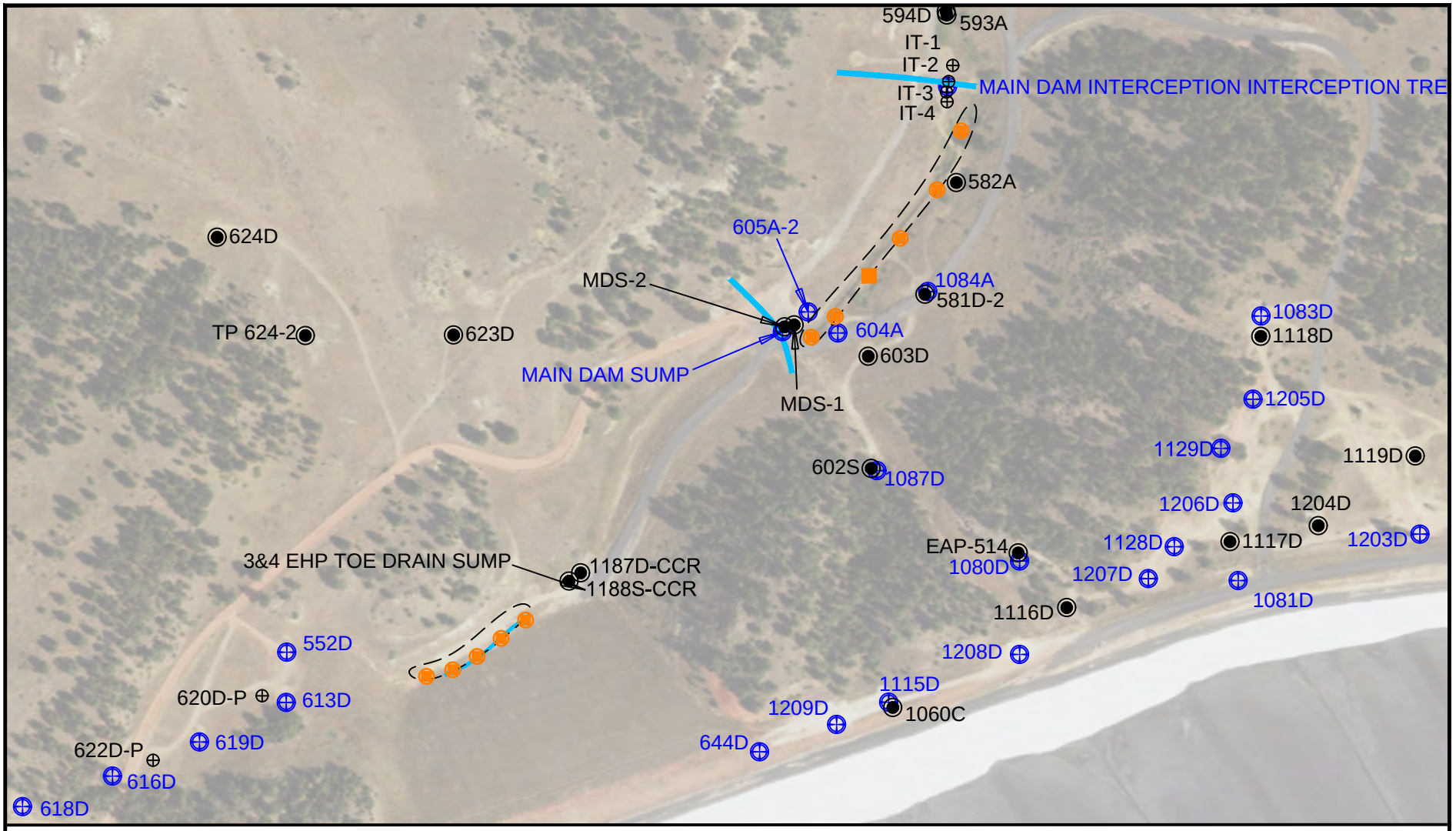

LEGEND

1168R	MONITORING WELL
1169R	CAPTURE WELL
	INTERCEPTION TRENCH
	APPROXIMATE EXTENT OF POTENTIALLY IMPACTED SOIL
	SOIL SAMPLE LOCATION
	DEEP SOIL SAMPLE LOCATION

NORTH

SCALE
0 (In Feet) 300

CLEANUP CRITERIA AND RISK ASSESSMENT
WASTEWATER FACILITIES COMPRISING THE
CLOSED-LOOP 3&4 EHP AREA COLSTRIP STEAM
ELECTRIC STATION COLSTRIP, MONTANA

MAIN DAM
SOIL SAMPLING AREA (EU 12)

FIGURE
13

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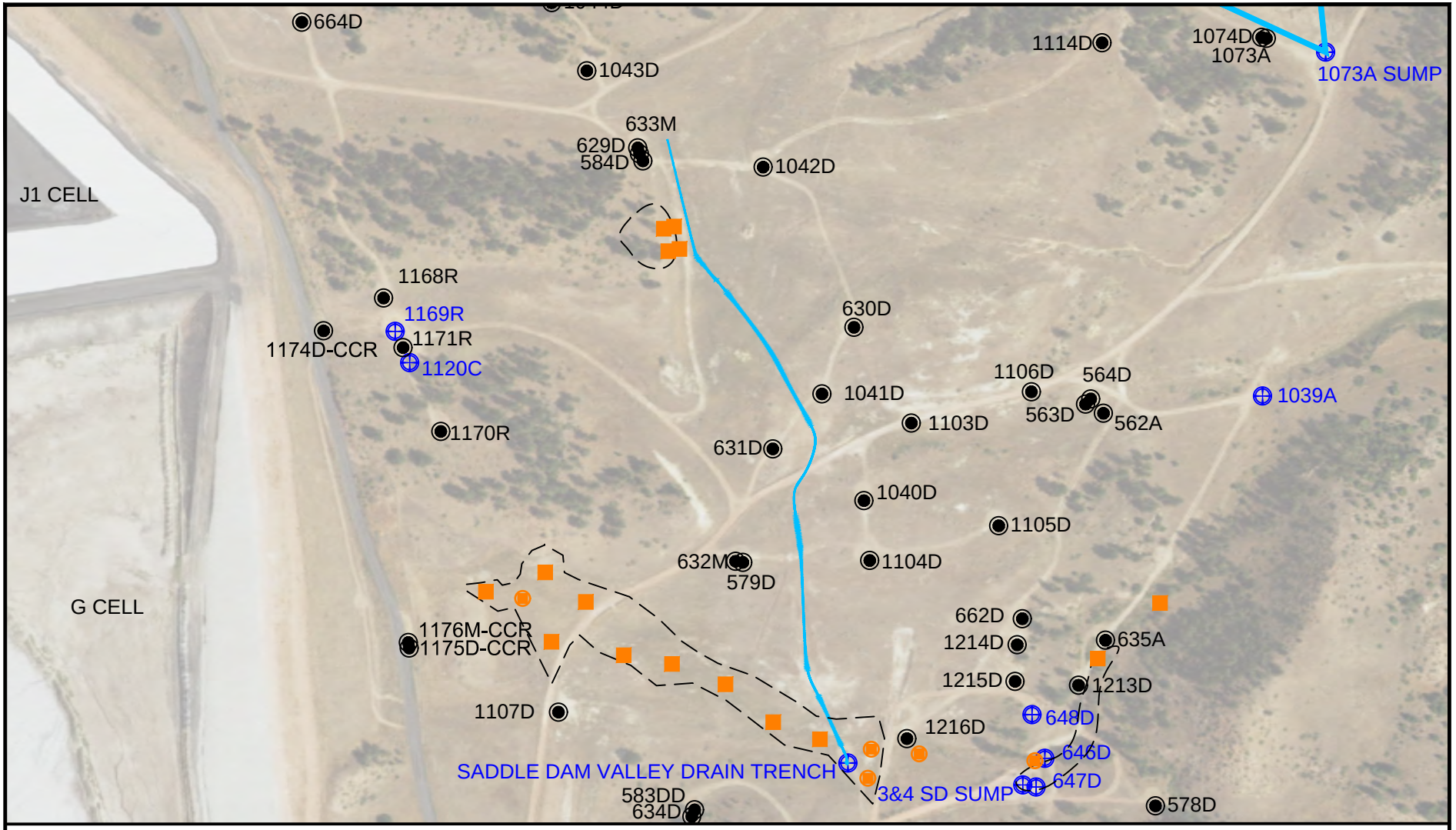

LEGEND

- 1168R — MONITORING WELL
- 1169R — CAPTURE WELL
- INTERCEPTION TRENCH
- APPROXIMATE EXTENT OF POTENTIALLY IMPACTED SOIL
- SOIL SAMPLE LOCATION

NORTH

SCALE
0 (In Feet) 300

CLEANUP CRITERIA AND RISK ASSESSMENT
WASTEWATER FACILITIES COMPRISING THE
CLOSED-LOOP 3&4 EHP AREA COLSTRIP STEAM
ELECTRIC STATION COLSTRIP, MONTANA

SADDLE DAM
SOIL SAMPLING AREA (EU 13)

FIGURE
14

UPDATE TIME: 11:59 AM
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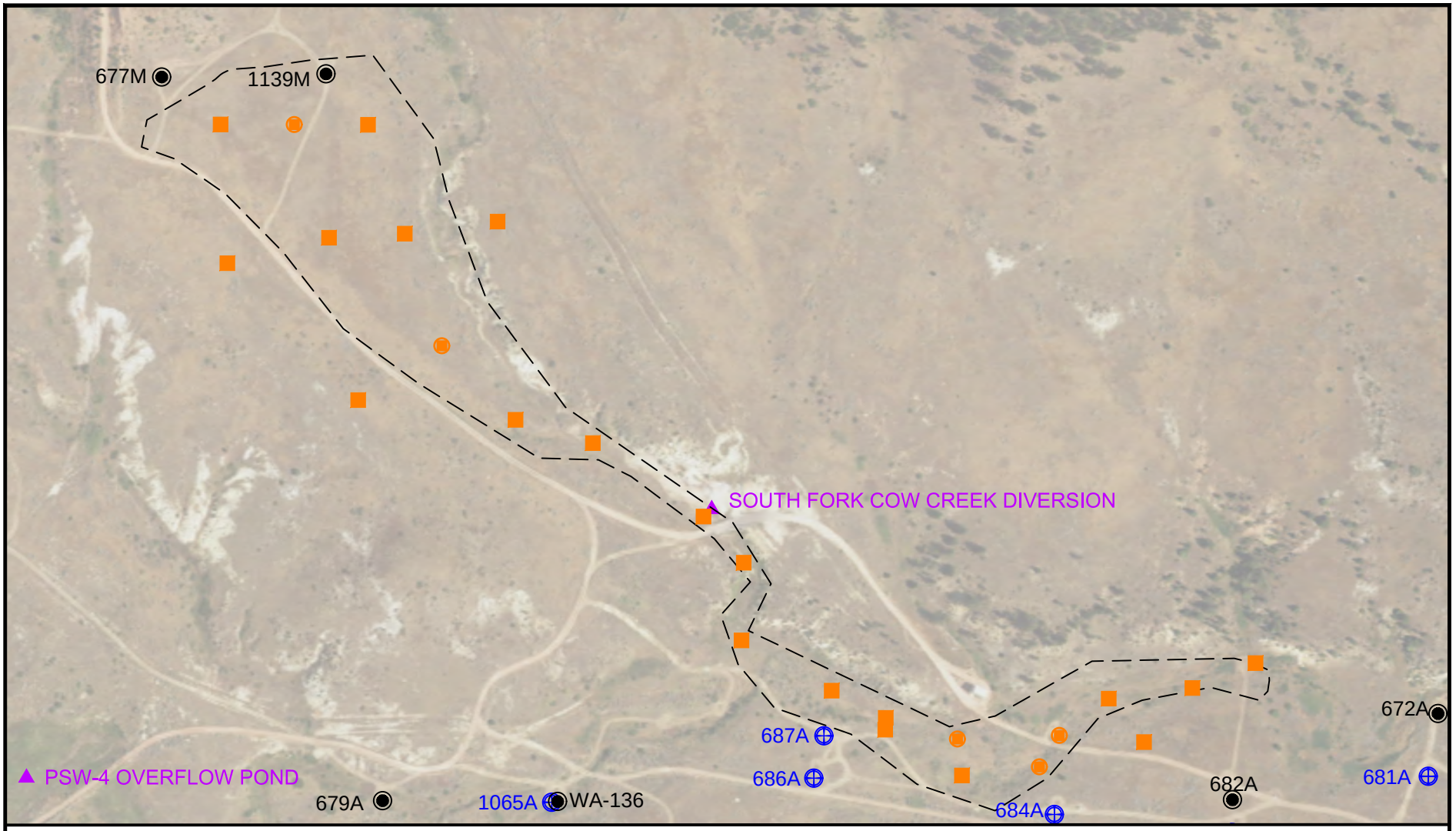

LEGEND

677M	MONITORING WELL
1065A	CAPTURE WELL
WEST SEEP	SURFACE WATER SITE

APPROXIMATE EXTENT OF POTENTIALLY IMPACTED SOIL
SOIL SAMPLE LOCATION
DEEP SAMPLE LOCATION

NORTH

SCALE
0 (In Feet) 300

CLEANUP CRITERIA AND RISK ASSESSMENT
WASTEWATER FACILITIES COMPRISING THE
CLOSED-LOOP 3&4 EHP AREA COLSTRIP STEAM
ELECTRIC STATION COLSTRIP, MONTANA

SOUTH FORK COW CREEK
SOIL SAMPLING AREA (EU 14)

FIGURE
15

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APPENDIX A

Administrative Order on Consent Summary

A. SUMMARY OF THE ADMINISTRATIVE ORDER ON CONSENT

The proposed approach for the selection of the Constituents of Interest (COIs) is presented in the following sections.

A.1 AOC DEFINITION OF COI AND CONTROL ACTIONS

The AOC (DEQ/PPLM, 2012; Article IV.F) defines Constituents of Interest (COI) as those parameters found in soil, groundwater, or surface water that (1) result from Site operations and the wastewater facilities and (2) exceed background or unaffected reference area concentrations.

The AOC (DEQ/PPLM, 2012; Article IV.B) defines Control Actions as remedial actions directed exclusively toward reducing, containing or controlling the seepage or migration of regulated substances including but not limited to sulfate, boron, selenium, potassium, sodium, magnesium, total dissolved solids, and salinity measured by specific electrical conductance through the environment. Control actions shall include affirmative source mitigation measures.

Based on the above AOC definitions, COIs and regulated substances may overlap. The regulated substances listed in the Control Action definition (sulfate, boron, selenium, potassium, sodium, magnesium, total dissolved solids, and salinity) are interpreted as the minimum required constituents that should be included in the remedial action development. The COIs are interpreted as constituents beyond the minimum required constituents that may be identified in soil, groundwater, or surface that resulted from Site operations and exceed background concentrations. Both the regulated substances and the COIs are interpreted to require inclusion in the remedial action development. Remedial actions designed to directly mitigate certain constituents will indirectly mitigate other constituents, as well.

A.2 AOC DEFINITION OF CLEANUP CRITERIA

The AOC (DEQ/PPLM, 2012; Article IV.G) defines the following Cleanup Criteria for the COIs:

1. For each COI in ground or surface water, except for the evaluation for ecological receptors, the applicable standard contained in the most current version of Circular DEQ-7 Montana Numeric Water Quality Standards ("DEQ-7"), the USEPA maximum contaminant level, the risk-based screening level contained in the most current version of Montana Risk-Based Guidance for Petroleum Releases, *whichever* is more stringent; and, for COIs for which there is not a DEQ-7 standard, a maximum contaminant level, or a risk-based screening level contained in the Montana Risk-Based Guidance for Petroleum Releases, the tap water screening level contained in the most current version of USEPA Regional Screening Levels for Chemical Constituents at Superfund Sites, except that no criterion may be more stringent than the background or unaffected reference areas concentrations; and

2. For each COI in ground or surface water that may impact an ecological receptor, an acceptable ecological risk determined using the most current versions of standard USEPA ecological risk assessment guidance if the criteria set pursuant to (1) above are not adequate to protect ecological receptors, except that no criterion may be more stringent than the background or unaffected reference areas concentrations;

3. For each COI in soil, the more stringent of:

   (a) A cumulative human health risk of 1×10^{-5} for carcinogens or a cumulative hazard index of 1 for non-carcinogenic COIs, except that no criterion may be more stringent than the background or unaffected reference areas concentrations;

   (b) An acceptable ecological risk, determined using the most current versions of standard USEPA ecological risk assessment guidance if the criteria set pursuant to (a) above are not adequate to protect ecological receptors, except that no criterion may be more stringent than the background or unaffected reference areas concentrations; or

   (c) The risk-based screening level contained in the most current version of Montana Risk-Based Guidance for Petroleum Releases, except that no criterion may be more stringent than the background or unaffected reference areas concentrations.

A.2.1 Groundwater Cleanup Criteria

According to the AOC, the Cleanup Criteria for each groundwater COI, except for the evaluation for ecological receptors, is the most stringent of the following:

- The applicable standard contained in the most current version of Circular DEQ-7 Montana Numeric Water Quality Standards ("DEQ-7"). It should be noted, in addition, that the MDEQ considers the DEQ-7 Standards to be clean-up values for groundwater, rather than screening levels (MDEQ, 2014).
- The EPA maximum contaminant level (MCL)
- The risk-based screening level (RBSL) contained in the most current version of Montana Risk-Based Guidance for Petroleum Releases

In addition, for COIs for which there is not a DEQ-7 standard, a maximum contaminant level, or a risk-based screening level contained in the Montana Risk-Based Guidance for Petroleum Releases, the cleanup criteria will be the tap water screening level contained in the most current version of the USEPA Regional Screening Levels (RSLs) for Chemical Constituents at Superfund Sites. No cleanup criterion, however, may be more stringent than the background or unaffected reference areas concentrations.

A.2.2 Surface Water Cleanup Criteria

According to the AOC, the Cleanup Criteria for each COI in surface water, except for the evaluation for ecological receptors, is the most stringent of the following:

- The applicable standard contained in the most current version of the DEQ-7 Circular. It should be noted, in addition, that the MDEQ considers the DEQ-7 Standards to be clean-up values for groundwater, rather than screening levels (DEQ, 2017c).
- The USEPA MCL.
- The RBSL contained in the most current version of Montana Risk-Based Guidance for Petroleum Releases.

In addition, for COIs for which there is not a DEQ-7 standard, a MCL, or a RBSL contained in the Montana Risk-Based Guidance for Petroleum Releases, the cleanup criteria will be the tap water screening level contained in the most current version of the EPA RSLs for Chemical Constituents at Superfund Sites. No cleanup criterion, however, may be more stringent than the background or unaffected reference areas concentrations. Note also, that some special cases may exist due to geospatial variations, in which ambient water at one site is naturally above background screening levels. Such cases will require examination on an individual basis in conjunction with the MDEQ.

A.2.3 Soil Cleanup Criteria

According to the AOC, the cleanup criteria for each COI in soil (soil data is available for areas of surface releases and sediment data is available for the Creek) is the most stringent of the following:

(a) A cumulative human health risk of 1×10^{-5} for carcinogens or a cumulative hazard index of 1 for non-carcinogenic constituents of interest, except that no criterion may be more stringent than the background or unaffected reference areas concentrations;

(b) An acceptable ecological risk, determined using the most current versions of standard USEPA ecological risk assessment guidance if the criteria set pursuant to (a) above are not adequate to protect ecological receptors, except that no criterion may be more stringent than the background or unaffected reference areas concentrations; or

(c) The risk-based screening level contained in the most current version of Montana Risk-Based Guidance for Petroleum Releases, except that no criterion may be more stringent than the background or unaffected reference areas concentrations.

Note: The AOC does not specifically define sediment cleanup criteria separately from soil cleanup criteria. However, according to DEQ guidance (2017b), sediment concentrations should be compared to the following ecological screening levels.

- USEPA Region 3 Biological Technical Assistance Group (BTAG) Freshwater Sediment Screening Benchmarks.

APPENDIX B

USEPA RAGS Part D Tables 1 through 10

Table B-1.1 USEPA RAGS Part D Table 1 , Selection of Exposure Pathways for Surface Water 11/7/2018
Human Health Risk Assessment
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP AOC Area, Colstrip Steam Electric Station, Colstrip Montana

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rational for Selection or Exclusion of Exposure Path
Current and Future	Surface Water	Surface Water	3&4 EHP Area	Resident	Adult and Child	Dermal and Incidental Ingestion	None	The 3&4 EHP Area is a controlled access area without residential areas.
				Industrial Outdoor Worker	Adult		Qual.	Outdoor Industrial Workers include both (1) Colstrip workers in areas beyond the active operations area and (2) ranchers who have leased property.
				Construction* Worker	Adult		None	Infrequent minor exposure.
				Recreational User	Adult		Qual.	Recreational receptors are limited to adult archery hunters accessing the area with permission.

Notes:

Construction*	DEQ does not require evaluation of the construction worker receptor to surface water as it is an infrequent minor exposure.
EU	Exposure unit
RAGS	Risk Assessment Guidance for Superfund
Qual.	Qualitative; this scenario qualitatively assessed through comparison (as appropriate) to DEQ-7 standards, MCLs, Tapwater RSLs and BSLs. No surface water COPCs identified.
Quan.	Quantitative; this scenario was quantitatively assessed in the human health risk assessment.
USEPA	United States Environmental Protection Agency

Table B-1.2 USEPA RAGS Part D Table 1 , Selection of Exposure Pathways for Private Stock Wells 11/15/2018
Human Health Risk Assessment
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP AOC Area, Colstrip Steam Electric Station, Colstrip Montana

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rational for Selection or Exclusion of Exposure Path
Current and Future	Private Stock Wells	Groundwater/ Surface Water	3&4 EHP Area	Resident	Adult and Child	Dermal and Incidental Ingestion	None	The 3&4 EHP Area is a controlled access area without residential areas.
				Industrial Outdoor Worker	Adult		Qual.	Outdoor Industrial Workers include both (1) Colstrip workers in areas beyond the active operations area and (2) ranchers who have leased property.
				Construction* Worker	Adult		None	Infrequent minor exposure.
				Recreational User	Adult		Qual.	Recreational receptors are limited to adult archery hunters accessing the area with permission.

Notes:

Construction*	DEQ does not require evaluation of the construction worker receptor to surface water as it is an infrequent minor exposure.
EU	Exposure unit
RAGS	Risk Assessment Guidance for Superfund
Quan.	Quantitative; this scenario was quantitatively assessed in the human health risk assessment.
USEPA	United States Environmental Protection Agency

Table B-1.3 USEPA RAGS Part D Table 1 , Selection of Exposure Pathways for Soils
Human Health Risk Assessment 11/15/2018
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP AOC Area, Colstrip Steam Electric Station, Colstrip Montana

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rational for Selection or Exclusion of Exposure Path
Current and Future	Soil	Soil	EU 9 thru EU 14 3&4 EHP Area	Resident	Adult and Child	Dermal and Incidental Ingestion	None	The 3&4 EHP Area is a controlled access area without residential areas.
				Industrial Outdoor Worker	Adult		Quan.	Outdoor Industrial Workers include both (1) Colstrip workers in areas beyond the active operations area and (2) ranchers who have leased property.
				Construction Worker	Adult		Quan.	Construction work may occur in the former seep/spill areas.
				Recreational User	Adult		Quan.	Recreational receptors are limited to adult archery hunters accessing the area with permission. Hunting may occur around former seep/spill areas.
Current and Future	Soil	Soil	EU 9 thru EU 14 3&4 EHP Area	Resident	Adult and Child	Inhalation of Soil Particulates	None	The 3&4 EHP Area is a controlled access area without residential areas.
				Industrial Outdoor Worker	Adult		Quan.	Outdoor Industrial Workers include both (1) Colstrip workers in areas beyond the active operations area and (2) ranchers who have leased property.
				Construction Worker	Adult		Quan.	Construction work may occur in the former seep/spill areas.
				Recreational User	Adult		Quan.	Recreational receptors are limited to adult archery hunters accessing the area with permission. Hunting may occur around former seep/spill areas.

Notes:

EU Exposure unit

RAGS Risk Assessment Guidance for Superfund

Quan. Quantitative; if soil COCs are retained, this scenario will be quantitatively assessed in the human health risk assessment.

USEPA United States Environmental Protection Agency

Table B-2.1 USEPA RAGS Part D Table 2, Data Summary for Surface Water, mg/L
Human Health Risk Assessment
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP AOC Area, Colstrip Steam Electric Station, Colstrip Montana

Revised 5/16/2019

Surface Water Sampling Locations	CAS Number	Chemical*	Data Time Range	Minimum [6] Concentration/ Location/ Date	Maximum [6] Concentration/ Location/Date	Detection Frequency [6]	Range of Detection Limits for Non-Detects	Most Recent Concentration Maximum/ Location/Date	Background Screening Level (2017)	Screening Value DEQ-7	COPC? (Y/N)	Rationale for Selection or Deletion
CC3, CC4, NP Cut, PSW-4 Overflow Pond, SFCC Diversion, SFCC1, SFCC2, SFCC3, SP-14, West Seep Diversion	7440-42-8	Boron Dissolved	3-5-2014 through 10-11-2017	0.2 SFCC Diversion 3-5-2015	8.9 West Seep Div 9-12-2017	39/42	< 0.1	0.9 SP-14 10-11-2017	0.88	No HHS[2] NC 4.0 Tapwater RSL	Y[7]	ASL
CC3, CC4, SFCC1, SFCC2, SFCC3	7440-42-8	Boron Total	3-5-2014 through 3-18-2014	0.6 CC3 3/18/2014	1.1 CC4 3/18/2014	2/5	<0.1	1.1 CC4 3-18-2014	0.88	No HHS[2] NC 4.0 Tapwater RSL	N	BSL
CC3, CC4, NP Cut, PSW-4 Overflow Pond, SFCC Diversion, SFCC1, SFCC2, SFCC3, SP-14, West Seep Diversion	7440-70-2	Calcium Dissolved	3-5-2014 through 10-11-2017	5 SFCC2 3-5-2014	533 NP CUT 5-12-2015	42/42	NA	190 SP-14 10-11-2017	NA	NA	N	No DEQ-7 No Tox Values
CC3, CC4, NP Cut, PSW-4 Overflow Pond, SFCC Diversion, SFCC1, SFCC2, SFCC3, SP-14, West Seep Diversion	16887-00-6	Chloride	3-5-2014 through 10-11-2017	1 SFCC2 3-5-2014	215 West Seep Diversion 9-12-2017	42/42	NA	19 SP-14 10-11-2017	NA	NA	N	No DEQ-7 No Tox Values
SFCC1, SFCC2, SFCC3	7439-97-6	Mercury Dissolved	3/18/2014	< 0.001 All Locations	< 0.001 All Locations	0/2	< 0.001	No sample	0.001	0.00005 [4] NC	N	All ND BB
SFCC1, SFCC2, SFCC3	7439-97-6	Mercury Total	3/5/2014 through 3/18/2014	< 0.0001 All Locations	< 0.0001 All Locations	0/5	< 0.0001	No sample	0.001	0.00005 [4] NC	N	All ND BB
CC3, CC4, PSW-4 Overflow Pond, SFCC Diversion, West Seep Diversion	NA	pH	3-5-2014 through 9-10-2015	7.62 CC4 3-18-2014	8.6 West Seep Diversion 9-10-2015	9/9	NA	No sample	8.206	NA	N	No DEQ-7 No Tox Values = Background
CC3, CC4, NP Cut, PSW-4 Overflow Pond, SFCC Diversion, SFCC1, SFCC2, SFCC3, SP-14, West Seep Diversion	7782-49-2	Selenium Dissolved	3-5-2014 through 10-11-2017	0.005 West Seep Diversion 9-12-2017	0.065 CC3 5-2-2017	4/42	< 0.005	< 0.005 SP-14 10-11-2017	0.01	0.050 [3] NC	N	High % ND
CC3, CC4, NP Cut, PSW-4 Overflow Pond, SFCC Diversion, SFCC1, SFCC2, SFCC3, SP-14, West Seep Diversion	7782-49-2	Selenium Total	3/5/2014 through 3/18/2014	<0.005 All Locations	<0.005 All Locations	0/5	<0.005	< 0.005 CC4 3-18-2014	0.01	0.050 [3] NC	N	All ND Detection Limit BB
CC3, CC4, NP Cut, PSW-4 Overflow Pond, SFCC Diversion, SFCC1, SFCC2, SFCC3, SP-14, West Seep Diversion	14808-79-8	Sulfate	3-5-2014 through 10-11-2017	4 SFCC1 & SFCC2 3-5-2014	10,200 West SeepDiversion 9-12-2017	42/42	NA	2,410 SP-14 10-11-2017	2,090 (dissolved)	NA	N	No DEQ-7 No Tox Values
CC3, CC4, NP Cut, PSW-4 Overflow Pond, SFCC Diversion, SFCC1, SFCC2, SFCC3, SP-14, West Seep Diversion	NA	Total Dissolved Solids (TDS)	3-5-2014 through 10-11-2017	68 SFCC2 3-5-2014	11,500 West Seep Diversion 9=-12-2017	42/42	NA	3,690 SP-14 10-11-2017	NA	NA	N	No DEQ-7 No Tox Values

Notes:

DEQ-7	Screening Levels are based on DEQ-7 values (DEQ, 2017c) and DEQ guidance if DEQ-7 values are not available (DEQ, 2017b). DEQ-7 values are total recoverable concentrations in groundwater, except for aluminum (DEQ, 2017c).
Background Screening Level	Background Screening Levels for Colstrip Steam Electric Station (Neptune 2017)
Neptune 2017	Final Report on Updated Background Screening Levels, Plant Site, 1&2 SOEP and STEP, and 3&4 EHP, Colstrip Steam Electric Station, Colstrip, Montana.
(1)	Dissolved concentrations not measured during 2015 sampling events.
(2)	No Human Health Standard (HHS) available from DEQ-7 and no MCL available. Tap Water RSL (traditional tables) was used as the screening value (DEQ, 2017c).
(3)	DEQ-7, Human Health Surface Water, based on the MCL
(4)	DEQ-7, Human Health Surface Water, based on Priority Pollutant (PP) Criteria
(5)	DEQ-7, Human Health Surface Water, based on health advisory (HA) from EPA's "Drinking Water Standards and Health Advisories" October 1996
(6)	Minimum and maximum concentrations and detection frequencies may differ in comparison to the Statistical Analysis (App D) as samples were averaged with their duplicates in the statistical analysis.
(7)	Boron was not retained as a surface water COC. Please see Section 10.1 for further discussion regarding boron in surface water.
Chemical*	Chemical lists vary between media because they were established at different times and for different objectives, but all were approved by DEQ. Some of the analyte lists were developed prior to the establishment of the Federal CCR Appendices III and IV lists.

Definitions:

AB	Above Background
ASL	Above Screening Level
BB	Below background
BSL	Below screening level
C	Carcinogen
CAS	Chemical Abstract Service
COPC	Chemical of Potential Concern
DL	Detection Level
mg/L	milligrams per liter
NA	Not Available/Not Applicable
NB	Near Background, essentially background
NC	Non-Carcinogen
ND	Non-detect
HHS	Human Health Standard
No Tox Values	No Human Health Toxicity Values available

Table B-2.2 USEPA RAGS Part D Table 2, Data Summary for Private Stock Wells, mg/L
Human Health Risk Assessment
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP AOC Area, Colstrip Steam Electric Station, Colstrip Montana

Revised 5/16/2019

Private Stock Well Sampling Locations	CAS Number	Chemical*	Data Time Range	Minimum [6] Concentration/ Location/ Date	Maximum [6] Concentration/ Location/Date	Detection Frequency [6]	Range of Detection Limits for Non-Detects	Most Recent Concentration Maximum/ Location/Date	Background Screening Level (2017)	Screening Value DEQ-7	COPC? (Y/N)	Rationale for Selection or Deletion
PSW-1, PSW-2, PSW-3, PSW-4A,PSW-6, PSW-7, PSW-9, & PSW-11	7440-42-8	Boron Total	5-29-2014 through 10-27-2017	0.3 PSW-7/6-12-2014, 5-12-2015, 5-2-2017 PSW-9/5-2-2017	2.04 PSW-4 7-30-2014	28/28	NA	1.7 PSW-4A 10-27-2017	0.88	No HHS[2] NC 4.0 Tapwater RSL	N	BSL
PSW-1, PSW-2, PSW-3, PSW-4A,PSW-6, PSW-7, PSW-9, & PSW-11	7440-70-2	Calcium Dissolved	5-29-2014 through 10-27-2017	12 PSW-11 9-9-2014	500 PSW-4A 7-30-2014	28/28	NA	462 PSW-4A 10-27-2017	NA	NA	N	No DEQ-7 No Tox Values
PSW-1, PSW-2, PSW-3, PSW-4A,PSW-6, PSW-7, PSW-9, & PSW-11	16887-00-6	Chloride	5-29-2014 through 10-27-2017	7 PSW-6 6-2016 & 5-2-2017	69 PSW-2 5-2-2017	28/28	NA	39 PSW-4A 10-27-2017	NA	NA	N	No DEQ-7 No Tox Values
PSW-4A & PSW-11	NA	pH	6-3-2014 through 9-92014	7.09 PSW-4A 7-30-2014	8.1 PSW-11 9-9-2014	3/3	NA	No sample	8.206	NA	N	No DEQ-7 No Tox Values = Background
PSW-1, PSW-2, PSW-3, PSW-4A,PSW-6, PSW-7, PSW-9, & PSW-11	7782-49-2	Selenium Total	5-29-2014 through 10-27-2017	0.0006 PSW-4A 12-3-2014	0.089 PSW-4A 10-27-2017	6/28	< 0.0007 - <0.005	0.089 PSW-4A 10-27-2017	0.01	0.050 [3] NC	N	High % ND BB
PSW-1, PSW-2, PSW-3, PSW-4A,PSW-6, PSW-7, PSW-9, & PSW-11	14808-79-8	Sulfate	5-29-2014 through 10-27-2017	721 PSW-7 5-12-2015	2,780 PSW-2 5-2-2017	28/28	NA	2,440 PSW-4A 10-27-2017	2,090 (dissolved)	NA	N	No DEQ-7 No Tox Values
PSW-1, PSW-2, PSW-3, PSW-4A,PSW-6, PSW-7, PSW-9, & PSW-11	NA	Total Dissolved Solids (TDS)	5-29-2014 through 10-27-2017	1,530 PSW-7 5-2-2017	4,290 PSW-2 3-31-2015	28/28	NA	3,580 PSW-4A 10-27-2017	NA	NA	N	No DEQ-7 No Tox Values

Notes:

DEQ-7	Screening Levels are based on DEQ-7 values (DEQ, 2017c) and DEQ guidance if DEQ-7 values are not available (DEQ, 2017b). DEQ-7 values are total recoverable concentrations in groundwater, except for aluminum (DEQ, 2017c).
Background Screening Level	Background Screening Levels for Colstrip Steam Electric Station (Neptune 2017)
Neptune 2017	Final Report on Updated Background Screening Levels, Plant Site, 1&2 SOEP and STEP, and 3&4 EHP, Colstrip Steam Electric Station, Colstrip, Montana.
(1)	Dissolved concentrations not measured during 2015 sampling events.
(2)	No Human Health Standard (HHS) available from DEQ-7 and no MCL available. Tap Water RSL (traditional tables) was used as the screening value (DEQ, 2017c).
(3)	DEQ-7, Human Health Surface Water, based on the MCL
(4)	DEQ-7, Human Health Surface Water, based on Priority Pollutant (PP) Criteria
(5)	DEQ-7, Human Health Surface Water, based on health advisory (HA) from EPA's "Drinking Water Standards and Health Advisories" October 1996
(6)	Minimum and maximum concentrations and detection frequencies may differ in comparison to the Statistical Analysis (App D) as samples were averaged with their duplicates in the statistical analysis.
Chemical*	Chemical lists vary between media because they were established at different times and for different objectives, but all were approved by DEQ. Some of the analyte lists were developed prior to the establishment of the Federal CCR Appendices III and IV lists.

Definitions:

AB	Above Background
ASL	Above Screening Level
BB	Below background
BSL	Below screening level
C	Carcinogen
CAS	Chemical Abstract Service
COPC	Chemical of Potential Concern
DL	Detection Level
mg/L	milligrams per liter
NA	Not Available/Not Applicable
NB	Near Background, essentially background
NC	Non-Carcinogen
ND	Non-detect
HHS	Human Health Standard
No Tox Values	No Human Health Toxicity Values available

Table B-2.3 USEPA RAGS Part D Table 2, Data Summary for Soil, EU9 Drain Pit 3 Seep, mg/kg, except where noted
Human Health Risk Assessment
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP AOC Area, Colstrip Steam Electric Station, Colstrip Montana

5/16/2019

Exposure Unit	Sampling Location	CAS Number	Chemical*	Date	Depth Range	Minimum [3] Concentration/ Location/Depth	Maximum [3] Concentration/ Location/Depth	Detection Frequency [3]	Range of Detection Limits for Non-Detects	RSLs - Carcinogens Residential Industrial	RSLs - Non-carcinogens Residential Industrial 1/10th	BTV for Inorganics in Montana Soils	COPC? (Y/N)	Rationale for Selection or Deletion	Protection of Groundwater SSL [1]	Leaching COPC Flag (Y/N)
EU9	Drain Pit 3	7440-36-0	Antimony	5/7/2018 - 5/8/2018	0-84 inches	7 DP3-2 12-24 inches	7 DP3-2 12-24 inches	1/39	< 1	NA	3.1 47	0.4	N	Low Detection Frequency	2.7	N[9]
EU9	Drain Pit 3	7440-38-2	Arsenic	5/7/2018 - 5/8/2018	0-84 inches	2 DP3-16 0-6 inches	47 DP3-2 12-24 inches	38/39	< 2	NA	NA	22.5	Y[8]	ASL	22.5 [2]	Y[4]
EU9	Drain Pit 3	7440-39-3	Barium	5/7/2018 - 5/8/2018	0-84 inches	35 DP3-5 72-84 inches	787 DP3-3 12-24 inches	39/39	NA	NA	1,500 22,000	429 [6]	N	BSL	421	Y[4]
EU9	Drain Pit 3	7440-41-7	Beryllium	5/7/2018 - 5/8/2018	0-84 inches	<1 All locations	<1 All locations	0/39	< 1	NA	16 230	1.1	N	All ND DL is BSL	32	N
EU9	Drain Pit 3	7440-42-8	Boron	5/7/2018 - 5/8/2018	0-84 inches	7 DP3-15 12-24 inches	78 DP3-6 0-6 inches	39/39	NA	NA	1,600 23,000	NA	N	BSL	130	N
EU9	Drain Pit 3	7440-43-9	Cadmium	5/7/2018 - 5/8/2018	0-84 inches	< 1 All locations	< 1 All locations	0/39	< 1	NA	7.1 98	0.7	N	All ND DL is BSL	3.8	N
EU9	Drain Pit 3	7440-70-2	Calcium (meq/L) sat. paste	5/7/2018 - 5/8/2018	0-84 inches	2.18 DP3-4 12-24 inches	27.1 DP3-5 0-6 inches	39/39	NA	NA	NA	NA	N	NS	NA	N
EU9	Drain Pit 3	16887-00-6	Chloride (mg/L) sat. paste	5/7/2018 - 5/8/2018	0-84 inches	3 DP3-4 12-24 inches & 72-84 inches	764 DP3-16 12-24 inches	39/39	NA	NA	NA	NA	N	NS	NA	N
EU9	Drain Pit 3	7440-47-3	Chromium	5/7/2018 - 5/8/2018	0-84 inches	6 DP3-3 36-48 inches	21 DP3-11 12-24 inches	39/39	NA	NA	12,000 180,000	41.7	N	BSL BB	4 x 10^8	N
EU9	Drain Pit 3	7440-48-4	Cobalt	5/7/2018 - 5/8/2018	0-84 inches	3 DP3-3 36-48 inches	9 DP3-5 72-84 inches	39/39	NA	NA	2.3 35	10.0[6]	N	BB	2.7	N BB
EU9	Drain Pit 3	16984-48-8	Fluoride (mg/L) sat. paste	5/7/2018 - 5/8/2018	0-84 inches	0.6 DP3-4 0-6 inches	1.6 DP3-4 12-24 inches	3/39	<0.5 to <20	NA	310 4,700	NA	N	BSL	1,200	N
EU9	Drain Pit 3	7439-92-1	Lead	5/7/2018 - 5/8/2018	0-84 inches	6 DP3-3 36-48 inches	17 DP3-5 72-84 inches	39/39	NA	NA	400 800	29.8	N	BSL	140	N
EU9	Drain Pit 3	7439-93-2	Lithium	5/7/2018 - 5/8/2018	0-84 inches	5.0 DP3-3 36-48 inches	17 DP3-5 12-24 inches	38/39	< 20	NA	16 230	NA	Y[8]	ASL	120	N
EU9	Drain Pit 3	7439-95-4	Magnesium	5/7/2018 - 5/8/2018	0-84 inches	1.17 DP3-15 12-24 inches	349 DP3-16 12-24 inches	39/39	NA	NA	NA	NA	N	NS	NA	N
EU9	Drain Pit 3	7439-96-5	Manganese	5/7/2018 - 5/8/2018	0-84 inches	102 DP3-9 0-6 inches	619 DP3-3 12-24 inches	39/39	NA	NA	180 2,600	880[6]	N	BB	280	N BB
EU9	Drain Pit 3	7439-97-6	Mercury	5/7/2018 - 5/8/2018	0-84 inches	<1 All locations	<1 All locations	0/39	< 1	NA	1.1 4.6	<0.05	N	All ND DL is BSL	1.0	N
EU9	Drain Pit 3	7439-98-7	Molybdenum	5/7/2018 - 5/8/2018	0-84 inches	1 Several Location	6 DP3-2 36-48 inches	19/39	< 1	NA	39 580	NA	N	BSL	20	N
EU9	Drain Pit 3	NA	pH std sat. paste	5/7/2018 - 5/8/2018	0-84 inches	7.2 DP3-1 0-6 inches	8.4 DP3-16 0-6 inches & 12-24 inches	39/39	NA	NA	NA	NA	N	NS	NA	N
EU9	Drain Pit 3	7440-14-4	Ra 226[7] (pCi/g)	5/7/2018 - 5/8/2018	0-84 inches	0.1 DP3-5 12-24 inches	0.8 DP3-11 12-24 inches	39/39	NA	0.124 4.73 71.2	NA	NA	Y[8]	ASL	NA	N
EU9	Drain Pit 3	7440-14-4	Ra 228[7] (pCi/g)	5/7/2018 - 5/8/2018	0-84 inches	0.3 DP3-2/12-24 inches DP3-3/12-24 inches	1.2 DP3-5 72-84 inches	32/39	<0.05 to <0.4	0.147 10.0 38.6	NA	NA	Y[8]	ASL	NA	N
EU9	Drain Pit 3	7782-49-2	Selenium	5/7/2018 - 5/8/2018	0-84 inches	0.5 DP3-2, 12-24 in DP3-6, 0-6 in	1.1 DP3-2 0-6 inches	8/39	<0.5 to < 3	NA	39 580	0.7	N	BSL	2.6	N
EU9	Drain Pit 3	14808-79-8	Sulfate mg/L sat. paste	5/7/2018 - 5/8/2018	0-84 inches	37 DP3-2 0-6 inches	21,700 DP3-16 12-24 inches	39/39	NA	NA	NA	NA	N	NS	NA	N
EU9	Drain Pit 3	7440-28-0	Thallium	5/7/2018 - 5/8/2018	0-84 inches	<1 All locations	<1 All locations	0/39	< 1	NA	0.078 1.2	0.41	N	All ND	1.4	N

Notes:

(1) Value derived following DEQ Soil Screening Process, Part 2 - Leaching to Groundwater, 2017b

(2) Background Threshold Value for arsenic in Montana was used rather than SSL based on MCL

(3) Minimum and maximum concentrations and detection frequencies may differ in comparison to the Statistical Analysis (App D) as samples were averaged with their duplicates in the statistical analysis.

(4) Although initially flagged as a leaching COPC, chemical was ultimately not identified as a leaching COC based on a more detailed evaluation (please see Section 10.2 for further discussion).

(5) Maximum concentration exceeds residential RSL, but not Industrial RSL. Sample located at depth (6-7' bgs) where only construction worker exposures expected. Industrial RSL is protective of construction worker exposures.

(6) BTV exceeds Protection of Groundwater SSL.

(7) Radium screening levels are calculated PRGs for residential, outdoor worker, and excavation worker in pCi/g (USDOE RAIS, 2017).

(8) Although constituent was initially flagged as a human health COPC, it was ultimately not retained as a COC based on a more detailed evaluation (please see Section 10.4 for further discussion).

(9) Only one detected sample, in the 12-24 inch interval, which was greater than groundwater protection SSL. However, sample directly below in the 36-48 inch interval was non-detect (<1 mg/kg).

DEQ, 2013 Project Report Background Concentrations of Inorganic Constituents in Montana Surface Soils. Prepared for DEQ by Hydrometrics, Inc. Available on-line at http://deq.mt.gov/StateSuperfund/background.mcpx September.

Chemical* Chemical lists vary between media because they were established at different times and for different objectives, but all were approved by DEQ. Some of the analyte lists were developed prior to the establishment of the Federal CCR Appendices III and IV lists.

Definitions:

ASL	Above Screening Level
BB	Below Background
BSL	Below Screening Level
BTV	Background Threshold Value for Inorganics in Montana Soils (DEQ, 2013)
CAS	Chemical Abstract Service
COPC	Chemical of Potential Concern
MCL	Maximum Contaminant Level
meq/L	milliequivalents per liter
mg/kg	milligrams per kilogram
NA	Not Available/ Not Applicable
ND	Not Detected
NS	No Standard
pCi/g	picoCuries per gram
PRG	Preliminary Remediation Goal
RSL	USEPA Regional Screening Level May 2016
SSL	USEPA Soil Screening Level for Groundwater Protection 2016

Table B-2.4 USEPA RAGS Part D Table 2, Data Summary for Soil, EU10 Drain Pit 5 Spill/Seep, mg/kg, except where noted
Human Health Risk Assessment
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP AOC Area, Colstrip Steam Electric Station, Colstrip Montana

5/16/2019

Exposure Unit	Sampling Location	CAS Number	Chemical*	Date	Depth Range	Minimum [3] Concentration/ Location/Depth	Maximum [3] Concentration/ Location/Depth	Detection Frequency [3]	Range of Detection Limits for Non-Detects	RSLs - Carcinogens Residential	RSLs - Non-carcinogens Residential Industrial 1/10th	BTV for Inorganics in Montana Soils	COPC? (Y/N)	Rationale for Selection or Deletion	Protection of Groundwater SSL [1]	Leaching COPC Flag (Y/N)
EU10	Drain Pit 5	7440-36-0	Antimony	5/7/2018	0-84 inches	1 DP5-3 72-84 inches	1 DP5-3 72-84 inches	1/23	< 1	NA	3.1 47	0.4	N	BSL	2.7	N
EU10	Drain Pit 5	7440-38-2	Arsenic	5/7/2018	0-84 inches	4 DP5-1/48-60 inches DP5-2/0-6 inches	47 DP5-3 72-84 inches	23/23	NA	NA	NA	22.5	Y[8]	ASL	22.5 [2]	Y[4]
EU10	Drain Pit 5	7440-39-3	Barium	5/7/2018	0-84 inches	43 DP5-1 48-60 inches	2,530 DP5-2 0-6 inches	23/23	NA	NA	1,500 22,000	429 [6]	Y[8]	ASL	421	Y[4]
EU10	Drain Pit 5	7440-41-7	Beryllium	5/7/2018	0-84 inches	< 1 All Locations	< 1 All Locations	0/23	< 1	NA	16 230	1.1	N	All ND DL is BSL	32	N
EU10	Drain Pit 5	7440-42-8	Boron	5/7/2018	0-84 inches	5 DP5-3/12-24 inches DP5-7/12-24 inches	93 DP5-2 0-6 inches	23/23	NA	NA	1,600 23,000	NA	N	BSL	130	N
EU10	Drain Pit 5	7440-43-9	Cadmium	5/7/2018	0-84 inches	< 1 All Locations	< 1 All Locations	0/23	< 1	NA	7.1 98	0.7	N	All ND DL is BSL	3.8	N
EU10	Drain Pit 5	7440-70-2	Calcium (meq/L) sat. paste	5/7/2018	0-84 inches	1.67 DP5-3 72-84 inches	28.1 DP5-8 0-6 inches	23/23	NA	NA	NA	NA	N	NS	NA	N
EU10	Drain Pit 5	16887-00-6	Chloride (mg/L) sat. paste	5/7/2018	0-84 inches	4 DP5-1/12-24 inches DP5-3/12-24 inches DP5-3/72-84 inches	198 DP5-2 72-84 inches	23/23	NA	NA	NA	NA	N	NS	NA	N
EU10	Drain Pit 5	7440-47-3	Chromium	5/7/2018	0-84 inches	10 DP5-7 12-24 inches	18 DP5-4 0-6 inches & 12-24 inches	23/23	NA	NA	12,000 180,000	41.7	N	BSL BB	4×10^8	N
EU10	Drain Pit 5	7440-48-4	Cobalt	5/7/2018	0-84 inches	5 DP5-2/0-6 inches DP5-6/0-6 inches DP5-7/12-24 inches	15 DP5-3 72-84 inches	23/23	NA	NA	2.3 35	10.0[6]	Y[8]	ASL	2.7	Y[4]
EU10	Drain Pit 5	16984-48-8	Fluoride (mg/L) sat. paste	5/7/2018	0-84 inches	0.6 DP5-1/0-6 inches DP5-4/12-24 inches	5 DP5-9 0-6 inches	5/23	<0.5 to <10	NA	310 4,700	NA	N	BSL	1,200	N
EU10	Drain Pit 5	7439-92-1	Lead	5/7/2018	0-84 inches	9 SDP5-2/0-6 inches DP5-6/12-24 inches DP5-7/12-24 inches DP5-8/12-24 inches	25 DP5-3 72-84 inches	23/23	NA	NA	400 800	29.8	N	BSL BB	140	N
EU10	Drain Pit 5	7439-93-2	Lithium	5/7/2018	0-84 inches	8 DP5-3/72-84 inches DP5-7/12-24 inches DP5-8/12/24 inches	29 DP5-2 0-6 inches	23/23	NA	NA	16 230	NA	Y[8]	ASL	120	N
EU10	Drain Pit 5	7439-95-4	Magnesium	5/7/2018	0-84 inches	1.13 DP5-4 12-24 inches	77.6 DP5-2 72-84 inches	23/23	NA	NA	NA	NA	N	NS	NA	N
EU10	Drain Pit 5	7439-96-5	Manganese	5/7/2018	0-84 inches	206 DP5-1 12-24 inches	874 DP5-2 72-84 inches	23/23	NA	NA	180 2,600	880[6]	N	BB	280	N BB
EU10	Drain Pit 5	7439-97-6	Mercury	5/7/2018	0-84 inches	< 1 All Locations	< 1 All Locations	0/23	< 1	NA	1.1 4.6	<0.05	N	All ND DL is BSL	1.0	N
EU10	Drain Pit 5	7439-98-7	Molybdenum	5/7/2018	0-84 inches	1 Several Locations	4 DP5-3 72-84 inches	9/23	< 1	NA	39 580	NA	N	BSL	20	N
EU10	Drain Pit 5	NA	pH std sat. paste	5/7/2018	0-84 inches	7.1 DP5-3 0-6 inches	8.2 DP5-2 72-84 inches	23/23	NA	NA	NA	NA	N	NS	NA	N
EU10	Drain Pit 5	7440-14-4	Ra 226[7] (pCi/g)	5/7/2018	0-84 inches	0.3 DP5-5/36-48 inches DP5-7/12-24 inches	0.6 DP5-1/12-24 inches DP5-4/0-6 inches DP5-4/12-24 inches DP5-8/12-24 inches DP5-9/0-6 inches	23/23	NA	0.124 4.73 71.2	NA	NA	Y[8]	ASL	NA	N
EU10	Drain Pit 5	7440-14-4	Ra 228[7] (pCi/g)	5/7/2018	0-84 inches	0.3 DP5-1 0-6 inches	1.6 DP5-6 12-24 inches	21/23	<0.2 to <0.3	0.147 10.0 38.6	NA	NA	Y[8]	ASL	NA	N
EU10	Drain Pit 5	7782-49-2	Selenium	5/7/2018	0-84 inches	0.5 DP5-3, 0-6 in DP5-4, 12-24 in	2.2 DP5-3 0-6 inches	6/23	<0.5 to <3	NA	39 580	0.7	N	BSL	2.6	N
EU10	Drain Pit 5	14808-79-8	Sulfate mg/L sat. paste	5/7/2018	0-84 inches	54 DP5-4 0-6 inches	8,680 DP5-2 72-84 inches	23/23	NA	NA	NA	NA	N	NS	NA	N
EU10	Drain Pit 5	7440-28-0	Thallium	5/7/2018	0-84 inches	< 1 All Locations	< 1 All Locations	0/23	< 1	NA	0.078 1.2	0.41	N	All ND	1.4	N

Notes:

(1) Value derived following DEQ Soil Screening Process, Part 2 - Leaching to Groundwater, 2017b

(2) Background Threshold Value for arsenic in Montana was used rather than SSL based on MCL

(3) Minimum and maximum concentrations and detection frequencies may differ in comparison to the Statistical Analysis (App D) as samples were averaged with their duplicates in the statistical analysis.

(4) Although initially flagged as a leaching COPC, chemical was ultimately not identified as a leaching COC based on a more detailed evaluation (please see Section 10.2 for further discussion).

(5) Maximum concentration exceeds residential RSL, but not Industrial RSL. Sample located at depth (6-7' bgs) where only construction worker exposures expected. Industrial RSL is protective of construction worker exposures.

(6) BTV exceeds Protection of Groundwater SSL.

(7) Radium screening levels are calculated PRGs for residential, outdoor worker, and excavation worker in pCi/g (USDOE RAIS, 2017).

(8) Although constituent was initially flagged as a human health COPC, it was ultimately not retained as a COC based on a more detailed evaluation (please see Section 10.4 for further discussion).

DEQ, 2013 Project Report Background Concentrations of Inorganic Constituents in Montana Surface Soils. Prepared for DEQ by Hydrometrics, Inc. Available on-line at http://deq.mt.gov/StateSuperfund/background.mcpx September.

Chemical* Chemical lists vary between media because they were established at different times and for different objectives, but all were approved by DEQ. Some of the analyte lists were developed prior to the establishment of the Federal CCR Appendices III and IV lists.

Definitions:

ASL	Above Screening Level
BB	Below Background
BSL	Below Screening Level
BTV	Background Threshold Value for Inorganics in Montana Soils (DEQ, 2013)
CAS	Chemical Abstract Service
COPC	Chemical of Potential Concern
MCL	Maximum Contaminant Level
meq/L	milliequivalents per liter
mg/kg	milligrams per kilogram
NA	Not Available/ Not Applicable
ND	Not Detected
NS	No Standard
pCi/g	picoCuries per gram
PRG	Preliminary Remediation Goal
RSL	USEPA Regional Screening Level May 2016
SSL	USEPA Soil Screening Level for Groundwater Protection 2016

Table B-2.5 USEPA RAGS Part D Table 2, Data Summary for Soil, EU11 West Seep, mg/kg, except where noted
Human Health Risk Assessment
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP AOC Area, Colstrip Steam Electric Station, Colstrip Montana

11/15/2018

Exposure Unit	Sampling Location	CAS Number	Chemical*	Date	Depth Range	Minimum [3] Concentration/ Location/Depth	Maximum [3] Concentration/ Location/Depth	Detection Frequency [3]	Range of Detection Limits for Non-Detects	RSLs - Carcinogens Residential Industrial	RSLs - Non-carcinogens Residential Industrial 1/10th	BTV for Inorganics in Montana Soils	COPC? (Y/N)	Rationale for Selection or Deletion	Protection of Groundwater SSL [1]	Leaching COPC Flag (Y/N)
EU11	West Seep Soil Area	7440-36-0	Antimony	5/8/2018	0-24 inches	< 1 All Locations	< 1 All Locations	0/12	< 1	NA	3.1 47	0.4	N	All ND DL is BSL	2.7	N
EU11	West Seep Soil Area	7440-38-2	Arsenic	5/8/2018	0-24 inches	5 WS-1 0-6 inches & 12-24 inches	8 WS-2 0-6 inches & 12-24 inches	12/12	NA	NA	NA	22.5	N	BSL BB	22.5 [2]	N
EU11	West Seep Soil Area	7440-39-3	Barium	5/8/2018	0-24 inches	73 WS-5 0-6 inches	352 WS-6 0-6 inches	12/12	NA	NA	1,500 22,000	429 [6]	N	BSL BB	421	N
EU11	West Seep Soil Area	7440-41-7	Beryllium	5/8/2018	0-24 inches	< 1 All Locations	< 1 All Locations	0/12	< 1	NA	16 230	1.1	N	All ND DL is BSL	32	N
EU11	West Seep Soil Area	7440-42-8	Boron	5/8/2018	0-24 inches	6 WS-4 12-24 inches	17 WS-1/12-24 inches WS-3/0-6 inches	11/12	< 1	NA	1,600 23,000	NA	N	BSL	130	N
EU11	West Seep Soil Area	7440-43-9	Cadmium	5/8/2018	0-24 inches	< 1 All Locations	< 1 All Locations	0/12	< 1	NA	7.1 98	0.7	N	All ND DL is BSL	3.8	N
EU11	West Seep Soil Area	7440-70-2	Calcium (meq/L) sat. paste	5/8/2018	0-24 inches	2.25 WS-4 12-24 inches	25.4 WS-2 12-24 inches	12/12	NA	NA	NA	NA	N	NS	NA	N
EU11	West Seep Soil Area	16887-00-6	Chloride (mg/L) sat. paste	5/8/2018	0-24 inches	4 WS-4/0-6 inches WS-6/0-6 inches	24 WS-3 12-24 inches	12/12	NA	NA	NA	NA	N	NS	NA	N
EU11	West Seep Soil Area	7440-47-3	Chromium	5/8/2018	0-24 inches	13 WS-3 12-24 inches	21 WS-5 12-24 inches	12/12	NA	NA	12,000 180,000	41.7	N	BSL BB	4 x 10^8	N
EU11	West Seep Soil Area	7440-48-4	Cobalt	5/8/2018	0-24 inches	6 WS-1/12-24 inches WS-3/0-6 inches WS-3/12-24 inches	10 WS-6 0-6 inches	11/12	< 1	NA	2.3 35	10.0 [6]	N	BSL	2.7	N BB
EU11	West Seep Soil Area	16984-48-8	Fluoride (mg/L) sat. paste	5/8/2018	0-24 inches	0.5 WS-2 0-6 inches	0.5 WS-2 0-6 inches	1/12	<0.5 to <5	NA	310 4,700	NA	N	BSL	1,200	N
EU11	West Seep Soil Area	7439-92-1	Lead	5/8/2018	0-24 inches	10 WS-1 12-24 inches	16 WS-5 0-6 inches	11/12	< 1	NA	400 800	29.8	N	BSL BB	140	N
EU11	West Seep Soil Area	7439-93-2	Lithium	5/8/2018	0-24 inches	10 WS-4/0-6 inches WS-6/0-6 inches WS-6/12-24 inches	15 WS-5 12-24 inches	11/12	< 5	NA	16 230	NA	N	BSL	120	N
EU11	West Seep Soil Area	7439-95-4	Magnesium	5/8/2018	0-24 inches	0.79 WS-6 0-6 inches	38.4 WS-2 12-24 inches	12/12	NA	NA	NA	NA	N	NS	NA	N
EU11	West Seep Soil Area	7439-96-5	Manganese	5/8/2018	0-24 inches	213 WS-3 12-24 inches	608 WS-6 0-6 inches	12/12	NA	NA	180 2,600	880 [6]	N	BB	280	N BB
EU11	West Seep Soil Area	7439-97-6	Mercury	5/8/2018	0-24 inches	< 1 All Locations	< 1 All Locations	0/12	< 1	NA	1.1 4.6	<0.05	N	All ND DL is BSL	1.0	N
EU11	West Seep Soil Area	7439-98-7	Molybdenum	5/8/2018	0-24 inches	1 WS-5/0-6 inches WS-5/12-24 inches	1 WS-5/0-6 inches WS-5/12-24 inches	2/11	< 1	NA	39 580	NA	N	BSL	20	N
EU11	West Seep Soil Area	NA	pH std sat. paste	5/8/2018	0-24 inches	7.5 WS-6 12-24 inches	7.9 WS-2 0-6 inches	12/12	NA	NA	NA	NA	N	NS	NA	N
EU11	West Seep Soil Area	7440-14-4	Ra 226 [7] (pCi/g)	5/8/2018	0-24 inches	0.4 Several Locations	0.7 WS-5 12-24 inches	12/12	NA	0.124 4.73 71.2	NA	NA	Y [8]	ASL	NA	N
EU11	West Seep Soil Area	7440-14-4	Ra 228 [7] (pCi/g)	5/8/2018	0-24 inches	0.5 WS-4 12-24 inches	0.9 WS-5 0-6 inches	10/12	< 0.4	0.147 10.0 38.6	NA	NA	Y [8]	ASL	NA	N
EU11	West Seep Soil Area	7782-49-2	Selenium	5/8/2018	0-24 inches	< 1 All Locations	< 1 All Locations	0/12	< 1	NA	39 580	0.7	N	All ND DL is BSL	2.6	N
EU11	West Seep Soil Area	14808-79-8	Sulfate mg/L sat. paste	5/8/2018	0-24 inches	13 WS-6 12-24 inches	3,250 WS-2 12-24 inches	12/12	NA	NA	NA	NA	N	NS	NA	N
EU11	West Seep Soil Area	7440-28-0	Thallium	5/8/2018	0-24 inches	< 1 All Locations	< 1 All Locations	0/12	< 1	NA	0.078 1.2	0.41	N	All ND	1.4	N

Notes:

(1) Value derived following DEQ Soil Screening Process, Part 2 - Leaching to Groundwater, 2017b
(2) Background Threshold Value for arsenic in Montana was used rather than SSL based on MCL
(3) Minimum and maximum concentrations and detection frequencies may differ in comparison to the Statistical Analysis (App D) as samples were averaged with their duplicates in the statistical analysis.
(4) Although initially flagged as a leaching COPC, chemical was ultimately not identified as a leaching COC based on a more detailed evaluation (please see Section 10.2 for further discussion).
(5) Maximum concentration exceeds residential RSL, but not Industrial RSL. Sample located at depth (6-7' bgs) where only construction worker exposures expected. Industrial RSL is protective of construction worker exposures.
(6) BTV exceeds Protection of Groundwater SSL.
(7) Radium screening levels are calculated PRGs for residential, outdoor worker, and excavation worker in pCi/g (USDOE RAIS, 2017).
(8) Although constituent was initially flagged as a human health COPC, it was ultimately not retained as a COC based on a more detailed evaluation (please see Section 10.4 for further discussion).

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Chemical* Chemical lists vary between media because they were established at different times and for different objectives, but all were approved by DEQ. Some of the analyte lists were developed prior to the establishment of the Federal CCR Appendices III and IV lists.

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ASL	Above Screening Level
BB	Below Background
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BTV	Background Threshold Value for Inorganics in Montana Soils (DEQ, 2013)
CAS	Chemical Abstract Service
COPC	Chemical of Potential Concern
MCL	Maximum Contaminant Level
meq/L	milliequivalents per liter
mg/kg	milligrams per kilogram
NA	Not Available/ Not Applicable
ND	Not Detected
NS	No Standard
pCi/g	picoCuries per gram
PRG	Preliminary Remediation Goal
RSL	USEPA Regional Screening Level May 2016
SSL	USEPA Soil Screening Level for Groundwater Protection 2016

Table B-2.6 USEPA RAGS Part D Table 2, Data Summary for Soil, EU12 Main Dam Seep, mg/kg, except where noted
Human Health Risk Assessment
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP AOC Area, Colstrip Steam Electric Station, Colstrip Montana

5/16/2019

Exposure Unit	Sampling Location	CAS Number	Chemical*	Date	Depth Range	Minimum [3] Concentration/ Location/Depth	Maximum [3] Concentration/ Location/Depth	Detection Frequency [3]	Range of Detection Limits for Non-Detects	RSLs - Carcinogens Residential Industrial	RSLs - Non-carcinogens Residential Industrial 1/10th	BTV for Inorganics in Montana Soils	COPC? (Y/N)	Rationale for Selection or Deletion	Protection of Groundwater SSL [1]	Leaching COPC Flag (Y/N)
EU12	Main Dam 1&2	7440-36-0	Antimony	5/9/2018	0-84 inches	< 1 All Locations	< 1 All Locations	0/33	< 1	NA	3.1 47	0.4	N	All ND DL is BSL	2.7	N
EU12	Main Dam 1&2	7440-38-2	Arsenic	5/9/2018	0-84 inches	2 MD-1/12-24 inches MD-1/72-84 inches MD-5/30-36 inches	38 MD-3 72-84 inches	33/33	NA	NA	NA	22.5	Y[8]	ASL	22.5 [2]	Y[4]
EU12	Main Dam 1&2	7440-39-3	Barium	5/9/2018	0-84 inches	20 MD-1/12-24 inches MD-3/72-84 inches	931 MD-7 0-6 inches	33/33	NA	NA	1,500 22,000	429 [6]	N	BSL	421	Y[4]
EU12	Main Dam 1&2	7440-41-7	Beryllium	5/9/2018	0-84 inches	1 MD-11 12-24 inches	1 MD-11 12-24 inches	1/33	< 1	NA	16 230	1.1	N	BSL BB	32	N
EU12	Main Dam 1&2	7440-42-8	Boron	5/9/2018	0-84 inches	4 MD-2 72-84 inches	47 MD-5 12-24 inches	33/33	NA	NA	1,600 23,000	NA	N	BSL	130	N
EU12	Main Dam 1&2	7440-43-9	Cadmium	5/9/2018	0-84 inches	4 MD-5 12-24 inches	4 MD-5 12-24 inches	1/33	< 1	NA	7.1 98	0.7	N	BSL	3.8	N[9]
EU12	Main Dam 1&2	7440-70-2	Calcium (meq/L) sat. paste	5/9/2018	0-84 inches	1.29 MD-2 72-84 inches	25.9 MD-2 0-6 inches	33/33	NA	NA	NA	NA	N	NS	NA	N
EU12	Main Dam 1&2	16887-00-6	Chloride (mg/L) sat. paste	5/9/2018	0-84 inches	5 MD-11 0-6 inches	537 MD-5 12-24 inches	33/33	NA	NA	NA	NA	N	NS	NA	N
EU12	Main Dam 1&2	7440-47-3	Chromium	5/9/2018	0-84 inches	11 MD-4 0-6 inches	20 MD-11 12-24 inches	33/33	NA	NA	12,000 180,000	41.7	N	BSL BB	4×10^8	N
EU12	Main Dam 1&2	7440-48-4	Cobalt	5/9/2018	0-84 inches	5 MD-2/0-6 inches MD-2/72-84 inches MD-4/12-24 inches MD-5/30-36 inches MD-7/0-6 inches	11 MD-7 72-84 inches	33/33	NA	NA	2.3 35	10.0[6]	Y[8]	ASL	2.7	Y[4]
EU12	Main Dam 1&2	16984-48-8	Fluoride (mg/L) sat. paste	5/9/2018	0-84 inches	1 MD-10 40-52 inches	3 MD-2 72-84 inches	2/33	< 1 to < 10	NA	310 4,700	NA	N	BSL	1,200	N
EU12	Main Dam 1&2	7439-92-1	Lead	5/9/2018	0-84 inches	6 MD-1/12-24 inches MD-2/72-84 inches MD-4/0-6 inches MD-5/30-36 inches	17 MD-7 72-84 inches	33/33	NA	NA	400 800	29.8	N	BSL BB	140	N
EU12	Main Dam 1&2	7439-93-2	Lithium	5/9/2018	0-84 inches	4.9 MD-1 72-84 inches	18 MD-7 0-6 inches	31/33	< 5	NA	16 230	NA	Y[8]	ASL	120	N
EU12	Main Dam 1&2	7439-95-4	Magnesium	5/9/2018	0-84 inches	2.33 MD-1 0-6 inches	225 MD-5 12-24 inches	33/33	NA	NA	NA	NA	N	NS	NA	N
EU12	Main Dam 1&2	7439-96-5	Manganese	5/9/2018	0-84 inches	98 MD-2 72-84 inches	2,410 MD-4 72-84 inches	33/33	NA	NA	180 2,600	880[6]	Y[8]	ASL	280	Y[4]
EU12	Main Dam 1&2	7439-97-6	Mercury	5/9/2018	0-84 inches	< 1 All Locations	< 1 All Locations	0/33	< 1	NA	1.1 4.6	<0.05	N	All ND DL is BSL	1.0	N
EU12	Main Dam 1&2	7439-98-7	Molybdenum	5/9/2018	0-84 inches	1 MD-6/0-6 inches MD-6/40-52 inches MD-7/0-6 inches MD-7/72-84 inches	5 MD-11 12-24 inches	6/33	< 1	NA	39 580	NA	N	BSL	20	N
EU12	Main Dam 1&2	NA	pH std sat. paste	5/9/2018	0-84 inches	7.4 MD-1/0-6 inches MD-9/12-24 inches MD-10/40-52 inches	8.3 MD-4 0-6 inches	33/33	NA	NA	NA	NA	N	NS	NA	N
EU12	Main Dam 1&2	7440-14-4	Ra 226[7] (pCi/g)	5/9/2018	0-84 inches	0.2 MD-9 0-6 inches	0.7 MD-2/0-6 inches MD-4/72-84 inches	33/33	NA	0.124 4.73 71.2	NA	NA	Y[8]	ASL	NA	N
EU12	Main Dam 1&2	7440-14-4	Ra 228[7] (pCi/g)	5/9/2018	0-84 inches	0.4 Several Locations	1.1 MD-3 72-84 inches	23/33	<-0.03 to <0.4	0.147 10.0 38.6	NA	NA	Y[8]	ASL	NA	N
EU12	Main Dam 1&2	7782-49-2	Selenium	5/9/2018	0-84 inches	< 1 Multiple Locations	< 1 Multiple Locations	0/33	< 1 to < 2	NA	39 580	0.7	N	All ND DL is BSL	2.6	N
EU12	Main Dam 1&2	14808-79-8	Sulfate mg/L sat. paste	5/9/2018	0-84 inches	60 MD-1 0-6 inches	14,700 MD-5 12-24 inches	33/33	NA	NA	NA	NA	N	NS	NA	N
EU12	Main Dam 1&2	7440-28-0	Thallium	5/9/2018	0-84 inches	< 1 All Locations	< 1 All Locations	0/33	< 1	NA	0.078 1.2	0.41	N	All ND	1.4	N

Notes:

(1) Value derived following DEQ Soil Screening Process, Part 2 - Leaching to Groundwater, 2017b

(2) Background Threshold Value for arsenic in Montana was used rather than SSL based on MCL

(3) Minimum and maximum concentrations and detection frequencies may differ in comparison to the Statistical Analysis (App D) as samples were averaged with their duplicates in the statistical analysis.

(4) Although initially flagged as a leaching COPC, chemical was ultimately not identified as a leaching COC based on a more detailed evaluation (please see Section 10.2 for further discussion).

(5) Maximum concentration exceeds residential RSL, but not Industrial RSL. Sample located at depth (6-7' bgs) where only construction worker exposures expected. Industrial RSL is protective of construction worker exposures.

(6) BTV exceeds Protection of Groundwater SSL.

(7) Radium screening levels are calculated PRGs for residential, outdoor worker, and excavation worker in pCi/g (USDOE RAIS, 2017).

(8) Although constituent was initially flagged as a human health COPC, it was ultimately not retained as a COC based on a more detailed evaluation (please see Section 10.4 for further discussion).

(9) Only one detected concentration, in the 12-24 inch interval, which was greater than groundwater protection SSL. However, sample directly below in the 30-36 inch interval was non-detect (<1 mg/kg).

DEQ, 2013 Project Report Background Concentrations of Inorganic Constituents in Montana Surface Soils. Prepared for DEQ by Hydrometrics, Inc. Available on-line at http://deq.mt.gov/StateSuperfund/background.mcpx September.

Chemical* Chemical lists vary between media because they were established at different times and for different objectives, but all were approved by DEQ. Some of the analyte lists were developed prior to the establishment of the Federal CCR Appendices III and IV lists.

Definitions:

ASL	Above Screening Level
BB	Below Background
BSL	Below Screening Level
BTV	Background Threshold Value for Inorganics in Montana Soils (DEQ, 2013)
CAS	Chemical Abstract Service
COPC	Chemical of Potential Concern
MCL	Maximum Contaminant Level
meq/L	milliequivalents per liter
mg/kg	milligrams per kilogram
NA	Not Available/ Not Applicable
ND	Not Detected
NS	No Standard
pCi/g	picoCuries per gram
PRG	Preliminary Remediation Goal
RSL	USEPA Regional Screening Level May 2016
SSL	USEPA Soil Screening Level for Groundwater Protection 2016

Table B-2.7 USEPA RAGS Part D Table 2, Data Summary for Soil, EU13 Saddle Dam Seep, mg/kg, except where noted
Human Health Risk Assessment
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP AOC Area, Colstrip Steam Electric Station, Colstrip Montana

11/15/2018

Exposure Unit	Sampling Location	CAS Number	Chemical*	Date	Depth Range	Minimum [3] Concentration/ Location/Depth	Maximum [3] Concentration/ Location/Depth	Detection Frequency [3]	Range of Detection Limits for Non-Detects	RSLs - Carcinogens Residential Industrial	RSLs - Non-carcinogens Residential Industrial 1/10th	BTV for Inorganics in Montana Soils	COPC? (Y/N)	Rationale for Selection or Deletion	Protection of Groundwater SSL [1]	Leaching COPC Flag (Y/N)
EU13	Saddle Dam East 1,2,&3	7440-36-0	Antimony	5/9/2018 - 5/10/2018	0-84 inches	1 SD-9 0-6 inches	1 SD-9 0-6 inches	1/48	< 1	NA	3.1 47	0.4	N	BSL	2.7	N
EU13	Saddle Dam East 1,2,&3	7440-38-2	Arsenic	5/9/2018 - 5/10/2018	0-84 inches	2 SD-2/72-84 inches SD-20/12-24 inches	16 SD-11 72-84 inches	48/48	NA	NA	NA	22.5	N	BSL BB	22.5 [2]	N
EU13	Saddle Dam East 1,2,&3	7440-39-3	Barium	5/9/2018 - 5/10/2018	0-84 inches	28 SD-20 12-24 inches	510 SD-14 0-6 inches	48/48	NA	NA	1,500 22,000	429 [6]	N	BSL	421	Y [4]
EU13	Saddle Dam East 1,2,&3	7440-41-7	Beryllium	5/9/2018 - 5/10/2018	0-84 inches	< 1 All Locations	< 1 All Locations	0/48	< 1	NA	16 230	1.1	N	All ND DL is BSL	32	N
EU13	Saddle Dam East 1,2,&3	7440-42-8	Boron	5/9/2018 - 5/10/2018	0-84 inches	6 SD-14/72-84 inches SD-20/12-24 inches	155 SD-2 12-24 inches	47/48	< 5	NA	1,600 23,000	NA	N	BSL	130	Y [4]
EU13	Saddle Dam East 1,2,&3	7440-43-9	Cadmium	5/9/2018 - 5/10/2018	0-84 inches	< 1 All Locations	< 1 All Locations	0/48	< 1	NA	7.1 98	0.7	N	All ND DL is BSL	3.8	N
EU13	Saddle Dam East 1,2,&3	7440-70-2	Calcium (meq/L) sat. paste	5/9/2018 - 5/10/2018	0-84 inches	2.79 SD-14 12-24 inches	29 SD-2 0-6 inches	48/48	NA	NA	NA	NA	N	NS	NA	N
EU13	Saddle Dam East 1,2,&3	16887-00-6	Chloride (mg/L) sat. paste	5/9/2018 - 5/10/2018	0-84 inches	5 SD-15/0-6 inches SD-18/12-24 inches SD-20/0-6 inches	484 SD-7 12-24 inches	48/48	NA	NA	NA	NA	N	NS	NA	N
EU13	Saddle Dam East 1,2,&3	7440-47-3	Chromium	5/9/2018 - 5/10/2018	0-84 inches	8 SD-5/12-24 inches SD-10/12-24 inches SD-20/12-24 inches	19 SD-11 0-6 inches	48/48	NA	NA	12,000 180,000	41.7	N	BSL BB	4 x 10^8	N
EU13	Saddle Dam East 1,2,&3	7440-48-4	Cobalt	5/9/2018 - 5/10/2018	0-84 inches	4 SD-10/12-24 inches SD-11/72-84 inches SD-20/12-24 inches	9 SD-12 0-6 inches	48/48	NA	NA	2.3 35	10.0 [6]	N	BB	2.7	N BB
EU13	Saddle Dam East 1,2,&3	16984-48-8	Fluoride (mg/L) sat. paste	5/9/2018 - 5/10/2018	0-84 inches	0.6 SD-15 0-6 inches	6 SD-5 12-24 inches	5/48	<0.5 to <10	NA	310 4,700	NA	N	BSL	1,200	N
EU13	Saddle Dam East 1,2,&3	7439-92-1	Lead	5/9/2018 - 5/10/2018	0-84 inches	5 SD-20 12-24 inches	27 SD-11 72-84 inches	48/48	NA	NA	400 800	29.8	N	BSL BB	140	N
EU13	Saddle Dam East 1,2,&3	7439-93-2	Lithium	5/9/2018 - 5/10/2018	0-84 inches	8 SD-10/12-24 inches SD-14/72-84 inches	30 SD-2 12-24 inches	47/48	< 5	NA	16 230	NA	Y [8]	ASL	120	N
EU13	Saddle Dam East 1,2,&3	7439-95-4	Magnesium	5/9/2018 - 5/10/2018	0-84 inches	1.2 SD-20 0-6 inches	204 SD-3 12-24 inches	48/48	NA	NA	NA	NA	N	NS	NA	N
EU13	Saddle Dam East 1,2,&3	7439-96-5	Manganese	5/9/2018 - 5/10/2018	0-84 inches	117 SD-11 72-84 inches	491 SD-5 12-24 inches	48/48	NA	NA	180 2,600	880 [6]	N	BB	280	N
EU13	Saddle Dam East 1,2,&3	7439-97-6	Mercury	5/9/2018 - 5/10/2018	0-84 inches	< 1 All Locations	< 1 All Locations	0/48	< 1	NA	1.1 4.6	<0.05	N	All ND DL is BSL	1.0	N
EU13	Saddle Dam East 1,2,&3	7439-98-7	Molybdenum	5/9/2018 - 5/10/2018	0-84 inches	1 Several	3 Several	23/48	< 1	NA	39 580	NA	N	BSL	20	N
EU13	Saddle Dam East 1,2,&3	NA	pH std sat. paste	5/9/2018 - 5/10/2018	0-84 inches	7.1 SD-17 0-6 inches & 12-24 inches	8.3 SD-3 12-24 inches	48/48	NA	NA	NA	NA	N	NS	NA	N
EU13	Saddle Dam East 1,2,&3	7440-14-4	Ra 226 [7] (pCi/g)	5/9/2018 - 5/10/2018	0-84 inches	0.2 SD-3/0-6 inches SD-7/0-6 inches SD-7/12-24 inches SD-8/12-24 inches SD-9/12-24 inches	0.8 SD-2 72-84 inches	48/48	NA	0.124 4.73 71.2	NA	NA	Y [8]	ASL	NA	N
EU13	Saddle Dam East 1,2,&3	7440-14-4	Ra 228 [7] (pCi/g)	5/9/2018 - 5/10/2018	0-84 inches	0.3 SD-4/12-24inches SD-6/12-24 inches SD-7/12-24 inches SD-8/0-6 inches	1.9 SD-16 12-24 inches	45/48	<0.3 to <0.4	0.147 10.0 38.6	NA	NA	Y [8]	ASL	NA	N
EU13	Saddle Dam East 1,2,&3	7782-49-2	Selenium	5/9/2018 - 5/10/2018	0-84 inches	< 1 Multiple Locations	< 2 Multiple Locations	0/48	<1 to <2	NA	39 580	0.7	N	All ND DL is BSL	2.6	N
EU13	Saddle Dam East 1,2,&3	14808-79-8	Sulfate mg/L sat. paste	5/9/2018 - 5/10/2018	0-84 inches	22 SD-17 0-6 inches	13,200 SD-3 12-24 inches	48/48	NA	NA	NA	NA	N	NS	NA	N
EU13	Saddle Dam East 1,2,&3	7440-28-0	Thallium	5/9/2018 - 5/10/2018	0-84 inches	< 1 All Locations	< 1 All Locations	0/48	< 1	NA	0.078 1.2	0.41	N	All ND	1.4	N

Notes:

(1) Value derived following DEQ Soil Screening Process, Part 2 - Leaching to Groundwater, 2017b
(2) Background Threshold Value for arsenic in Montana was used rather than SSL based on MCL
(3) Minimum and maximum concentrations and detection frequencies may differ in comparison to the Statistical Analysis (App D) as samples were averaged with their duplicates in the statistical analysis.
(4) Although initially flagged as a leaching COPC, chemical was ultimately not identified as a leaching COC based on a more detailed evaluation (please see Section 10.2 for further discussion).
(5) Maximum concentration exceeds residential RSL, but not Industrial RSL. Sample located at depth (6-7' bgs) where only construction worker exposures expected. Industrial RSL is protective of construction worker exposures.
(6) BTV exceeds Protection of Groundwater SSL.
(7) Radium screening levels are calculated PRGs for residential, outdoor worker, and excavation worker in pCi/g (USDOE RAIS, 2017).
(8) Although constituent was initially flagged as a human health COPC, it was ultimately not retained as a COC based on a more detailed evaluation (please see Section 10.4 for further discussion).
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Chemical* Chemical lists vary between media because they were established at different times and for different objectives, but all were approved by DEQ. Some of the analyte lists were developed prior to the establishment of the Federal CCR Appendices III and IV lists.

Definitions:

ASL Above Screening Level
BB Below Background
BSL Below Screening Level
BTV Background Threshold Value for Inorganics in Montana Soils (DEQ, 2013)
CAS Chemical Abstract Service
COPC Chemical of Potential Concern
MCL Maximum Contaminant Level
meq/L milliequivalents per liter
mg/kg milligrams per kilogram
NA Not Available/ Not Applicable
ND Not Detected
NS No Standard
pCi/g picoCuries per gram
PRG Preliminary Remediation Goal
RSL USEPA Regional Screening Level May 2016
SSL USEPA Soil Screening Level for Groundwater Protection 2016

Exposure Unit	Sampling Location	CAS Number	Chemical*	Date	Depth Range	Minimum [3] Concentration/ Location/Depth	Maximum [3] Concentration/ Location/Depth	Detection Frequency [3]	Range of Detection Limits for Non-Detects	RSLs - Carcinogens Residential Industrial	RSLs - Non-carcinogens Residential Industrial 1/10th	BTV for Inorganics in Montana Soils	COPC? (Y/N)	Rationale for Selection or Deletion	Protection of Groundwater SSL [1]	Leaching COPC Flag (Y/N)
EU14	South Fork Cow Creek	7440-36-0	Antimony	5/10/2018	0-84 inches	< 1 All Locations	< 1 All Locations	0/58	< 1	NA	3.1 47	0.4	N	All ND DL is BSL	2.7	N
EU14	South Fork Cow Creek	7440-38-2	Arsenic	5/10/2018	0-84 inches	5 SFCC-7 12-24 inches	24 SFCC-18 48-60 inches	58/58	NA	NA	NA	22.5	Y[8]	ASL	22.5 [2]	Y[4]
EU14	South Fork Cow Creek	7440-39-3	Barium	5/10/2018	0-84 inches	70 SFCC-21 0-6 inches	583 SFCC-24 12-24 inches	58/58	NA	NA	1,500 22,000	429 [6]	N	BSL	421	Y[4]
EU14	South Fork Cow Creek	7440-41-7	Beryllium	5/10/2018	0-84 inches	< 1 All Locations	< 1 All Locations	0/58	< 1	NA	16 230	1.1	N	All ND DL is BSL	32	N
EU14	South Fork Cow Creek	7440-42-8	Boron	5/10/2018	0-84 inches	5 SFCC-19 12-24 inches	61 SFCC-2 72-84 inches	56/58	< 5	NA	1,600 23,000	NA	N	BSL	130	N
EU14	South Fork Cow Creek	7440-43-9	Cadmium	5/10/2018	0-84 inches	< 1 All Locations	< 1 All Locations	0/58	< 1	NA	7.1 98	0.7	N	All ND DL is BSL	3.8	N
EU14	South Fork Cow Creek	7440-70-2	Calcium (meq/L) sat. paste	5/10/2018	0-84 inches	1.55 SFCC-23 12-24 inches	28.7 SFCC-14 12-24 inches	58/58	NA	NA	NA	NA	N	NS	NA	N
EU14	South Fork Cow Creek	16887-00-6	Chloride (mg/L) sat. paste	5/10/2018	0-84 inches	2 SFCC-22 12-24 inches	298 SFCC-2 72-84 inches	58/58	NA	NA	NA	NA	N	NS	NA	N
EU14	South Fork Cow Creek	7440-47-3	Chromium	5/10/2018	0-84 inches	10 SFCC-7 12-24 inches	22 SFCC-20 36-48 inches	58/58	NA	NA	12,000 180,000	41.7	N	BSL BB	4×10^8	N
EU14	South Fork Cow Creek	7440-48-4	Cobalt	5/10/2018	0-84 inches	5 SFCC-7 12-24 inches	13 SFCC-18 48-60 inches	58/58	NA	NA	2.3 35	10.0[6]	Y[8]	ASL	2.7	Y[4]
EU14	South Fork Cow Creek	16984-48-8	Fluoride (mg/L) sat. paste	5/10/2018	0-84 inches	0.5 SFCC-10/0-6 inches SFCC-19/12-24 inches SFCC-23/12-24 inches	1 SFCC-2 12-24 inches	7/58	<0.5 to <10	NA	310 4,700	NA	N	BSL	1,200	N
EU14	South Fork Cow Creek	7439-92-1	Lead	5/10/2018	0-84 inches	7 SFCC-7 12-24 inches	21 SFCC-18 48-60 inches	58/58	NA	NA	400 800	29.8	N	BSL BB	140	N
EU14	South Fork Cow Creek	7439-93-2	Lithium	5/10/2018	0-84 inches	10 Several	23 SFCC-2 12-24 inches	56/58	< 5	NA	16 230	NA	Y[8]	ASL	120	N
EU14	South Fork Cow Creek	7439-95-4	Magnesium	5/10/2018	0-84 inches	1.3 SFCC-19 0-6 inches	197 SFCC-2 72-84 inches	58/58	NA	NA	NA	NA	N	NS	NA	N
EU14	South Fork Cow Creek	7439-96-5	Manganese	5/10/2018	0-84 inches	230 SFCC-1 0-6 inches	944 SFCC-24 12-24 inches	58/58	NA	NA	180 2,600	880[6]	Y[8]	ASL	280	Y[4]
EU14	South Fork Cow Creek	7439-97-6	Mercury	5/10/2018	0-84 inches	< 1 All Locations	< 1 All Locations	0/58	< 1	NA	1.1 4.6	<0.05	N	All ND DL is BSL	1.0	N
EU14	South Fork Cow Creek	7439-98-7	Molybdenum	5/10/2018	0-84 inches	1 Multiple Locations	3 SFCC-7 0-6 inches	28/58	<1 to <2	NA	39 580	NA	N	BSL	20	N
EU14	South Fork Cow Creek	NA	pH std sat. paste	5/10/2018	0-84 inches	6.4 SFCC-7 0-6 inches	8 SFCC-2 72-84 inches	58/58	NA	NA	NA	NA	N	NS	NA	N
EU14	South Fork Cow Creek	7440-14-4	Ra 226[7] (pCi/g)	5/10/2018	0-84 inches	0.3 SFCC-2/72-84 inches SFCC-9/12-24 inches SFCC-22/0-6 inches	0.9 SFCC-14 12-24inches	58/58	NA	0.124 4.73 71.2	NA	NA	Y[8]	ASL	NA	N
EU14	South Fork Cow Creek	7440-14-4	Ra 228[7] (pCi/g)	5/10/2018	0-84 inches	0.4 SFCC-4/12-24 inches SFCC-10/0-6 inches SFCC-10/12-24 inches SFCC-11/0-6 inches	3.4 SFCC-1 0-6 inches	50/58	<0.2 to <0.3	0.147 10.0 38.6	NA	NA	Y[8]	ASL	NA	N
EU14	South Fork Cow Creek	7782-49-2	Selenium	5/10/2018	0-84 inches	1 SFCC-6 12-24 inches	1 SFCC-6 12-24 inches	1/58	< 1 to < 3	NA	39 580	0.7	N	BSL	2.6	N
EU14	South Fork Cow Creek	14808-79-8	Sulfate mg/L sat. paste	5/10/2018	0-84 inches	13 SFCC-22 0-6 inches	12,600 SFCC-2 72-84 inches	58/58	NA	NA	NA	NA	N	NS	NA	N
EU14	South Fork Cow Creek	7440-28-0	Thallium	5/10/2018	0-84 inches	< 1 All Locations	< 1 All Locations	0/58	< 1	NA	0.078 1.2	0.41	N	All ND	1.4	N

Notes:

(1) Value derived following DEQ Soil Screening Process, Part 2 - Leaching to Groundwater, 2017b

(2) Background Threshold Value for arsenic in Montana was used rather than SSL based on MCL

(3) Minimum and maximum concentrations and detection frequencies may differ in comparison to the Statistical Analysis (App D) as samples were averaged with their duplicates in the statistical analysis.

(4) Although initially flagged as a leaching COPC, chemical was ultimately not identified as a leaching COC based on a more detailed evaluation (please see Section 10.2 for further discussion).

(5) Maximum concentration exceeds residential RSL, but not Industrial RSL. Sample located at depth (6-7' bgs) where only construction worker exposures expected. Industrial RSL is protective of construction worker exposures.

(6) BTV exceeds Protection of Groundwater SSL.

(7) Radium screening levels are calculated PRGs for residential, outdoor worker, and excavation worker in pCi/g (USDOE RAIS, 2017).

(8) Although constituent was initially flagged as a human health COPC, it was ultimately not retained as a COC based on a more detailed evaluation (please see Section 10.4 for further discussion).

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Chemical* Chemical lists vary between media because they were established at different times and for different objectives, but all were approved by DEQ. Some of the analyte lists were developed prior to the establishment of the Federal CCR Appendices III and IV lists.

Definitions:

ASL	Above Screening Level
BB	Below Background
BSL	Below Screening Level
BTV	Background Threshold Value for Inorganics in Montana Soils (DEQ, 2013)
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COPC	Chemical of Potential Concern
MCL	Maximum Contaminant Level
meq/L	milliequivalents per liter
mg/kg	milligrams per kilogram
NA	Not Available/ Not Applicable
ND	Not Detected
NS	No Standard
pCi/g	picoCuries per gram
PRG	Preliminary Remediation Goal
RSL	USEPA Regional Screening Level May 2016
SSL	USEPA Soil Screening Level for Groundwater Protection 2016

Table B-3.1 USEPA RAGS Part D Table 3, Exposure Point Concentration Summary, Surface Water, EU 15, mg/L 11/15/2018
Human Health Risk Assessment
Wastewater Facilities Comprising the Closed Loop System
Units 3&4 EHP AOC Area, Colstrip Steam Electric Station, Colstrip, Montana

Scenario Timeframe:	Future
Medium:	Surface Water
Exposure:	Incidental Ingestion/Dermal

Exposure Unit	Chemicals of Potential Concern	Detection Frequency	Number of High Censored Results	Mean	95 UCL Distribution	Maximum Concentration	Exposure Point Concentration		
							Value	Statistic	Method
EU 15 Various Ephemeral Surface Water Locations Units 3&4 EHP AOC Area	No COPCs identified for surface water.								

Scenario Timeframe:	Current/Future
Medium:	Soil
Exposure:	Incidental Ingestion/ Dermal

Exposure Unit	Depth Interval (feet bgs)	Chemicals of Potential Concern	Detection Frequency	Number of High Censored Results	Average	95 UCL Distribution	Maximum Concentration	Exposure Point Concentration		
								Value	Statistic	Method
EU 9 - EU 14	No COCs retained for soil (samples collected from seep/spill areas) (1).									

Notes:

(1) See Section 10.2 for an evaluation of leaching COPCs in soil and Section 10.4 for an evaluation of human health COPCs in soil.

Scenario Timeframe:	Current/Future
Medium:	Soil
Exposure:	Incidental Ingestion, Dermal

Exposure Route	Receptor Population	Receptor Age	Exposure Unit	Parameter Code	Parameter Definition	Value	Units	Rationale/Reference	Intake Equation/Model Name
No COCs retained for soil (samples collected from seep/spill areas).									

Chemical of Potential Concern	Chronic / Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal	Gastro-intestinal Absorption Factor	Absorbed RfD for Dermal		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	Oral Reference Dose	
		Value	Units			Value	Units			Source(s)	Date(s)
No non-carcinogenic COCs retained for soil (samples collected from seep/spill areas).											

Notes:

COC	Chemical of Concern
RfD	Reference Dose
IRIS	Integrated Risk Information System
mg/kg-day	milligrams per kilogram-day

Table B-5.2 USEPA RAGS PART D TABLE 5, FEDERAL NON-CANCER TOXICITY DATA - INHALATION
Human Health Risk Assessment 11/15/2018
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP Area, Colstrip Steam Electric Station, Colstrip, Montana

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC		Primary Target Organ(s)	Combined Uncertainty/ Modifying Factors	Inhalation Reference Concentration	
		Value	Units			Source(s)	Date(s)
No non-carcinogen COCs retained for the soil and the inhalation pathway.							

Notes:

COC	Chemical of Concern
RAGS	Risk Assessment Guidance for Superfund
RfC	Reference Concentration
USEPA	United States Environmental Protection Agency

Table B-6.1 USEPA RAGS PART D TABLE 5, FEDERAL CANCER TOXICITY DATA - ORAL / DERMAL
Human Health Risk Assessment 11/15/2018
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP Area, Colstrip Steam Electric Station, Colstrip, Montana

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal	Absorbed Cancer Slope Factor for Dermal		Weight of Evidence / Cancer Guidance Description	Oral Cancer Slope Factor	
	Value	Units		Value	Units		Source(s)	Date(s)
No carcinogenic COCs retained for soil (samples collected from seep/spill areas).								

Notes:

COC	Chemical of Concern
RAGS	Risk Assessment Guidance for Superfund
USEPA	United States Environmental Protection Agency

Table B-6.2 USEPA RAGS PART D TABLE 6, FEDERAL CANCER TOXICITY DATA - INHALATION
Human Health Risk Assessment 11/15/2018
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP Area, Colstrip Steam Electric Station, Colstrip, Montana

Chemical of Potential Concern	Unit Risk		Weight of Evidence / Cancer Guidance Description	Unit Risk: Inhalation Cancer Slope Factor	
	Value	Units		Source(s)	Date(s)
No carcinogenic COCs retained for the soil and the inhalation pathway.					

Notes:

COC	Chemical of Concern
RAGS	Risk Assessment Guidance for Superfund
USEPA	United States Environmental Protection Agency

Table B-7 USEPA RAGS PART D TABLE 7, CALCULATION OF RME CHEMICAL CANCER RISK AND NONCANCER HAZARDS FOR SOIL EXPOSURE 11/15/2018
Human Health Risk Assessment
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP Area, Colstrip Steam Electric Station, Colstrip, Montana

Receptor Population:	Industrial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Exposure Route	Chemical of Potential Concern	EPC		Cancer Risk Calculations					Noncancer Hazard Quotient				
							Intake/Exposure Concentration		CSF / Unit Risk		Cancer Risk	Intake/Exposure Concentration		RfD / RfC		Noncancer Hazard Quotient
					Value	Units	Value	Units	Value	Units		Value	Units	Value	Units	
No carcinogenic or non-carcinogenic COCs retained for soil.																

Notes:
COC Chemical of Concern
CSF Cancer Slope Factor
EPC Exposure Point Concentration
RAGS Risk Assessment Guidance for Superfund
RfD Reference Dose
RfC Reference Concentration
USEPA United States Environmental Protection Agency

TABLE B-9 USEPA RAGS PART D TABLE 9, CALCULATION OF RME CHEMICAL CANCER RISK AND NONCANCER HAZARDS FOR SOIL EXPOSURE
Human Health Risk Assessment
Wastewater Facilities Comprising the Closed Loop System 11/15/2018
3&4 EHP Area, Colstrip Steam Electric Station, Colstrip, Montana

Receptor Population:	Industrial Worker
Receptor Age:	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Cancer Risk Calculations				Noncancer Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
No carcinogenic or non-carcinogenic COCs retained for soil.												

Notes:

NA	Not Available/Not Applicable
RAGS	Risk Assessment Guidance for Superfı
RME	Reasonable Maximum Exposure
USEPA	United States Environmental Protection Agency

Target Organ Hazard Index	
Target Organ	NA
Central Nervous System	NA
Maximum	NA

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TABLE B-10 USEPA RAGS PART D TABLE 10, RISK SUMMARY FOR SOIL EXPOSURE
Human Health Risk Assessment
Wastewater Facilities Comprising the Closed Loop System
3&4 EHP Area, Colstrip Steam Electric Station, Colstrip, Montana

11/15/2018

Receptor Population:	Industrial Worker	Construction Worker	Recreational User
Receptor Age:	Adult	Adult	Adult

Medium	Exposure Medium	Exposure Point	Chemical of Potential Concern	Cancer Risk Calculations				Noncancer Hazard Quotient				
				Ingestion	Inhalation	Dermal	Exposure Routes Total	Primary Target Organ(s)	Ingestion	Inhalation	Dermal	Exposure Routes Total
No carcinogenic or non-carcinogenic COCs retained for soil.												

Notes:
RAGS Risk Assessment Guidance for Superfund
USEPA United States Environmental Protection Agency

APPENDIX C

Ecological Risk Assessment

Appendix C: Ecological Risk Assessment for the CCRA Waste Water Facilities Comprising the Units 3 & 4 Effluent Holding Pond Area, Colstrip Power Plant

Prepared for Hydrometrics, Inc.

26 August 2019



Prepared by

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List of Acronyms

ADD	Average Daily Dose
AUF	Area Use Factor
BERA	Baseline ecological risk assessment
bgs	below ground surface
BSL	Background screening level
BTAG	Biological Technical Assistance Group
BTV	Background threshold value
BW	Body weight
CC	Cow Creek
CCME	Canadian Council of Ministers of the Environment
CCRA	Cleanup Criteria and Risk Assessment
CMC	Criteria Maximum Concentration
COC	Chemical of Concern
COPC	Chemical of Potential Concern
DL	Detection Limit
DP3	Drain Pit 3
DP5	Drain Pit 5
EcoSSL	Ecological Soil Screening Levels
EHP	Effluent Holding Ponds
EPC	Exposure Point Concentration
ERA	Ecological Risk Assessment
ESL	Ecological Screening Level
HQ	Hazard Quotient
IR	Ingestion rate
LANL	Los Alamos National Laboratory
LOAEL	Lowest Observed Adverse Effect Level
LOD	Limit of Detection
MD	Main Dam
MDEQ	Montana Department of Environmental Quality
NOAEL	No Observed Adverse Effects Level
PAUF	Population Area Use Factor
PSW	Private Stock Well
SCEM	Site conceptual exposure model
SD	Saddle Dam
SFCC	South Fork Cow Creek
SLERA	Screening-level ecological risk assessment
T&E	Threatened and endangered
TDS	Total dissolved solids
TRVs	Toxicity Reference Values
UCL	Upper Confidence Level
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
WS	West Seep

EXECUTIVE SUMMARY

This Ecological Risk Assessment (ERA) presents an evaluation of the potential for exposure and ecological risks in the Units 3 & 4 Effluent Holding Pond (3&4 EHP) Area of the Colstrip Steam Electric Station (the Facility). The ERA uses environmental data related to present-day concentrations of chemicals in soil and surface water in the 3&4 EHP area. Groundwater was assessed for wells PSW-1 through PSW-11, under the assumption that water from those wells may be pumped for purposes of watering livestock. Protective groundwater clean-up numbers were derived for the 3&4 EHP based upon a livestock ingestion model and are also included here.

ES-1 Overview of the Ecological Risk Assessment Process

The ERA for the 3&4 EHP area consists of a Screening Level Ecological Risk Assessment (SLERA), SLERA refinement, and a baseline ecological risk assessment (BERA). An ecological Site Conceptual Exposure Model (SCEM) identified the ecological exposures associated with the 3&4 EHP area, as well as the Facility-specific contaminant sources, release mechanisms, transport routes and media, and potential receptors. The SLERA (Steps 1 and 2 of the United States Environmental Protection Agency (USEPA) ERA Process conservatively ruled out further evaluation of constituents and media that did not pose an ecological risk. Constituents that remained following the SLERA were carried to the SLERA refinement, which represents Step 3A of the USEPA ERA process. Chemicals of potential concern (COPCs) were carried forward from the SLERA refinement to the BERA, wherein chemicals of concern (COCs) were identified utilizing realistic, site-specific exposure assumptions.

This ERA was implemented pursuant to the USEPA guidance (USEPA, 1993, 1997, 1998 et al.) and Montana Department of Environmental Quality (MDEQ) guidance (DEQ, 2016).

ES-2 Ecological Risk Assessment

Evaluation of the Site for sensitive environments identified wetland areas in and adjacent to the Drain Pit 3 (DP3) and Drain Pit 5 (DP5) soil investigation areas. The remaining soil investigation areas (South Fork Cow Creek [SFCC]; Saddle Dam [SD]; Main Dam [MD]; and West Seep [WS]) did not contain delineated wetland areas. Delineated wetland types include Palustrine Aquatic Bed Semi-Permanently Flooded wetland (excavated), and Palustrine Unconsolidated Shore Seasonally Flooded wetland (impounded) near DP3; and Palustrine Emergent Temporarily Flooded Wetland and Palustrine Unconsolidated Bottom Semi-Permanently Flooded wetland (excavated) near DP5. Aside from the 3&4 EHP itself, surface water features in the investigation area are temporary and/or ephemeral and are dependent upon seasonal precipitation. Terrestrial habitats in the 3&4 EHP investigation area are comprised of grasslands with scattered shrubs, which provide habitat for a variety of birds and small mammals. It is assumed that seasonal surface water features, when present, are used by wildlife and livestock as a drinking water source. Therefore, ecological exposure pathways are considered complete for all trophic levels to surface water and soil.

Ecological exposure pathways to groundwater are considered incomplete for wildlife receptors. However, the groundwater at the Site is designated Class III under the Administrative Rules of Montana, which means it must be of at least marginal quality for livestock watering and industrial use. Protective clean-up levels were calculated for chemicals in Site groundwater based upon the assumption that groundwater could be pumped to provide a drinking water

source for livestock. The livestock groundwater evaluation is not part of the ERA, but is discussed separately following the BERA risk characterization.

SLERA Results: The SLERA compared maximum detected concentrations in surface water and soil to ecological screening levels. Background or reference concentrations of metals were also factored into the determination of preliminary COPCs. Boron, selenium and sulfate were identified as preliminary COPCs in surface water. In surface soils (0 – 24") antimony, arsenic, barium, boron, cadmium, manganese, selenium, and radium-228 exceeded ecological soil screening levels in one or more areas and were retained as preliminary COPCs in those areas. No unacceptable risk was posed to livestock from ingestion of groundwater pumped from the 3&4 EHP wells, though maximum concentrations of sulfate in the water render the creek marginal for livestock watering.

SLERA refinement results: The SLERA refinement process used the statistical 95% Upper Confidence Level (95 UCL) to represent exposure point concentrations for site receptors, and included an expanded screening to focus the list of receptors potentially at risk from Site COPCs. Boron and selenium were both retained as COPCs in surface water after screening refinement based on potential risk to aquatic life. In surface soils antimony, arsenic, barium, boron, manganese, selenium, and radium-228 were retained as COPCs and evaluated further in the expanded soil screening to determine which receptors were at potential risk from these constituents in surface soil, and to focus the BERA evaluation. Barium, boron, manganese, and selenium were designated as COPCs based on potential risk to plants in surface soil; and arsenic, barium, and manganese were retained as COPCs based on potential risk to soil invertebrates. Boron and selenium were retained as COPCs in the SLERA refinement based on potential risk to terrestrial wildlife.

BERA results: The BERA risk characterization involved 1) comparison of surface water and soil concentrations to Lowest Observed Adverse Effect Level (LOAEL) thresholds for aquatic life (surface water) and plants and invertebrates (surface soil); and 2) calculation of average daily doses of COPCs to wildlife potentially exposed to the 3&4 EHP soil and surface water. Boron in surface water was found to have the potential for risk to fish and aquatic plant populations/communities in West Seep Diversion, SFCC Diversion, and PSW-4 Overflow Pond, but populations/communities of these organisms are unlikely in these areas due to the ephemeral nature of the surface water at these sites. Selenium was found to pose no unacceptable risk to aquatic life given the ephemeral nature of the creek where selenium was detected in surface water. Arsenic, boron, manganese, and selenium in soil were less than soil LOAEL thresholds for plants and soil invertebrates and thus do not pose unacceptable risk to these organisms. Barium concentrations in several soil areas (DP5, MD) suggested releases of barium had occurred, but unacceptable risk to plant communities was not likely due to the small areas represented by the elevated concentrations. Boron doses to insectivorous birds and herbivorous birds did not pose unacceptable risk in surface soil. Selenium doses in DP5 soil slightly exceeded NOAEL (No Observed Adverse Effects Level) and LOAEL toxicity reference values (TRVs) for terrestrial wildlife, but the risk could not be differentiated from risk posed by Montana background concentrations of selenium.

Conclusions: The BERA risk characterization identified boron in surface water as posing potential risk to aquatic life (particularly fish and/aquatic plants) in West Seep Diversion, SFCC Diversion, and PSW-4 Overflow pond, but fish and aquatic plants are not expected in these areas

due to the ephemeral nature of the surface water. Therefore, a clean-up level for boron in surface water was not developed. Areas of barium concentrations in soil posing risk to plants are limited in areal extent, representing less than 0.25 acres, and therefore unacceptable risk to plant populations/communities is not expected. Therefore, a clean-up level for barium in soil was not developed.

C-1 Introduction

The Ecological Risk Assessment (ERA) was prepared by Neptune and Company, Inc. The ERA was conducted following United States Environmental Protection Agency (USEPA) guidance (USEPA, 1993, 1997, 1998 et al.) and Montana Department of Environmental Quality (MDEQ) guidance (DEQ, 2016).

The ERA focuses on potential exposure to chemicals of potential concern (COPCs) in soil and surface water in the 3&4 EHP area of the Colstrip Steam Electric Station. Potential risk from chemical concentrations in groundwater were evaluated based on the assumption that groundwater may be pumped for livestock watering. Protective groundwater clean-up numbers were derived as part of the ERA for the 3&4 EHP area based upon a livestock ingestion model, and those protective groundwater clean-up numbers are included as part of the investigation of the 3&4 EHP area.

A screening-level ecological risk assessment (SLERA) was not previously presented for the 3&4 EHP area because soil data were not available for all areas prior to the current investigation. The SLERA is presented as part of this report and serves to conservatively rule out further evaluation of constituents and media that do not pose an ecological risk. The SLERA represents Steps 1 and 2 of the USEPA ecological risk assessment process (USEPA, 1997). Any constituents that remained following the initial SLERA were carried to the screening refinement, informally known as Step 3A of the USEPA ecological risk assessment process. COPCs remaining following screening refinement were carried forward to the baseline ecological risk assessment (BERA), where the conservative assumptions used in the SLERA were replaced with more realistic, site-specific exposure assumptions.

The ecological risk assessment was conducted with soil data for the six soil investigation areas (DP3, DP5, MD, WS, SD, and SFCC), and surface water collected within the 3&4 EHP area from Cow Creek (CC), South Fork Cow Creek (SFCC), south of Drain Pit 3 and Drain Pit 5, and near the SP-14 Pond which is East of the 3&4 EHP.

C-2 Ecological Exposure Assessment

The Ecological Exposure Assessment provides a description of the environmental exposure to releases or threatened releases of wastewater COPCs from the 3&4 EHP based upon the current use of the Facility and adjacent properties and reasonably anticipated future uses of the Facility and adjacent properties. The Ecological Exposure Assessment was prepared following MDEQ and USEPA guidance as described in the following sections.

C-2.1 Ecological Site Conceptual Exposure Model

An ecological Site Conceptual Exposure Model (SCEM) was prepared as the first step in the Exposure Assessment. The ecological SCEM identifies the ecological exposures associated with the Facility-specific contaminant sources, release mechanisms, transport routes and media, and potential receptors. The ecological exposures assessed in the ERA are presented in the SCEM (Figure 8 of main text).

C-2.2 Assessment Endpoints, Measures of Effect, and Exposure Pathways

Ecological assessment endpoints represent the ecological values to be protected at the Facility. Potential receptors for the SLERA and BERA have been selected based on a site visit conducted in July 2014 and information obtained from the Montana Natural Heritage Program. Receptors, include the plants, animals and components of the environment (e.g., habitats, populations, communities) that may potentially be exposed to contamination in the3&4 EHP soil and surface water areas. Exposure pathways are identified in the SCEM (see Figure 8 of main text). Preliminary assessment endpoints for the SLERA and screening refinement include:

- Protection of populations of aquatic plants exposed to ephemeral surface water in seeps and creeks.
- Protection of benthic invertebrate communities exposed to ephemeral surface water in seeps and creeks.
- Protection of populations of soil invertebrates exposed to upland soil in the soil historic release areas.
- Protection of populations of plants exposed to upland soil in the soil historic release areas.
- Protection of populations of and mammals exposed to upland soil and ephemeral surface water in seeps and creeks in the historic release areas.

Ecological risk assessments focus on the protection of populations of organisms, except when the potential exists for threatened and endangered (T&E) species to occur at the Facility. Protection of individuals of T&E species is a goal of the ERA if such species are known or suspected to occur. Information on the potential for T&E species to be present was obtained from the Montana Natural Heritage Program. According to the Species of Concern list updated on 9/25/2018, there are 44 animal species of concern in Rosebud County. Of these, only one, the Pallid Sturgeon, is listed as endangered. The Pallid Sturgeon occurs in large rivers and would not occur in the ephemeral creeks in the vicinity of the 3&4 EHP. A second species, Yellow-billed Cuckoo, is listed as threatened in the portion of its range that includes the State of Montana. The Yellow-billed Cuckoo inhabits prairie riparian forests and may utilize streamside cottonwoods during migration. For breeding purposes, the western subspecies of yellow-billed cuckoo requires patches of at least 10 hectares (25 acres) of dense, riparian forest with a canopy cover of at least 50 percent in both the understory and overstory. Such habitat is not present in the area of the 3&4 EHP to support breeding yellow-billed cuckoos. According to the Montana Field Guide developed by the Montana Natural Heritage Program and Montana Fish, Wildlife, and Parks (http://FieldGuide.mt.gov/speciesDetail.aspx?elcode=ABNRB02020), there are only 18 records of yellow-billed cuckoo in Montana (all during the months of June and July), and no direct evidence of breeding in the state. Given the lack of suitable habitat for yellow-billed cuckoo within the 3&4 EHP area, the yellow-billed cuckoo is not considered a receptor of concern for this risk evaluation.

The greater sage grouse inhabits sagebrush habitats throughout central and eastern Montana, including much of Rosebud County. The United States Fish and Wildlife Service (USFWS) published a finding in October 2015 on a petition to list the greater sage grouse as endangered or threatened across its range, including Montana. The 2015 finding concluded that listing of the greater sage grouse was not warranted. Greater sage grouse is considered an S2 species of concern in Montana, meaning populations are at risk because of very limited and/or potentially

declining population numbers, range and/or habitat. Due to the USFWS finding that greater sage grouse listing as a T&E species was not warranted, greater sage grouse was not selected as a special status receptor in this risk assessment. Protection of greater sage grouse populations at the site is covered through the surrogate species selected to represent avian omnivores in the risk assessment.

Two other species, Bald Eagle and Golden Eagle, receive protection under the Bald and Golden Eagle Protection Act. Bald Eagles normally stay near large bodies of water, while Golden Eagles prefer open country. Of the two, Golden eagles are more likely to occur around the 3&4 EHP area, where they would be expected to feed on a variety of small mammals in the open grasslands. Individual golden eagles range widely, and nesting golden eagles require 55 - 105 square miles per nesting pair. Due to their large foraging area requirements, exposure of eagles to any individual area within 3&4 EHP is expected to be small. Because the chemicals of potential concern at the site do not biomagnify up the food chain, exposure of eagles to the COPCs is expected to be less than to trophic level birds with home ranges more aligned with the size of the areas of potential releases. Therefore, bald eagles and golden eagles were not selected as receptors of concern for this risk assessment.

According to information, obtained from the Montana Natural Heritage Program's Wetland's Mapper (http://geoinfo.msl.mt.gov/home/msdi/wetlands), the following delineated wetlands occur within the study area:

- Soil Area DP3 includes Palustrine Aquatic Bed Semi-Permanently Flooded wetland (< 0.1 acres), and Palustrine Unconsolidated Shore Seasonally Flooded wetland (approximately 0.3 acres).
- Soil Area DP5 includes Palustrine Emergent Temporarily Flooded Wetland (approximately 400 linear feet), and Palustrine Unconsolidated Bottom Semi-Permanently Flooded wetland (< 0.1 acres).

Measures of Effect describe how assessment endpoints are evaluated to determine whether potential risk exists to a specific assessment endpoint. Measures of Effect for the SLERA and screening refinement include:

- Comparison of surface water concentrations to chronic aquatic life standards published in Montana DEQ-7 (MDEQ, 2017).
- Comparison of soil concentrations to USEPA Ecological Soil Screening Levels (EcoSSLs) or other ecological soil screening benchmarks if EPA EcoSSLs have not been derived for a given constituent.
- Comparison of soil and surface water concentrations to appropriate background or reference areas that are not impacted by the 3&4 EHP operations.

Additional Measures of effect for a baseline ecological risk assessment include:

- Food chain modeling to terrestrial birds and mammals utilizing upland soil areas and surface water from seeps and creeks as a source of food and drinking water, and comparison of average daily doses to toxicity reference values (TRVs). Food-chain models were constructed as needed for the following representative receptors that may forage in upland soil areas:

- Ord's kangaroo rat (*Dipodomys ordii*), representative of herbivorous mammals utilizing upland soil areas at the 3&4 EHP area.
- Masked shrew (*Sorex cinereus*), representative of insectivorous mammals utilizing upland soil areas at the 3&4 EHP area.
- Lark sparrow (*Chondestes grammacus*), representative of herbivorous birds utilizing upland soil areas at the 3&4 EHP area.
- Sprague's pipit (*Anthus spragueii*), representative of insectivorous birds utilizing upland soil areas at 3&4 EHP area.

Following the SLERA and screening refinement, the list of assessment endpoints and the SCEM were refined based upon the results of the screening-level assessment. Current and reasonably anticipated future uses of adjacent properties were also considered when identifying potential receptors and exposure pathways.

Surface water in the 3&4 EHP area, including Cow Creek and South Fork Cow Creek is designated Class C-3 under the Montana Water Quality Act. A Class C-3 waterbody is defined as suitable for bathing, swimming, and recreation; and growth and propagation of non-salmonid fishes and associated aquatic life, waterfowl, and furbearers. The quality of Class C-3 waters is naturally marginal for drinking, culinary, and food processing purposes, agriculture, and industrial water supply.

Wetland areas are present in and adjacent to the ephemeral creeks within the investigation area: Delineated wetland Palustrine Aquatic Bed Semi-permanently Flooded wetland, Palustrine Emergent Temporarily Flooded wetland, Palustrine Unconsolidated Shore Seasonally Flooded wetland, and Palustrine Unconsolidated Bottom Semi-Permanently Flooded wetland. Because of the temporal/seasonal nature of surface water in the 3&4 EHP area, surface water outside of the effluent ponds may provide temporary habitat for aquatic and terrestrial plants and aquatic and benthic invertebrates, but the presence of fish is unlikely. The utility of the ephemeral creeks as a drinking water source for wildlife is uncertain due to the high concentrations of cations and dissolved solids, which make the water in the seeps and creeks more akin to saltwater than freshwater. However, for risk assessment purposes it was assumed that the seeps and creeks are used by wildlife as a drinking water source. Terrestrial habitats in the 3&4 EHP area, including the six soil release areas evaluated in this report, are comprised of grasslands with scattered shrubs. These provide habitat for a variety of birds and small mammals. Some of the surrounding grasslands on and adjacent to the 3&4 EHP are fenced to allow grazing by cattle and horses. Therefore, ecological exposure pathways are considered complete for all trophic levels to surface water, and soil. Complete exposure pathways for each ERA receptor group are shown in Table C-1.

Ecological exposure pathways to groundwater are considered incomplete for wildlife receptors, but the ingestion pathway for groundwater is considered complete for livestock. The groundwater at the Site is designated Class III under the Montana Water Quality Act. Class III ground waters are those ground waters with a natural specific conductance that is greater than 2,500 and less than or equal to 15,000 microSiemens/cm at 25ºC. Groundwater in Colstrip typically exhibits a specific conductance above 4,000 umhos/cm. Class III ground waters are not suitable for potable use without treatment, but must be of at least marginal quality for livestock watering and industrial use. Protective clean-up levels were calculated for chemicals in Site groundwater based upon the assumption that groundwater could be pumped to provide a

drinking water source for livestock. The livestock groundwater screening valuation is part of the ERA, and derivation of groundwater clean-up levels is discussed in Section C-4 immediately following the BERA risk characterization.

Table C-1. Ecological Exposure Pathways

Ecological Receptor	Exposure Pathway				
	Root Uptake	Dermal Contact	Surface Water Ingestion	Soil Ingestion	Food-chain Ingestion
Benthic Invertebrates	NA	1°	1°	1°	2°
Soil Invertebrates	NA	1°	NA	1°	2°
Aquatic Plants / Terrestrial Plants	1°	2°	NA	NA	NA
Terrestrial Mammals	NA	2°	1°	2°	1°
Terrestrial Birds	NA	2°	1°	2°	1°

1° = Primary or major pathway
2° = Secondary or minor pathway
N/A = Insignificant or Incomplete Pathway

C-2.3 Exposure Assumptions

Ecological exposure scenarios are identified based on the current and reasonably anticipated future Facility use (and adjacent areas), the potential receptors, and complete exposure pathways. For the SLERA, conservative exposure assumptions are used so that risk is not underestimated. These assumptions include:

- An Area Use Factor (AUF) of 1 (i.e., an organism gets 100% of its exposure from each soil area within the 3&4 EHP).
- 100% bioavailability of chemical constituents in soil and surface water.
- Use of No Observed Adverse Effects Level (NOAEL) screening levels and TRVs.

For the BERA food chain modeling of dose to birds and mammals exposed to soil and surface water, more realistic exposure assumptions are used to represent exposure, and Lowest Observed Adverse Effects Level (LOAEL) TRVs are used. Organism body weights, food ingestion rates, and water ingestion rates for use in the food-chain modeling are shown in Table C-2 below. Because no biotic tissue has been analyzed to provide estimates of contaminant concentrations in the food chain, estimates of bioaccumulation into food/prey items were selected from available literature. Bioaccumulation factors used to estimate contaminant concentrations in food items are shown in Table C-3.

C-2.4 Ecological Exposure Areas and Exposure Point Concentrations

The exposure areas for the ERA were defined as each of the six soil release areas associated with the 3&4 EHP area. Each of the six areas were evaluated individually.

For the initial screening-level assessment, the maximum concentration of each COPC in soil and surface was used. Refinement of the SLERA and the BERA utilized a 95% Upper Confidence Level

(95 UCL) for each area to represent more realistic exposure integrated across each exposure area.

Statistical and graphical summaries of the data to support EPC calculations are presented in Appendix D. Details of the 95 UCL calculations for surface water and soil are presented in Appendix D. For certain data sets with small sample sizes, the calculated 95 UCL may exceed the maximum reported concentration. Exposure units and type of EPC used for each line of evidence in the SLERA and BERA are shown in Table C-4.

Table C-2. Food Chain Modeling Exposure Parameters For the 3&4 EHP Soil Area Receptors

Ord's Kangaroo Rat (mammalian herbivore)		
Body Weight (kg)	0.052	Mean adult body mass reported in Garrison and Best, 1990.
Food Ingestion Rate (kg/d dry wt.)	0.0058	Calculated using allometric equation for rodents (Equation 3-8) in Wildlife Exposure Factors Handbook (USEPA, 1993)
Water Ingestion Rate (L/d)	0.007	Calculated using allometric equation for mammals (Equation 3-17) in Wildlife Exposure Factors Handbook (USEPA, 1993)
Incidental Soil Ingestion Rate (k/d dry wt)	0.0058	Calculated as 10% of total ingestion
Fraction Plants in Diet	1	Diet assumed to be 100% plant material to be protective of all herbivorous mammals utilizing the upland soil areas
Area Use Factor	1	
Masked Shrew (mammalian insectivore)		
Body Weight (kg)	0.004	Recommended value for masked shrew from Warrington, P.D. 2001.
Food Ingestion Rate (kg/d dry wt.)	0.00084	Based upon a high point recommended value for short-tailed shrew of 0.209 g dw food/g body weight/d (Table 1 of EPA 2007)
Water Ingestion Rate (L/d)	0.0005	Recommended value for masked shrew from Warrington, P.D. 2001.
Incidental Soil Ingestion Rate (k/d dry wt)	0.000084	Calculated as 10% of total ingestion
Fraction Invertebrates in Diet	1	Assumed to be 100% to be protective of all insectivorous mammals
Area Use Factor	1	
Lark Sparrow (avian herbivore)		
Body Weight (kg)	0.0289	Mean adult weight from four studies reported in Martin and Parrish (2000)
Food Ingestion Rate (kg/d dry wt.)	0.00694	Calculated using allometric equation for passerine birds (Equation 3-4) in Wildlife Exposure Factors Handbook (USEPA, 1993).
Water Ingestion Rate (L/d)	0.005	Calculated using allometric equation for birds (Equation 3-15) in Wildlife Exposure Factors Handbook (USEPA, 1993)
Incidental Soil Ingestion Rate (k/d dry wt)	0.00014	Calculated as 2% of total ingestion
Fraction Plants in Diet	0.75	Martin and Parrish, 2000
Fraction Invertebrates in Diet	0.25	Martin and Parrish, 2000
Area Use Factor	1	
Spraque's Pipit (avian insectivore)		
Body Weight (kg)	0.02375	Mean of 343 territorial males and breeding females reported in Davis et al., 2014.
Food Ingestion Rate (kg/d dry wt.)	0.00588	Calculated using allometric equation for passerine birds (Equation 3-4) in Wildlife Exposure Factors Handbook (USEPA, 1993).
Water Ingestion Rate (L/d)	0.005	Calculated using allometric equation for birds (Equation 3-15) in Wildlife Exposure Factors Handbook (USEPA, 1993)
Incidental Soil Ingestion Rate (k/d dry wt)	0.00012	Calculated as 2% of total ingestion
Fraction Invertebrates in Diet	1	According to Davis et al. (2014) diet consists of a wide array of arthropods with a small amount of plant matter. For risk assessment purposes, 100% invertebrate ingestion is assumed
Area Use Factor	1	

Table C-3. Bioaccumulation Factors for Metals in Soil

	Soil to Plant BAF	Soil to Invertebrate BAF	Soil to Flesh BAF
Arsenic[1]	$B_i = 0.03752 * Soil_j$	$\ln(B_i) = 0.706 * \ln(Soil_j) - 1.421$	$\ln(B_i) = 0.8188 * \ln(Soil_j) - 4.8471$
Barium[1]	$B_i = 0.156 * Soil_j$	$B_i = 0.091* Soil_j$	$B_i = C_{diet}* 0.0075$
Boron[2]	$B_i = 4.0 * Soil_j$	$B_i = 1 * Soil_j$ (Default)	$B_i = 0.000817 * Soil_j$
Cadmium[1]	$\ln(B_i) = 0.546 * \ln(Soil_j) - 0.475$	$\ln(B_i) = 0.795 * \ln(Soil_j) + 2.114$	$\ln(B_i) = 0.4723 * \ln(Soil_j) - 1.2571$
Chromium[1]	$B_i = 0.041 * Soil_j$	$B_i = 0.306 * Soil_j$	$\ln(B_i) = 0.7338 * \ln(Soil_j) - 1.4599$
Lead[1]	$\ln(B_i) = 0.561 * \ln(Soil_j) - 1.328$	$\ln(B_i) = 0.807 * \ln(Soil_j) - 0.218$	$\ln(B_i) = 0.4422 * \ln(Soilj) + 0.0761$
Manganese[1]	$B_i = 0.079 * Soil_j$	$\ln(B_i) = 0.682 * \ln(Soil_j) - 0.809$	$B_i = 0.0205 * Soil_j$
Mercury[2]	$B_i = 0.663 * Soil_j$	$B_i = 3.933 * Soil_j$	$B_i = 0.49 * Soil_j$
Selenium[1]	$\ln(B_i) = 1.104 * \ln(Soilj) - 0.677$	$\ln(B_i) = 0.733 * \ln(Soil_j) - 0.075$	$\ln(B_i) = 0.3764 * \ln(Soil_j) - 0.4158$

[1] Bioaccumulation factors from USEPA EcoSSL guidance documents (USEPA, 2003)
[2] Bioaccumulation factors from LANL EcoRisk Database (LANL, 2017)

Table C-4. Exposure Units for the 3&4 EHP Ecological Risk Assessment

Receptor	Ecological Exposure Unit	Exposure Medium	EPC
SLERA			
Aquatic Plants and Invertebrates		Surface Water	Maximum
Terrestrial Plants and Animals	Soil Areas DP3, DP5, MD, WS, SD, and SFCC (separately)	Soil	Maximum
BERA			
Aquatic Plants and Invertebrates		Surface Water	95 UCL (all locations)
Terrestrial Plants	Soil Areas DP3, DP5, MD, WS, SD, and SFCC (separately)	Soil	95 UCL (each area)
Terrestrial Invertebrates	Soil Areas DP3, DP5, MD, WS, SD, and SFCC (separately)	Soil	95 UCL (each area)
Terrestrial Herbivorous and Insectivorous Mammals	Soil Areas DP3, DP5, MD, WS, SD, and SFCC (separately)	Soil	95 UCL (each area)
		Food Chain	Bioaccumulation based on Soil 95 UCL
Terrestrial Herbivorous and Insectivorous Birds	Soil Areas DP3, DP5, MD, WS, SD, and SFCC (separately)	Soil	Bioaccumulation based on Soil 95 UCL
		Food Chain	95 UCL (each area)

C-3 Ecological Toxicity Assessment

The Toxicity Assessment for the COPCs identified for the 3&4 EHP area follows the USEPA recommended approach (USEPA, 1997, 1998). Surface water screening values were chosen to represent chronic criteria for protection of aquatic life as published in DEQ-7. Surface water screening levels used in the SLERA are shown in Table C-5. Soil screening criteria represent EcoSSLs developed by the USEPA. Alternative sources of screening values, such as the EcoRisk Database developed by Los Alamos National Laboratory (LANL), were used when the primary sources listed above lack screening values for a given COPC. Soil screening levels for plants, invertebrates and wildlife are shown in Table C-6. The screening values for the SLERA and screening refinement are based on NOAEL toxicity levels, while the BERA considered both NOAEL and LOAEL toxicity values. TRVs for evaluation of dose to upper-trophic level birds and mammals likewise represent NOAEL values for screening and NOAEL and LOAEL values for screening refinement and the BERA. TRVs were selected from available sources, including those derived by USEPA as part of the Ecological Soil Screening Level Guidance (USEPA, 2003), and Los Alamos National Laboratory (LANL, 2017). NOAEL TRVs for use in food chain modeling are presented in Table C-9, and LOAEL TRVs are presented in table C-10.

Table C-5. Ecological Screening Criteria For Protection Of Aquatic Life

	Surface Water Screening Level (µg/L)	Source [1]
Arsenic	150	DEQ-7
Barium	4	Region 3
Beryllium	0.66	Region 3
Boron	1.6	Region 3
Cadmium	2.39 (adjusted for maximum hardness of 400 mg/kg $CaCO_3$)	DEQ-7
Chromium (III)	268 (adjusted for maximum hardness of 400 mg/kg $CaCO_3$)	DEQ-7
Copper	30.5 (adjusted for maximum hardness of 400 mg/kg $CaCO_3$)	DEQ-7
Lead	18.6 (adjusted for maximum hardness of 400 mg/kg $CaCO_3$)	DEQ-7
Manganese	120	Region 3
Mercury	0.91	DEQ-7
Nickel	168 (adjusted for maximum hardness of 400 mg/kg $CaCO_3$)	DEQ-7
Selenium	5	DEQ-7
Thallium	0.8	Region 3
Vanadium	20	Region 3
Zinc	387 (adjusted for maximum hardness of 400 mg/kg $CaCO_3$)	DEQ-7
Calcium	116,000	Region 3
Chloride	230,000	Region 3
Fluoride	7450 (adjusted for maximum hardness of 400 mg/kg $CaCO_3$)	Region 3
Magnesium	82,000	Region 3
Potassium	53,000	Region 3
Sodium	680,000	Region 3
Sulfate	3,000,000	USDA-ARS

[1] DEQ-7 = Montana Numeric Water Quality Standards, Chronic Aquatic Life Standards (DEQ, 2017)

Region 3 = USEPA Region 3 Ecological Screening Benchmarks for Freshwater and Freshwater Sediment, published 2006. Obtained from https://www.epa.gov/risk/biological-technical-assistance-group-btag-screening-values on 4/30/2016
USDA-ARS = USDA-ARS, 2009. Livestock Water Quality. USDA-ARS Fort Keough Livestock and Range Research Laboratory. Online at http://www.ars.usda.gov/SP2UserFiles/Place/30300000/Research/WATERQUALITYMKP6-09.pdf
NA = Not available

Table C-6. Ecological Soil Screening Levels for Plants, Invertebrates and Wildlife

	Plant Soil Screening Level (mg/kg)	Source [1]	Invert. Soil Screening Level (mg/kg)	Source [1]	Wildlife Soil Screening Level [2] (mg/kg)	Source [1]
Antimony	11	EPA EcoSSL	78	EPA EcoSSL	0.27	EPA EcoSSL
Arsenic	18	EPA EcoSSL	6.8	LANL ER Db	43	EPA EcoSSL
Barium	110	LANL ER Db	330	EPA EcoSSL	2000	EPA EcoSSL
Beryllium	2.5	LANL ER Db	40	EPA EcoSSL	21	EPA EcoSSL
Boron	36	LANL ER Db	NA	NA	2	LANL ER Db
Cadmium	32	EPA EcoSSL	140	EPA EcoSSL	0.36	EPA EcoSSL
Chromium (III)	NA	NA	NA	NA	26	EPA EcoSSL
Cobalt	13	EPA EcoSSL	NA	NA	120	EPA EcoSSL
Fluoride	NA	NA	NA	NA	120	LANL ER Db
Lead	120	EPA EcoSSL	1700	EPA EcoSSL	11	EPA EcoSSL
Lithium	NA	NA	NA	NA	75	LANL ER Db
Manganese	220	EPA EcoSSL	450	EPA EcoSSL	4000	EPA EcoSSL
Mercury	34	LANL ER Db	0.05	LANL ER Db	0.013	LANL ER Db
Molybdenum	NA	NA	NA	NA	15	LANL ER Db
Selenium	0.52	EPA EcoSSL	4.1	EPA EcoSSL	0.63	EPA EcoSSL
Thallium	0.05	LANL ER Db	NA	NA	0.42	LANL ER Db
Radium-226	54 (pCi/g)	LANL ER Db	1.5 (pCi/g)	LANL ER Db	8.2 (pCi/g)	LANL ER Db
Radium-228	48 (pCi/g)	LANL ER Db	1.2 (pCi/g)	LANL ER Db	11 (p/Ci/g)	LANL ER Db

[1] EPA EcoSSL = TRVs obtained from EPA Ecological Soil Screening Levels documents (USEPA, 2003, 2005a though 2005e, 2007a, 2007b)
LANL ER Db = TRVs obtained from Los Alamos National Laboratory EcoRisk Database (LANL, 2017)
[2] Wildlife Soil Screening Level represents the minimum soil screening value for birds and mammals
NA = Not available

Table C-7. NOAEL Toxicity Reference Values For Wildlife Food Chain Models

	Mammalian NOAEL TRV (mg/kg/d)	Source [1]	Avian NOAEL TRV (mg/kg/d)	Source [1]
Antimony	0.059	EPA EcoSSL	NA	NA
Arsenic	1.04	EPA EcoSSL	2.24	EPA EcoSSL
Barium	51.8	EPA EcoSSL	73.5	LANL ER Db
Beryllium	0.532	LANL ER Db	NA	LANL ER Db
Boron	28	LANL ER Db	2.92	LANL ER Db
Cadmium	0.77	EPA EcoSSL	1.47	EPA EcoSSL
Chromium (III)	2.4	EPA EcoSSL	2.66	EPA EcoSSL
Cobalt	7.33	EPA EcoSSL	7.61	EPA EcoSSL
Copper	5.6	EPA EcoSSL	4.05	EPA EcoSSL
Fluoride	26.6	LANL ER Db	12.2	LANL ER Db
Lead	4.7	EPA EcoSSL	1.63	EPA EcoSSL
Lithium	1.13	LANL ER Db	NA	LANL ER Db
Manganese	51.5	EPA EcoSSL	179	EPA EcoSSL
Mercury	1.41	LANL ER Db	0.019	LANL ER Db
Molybdenum	NA	LANL ER Db	3.5	LANL ER Db
Nickel	1.7	EPA EcoSSL	6.71	EPA EcoSSL
Selenium	0.143	EPA EcoSSL	0.29	EPA EcoSSL
Thallium	0.0071	LANL ER Db	0.35	LANL ER Db

[1] EPA EcoSSL = TRVs obtained from EPA Ecological Soil Screening Levels documents (USEPA, 2003, 2005, 2007), LANL ER Db = TRVs obtained from Los Alamos National Laboratory EcoRisk Database (LANL, 2014)
NA = Not available

Table C-8. LOAEL Toxicity Reference Values for BERA Food Chain Modeling

	Mammalian LOAEL TRV (mg/kg/d)	Source [1]	Avian LOAEL TRV (mg/kg/d)	Source [1]
Antimony	0.59	LANL ER Db	NA	NA
Arsenic	1.66	LANL ER Db	22.4	LANL ER Db
Barium	518	LANL ER Db	131	LANL ER Db
Beryllium	5.32	LANL ER Db	NA	NA
Boron	280	LANL ER Db	14.5	LANL ER Db
Cadmium	7.7	LANL ER Db	14.7	LANL ER Db
Chromium (III)	24	LANL ER Db	26.6	LANL ER Db
Copper	9.34	LANL ER Db	12.1	LANL ER Db
Cobalt	73.3	LANL ER Db	76.1	LANL ER Db
Fluoride	49	LANL ER Db	122	LANL ER Db
Lead	8.9	LANL ER Db	3.26	LANL ER Db
Lithium	5.39	LANL ER Db	NA	LANL ER Db
Manganese	515	LANL ER Db	1790	LANL ER Db
Mercury	14.1	LANL ER Db	0.19	LANL ER Db
Molybdenum	NA	LANL ER Db	35	LANL ER Db
Nickel	3.4	LANL ER Db	67.1	LANL ER Db
Selenium	0.215	LANL ER Db	0.579	LANL ER Db
Thallium	0.071	LANL ER Db	3.5	LANL ER Db

[1] LANL ER Db = TRVs obtained from Los Alamos National Laboratory EcoRisk Database (LANL, 2017)
NA = Not available

C-4 Ecological Risk Characterization

For complete pathways, the risk characterization combines the exposure and toxicity assessments to produce quantitative estimates of potential ecological risks associated with the COPCs.

Ecological risk assessments generally characterize risk based on direct toxicity of COPCs. Unlike the human health risk characterization, ecological risk characterization does not calculate carcinogenic risk directly. Ecological risk is concerned primarily with risk to populations, and the life-span of most ecological receptors is not long enough for cancer endpoints to pose population level effects.

The potential for direct toxicity of COPCs to ecological receptors was evaluated through calculation of hazard quotients (HQs). For screening of surface water data for the protection of aquatic life, and screening of soil data for protection of plants, soil invertebrates, and wildlife, hazard quotients were calculated as follows:

Equation 1:

$$\boldsymbol{Hazard\ Quotient} = \frac{\boldsymbol{EPC}}{\boldsymbol{Media\ Specific\ Screening\ Level}}$$

where:

EPC = media-specific exposure concentration

In the BERA, potential risk to birds and mammals using the 3&4 EHP soil areas was assessed through calculation of hazard quotients based upon the average daily food chain dose to the organisms identified in Tables C-2 and C-3:

Equation 2:

$$\boldsymbol{Hazard\ Quotient} = \frac{\boldsymbol{ADD}}{\boldsymbol{TRV}}$$

where:

ADD = average daily dose (mg/kg-d)
TRV = toxicity reference value (mg/kg-d)

The average daily dose was calculated as follows:

Equation 3:

$$\boldsymbol{ADD} = \frac{\sum(\boldsymbol{C_i} * \boldsymbol{IR_i}) * \boldsymbol{AUF}}{\boldsymbol{BW}}$$

where:

ADD = average daily dose (mg/kg-d)
C_i = concentration of chemical in media “i” (mg/kg)
IR_i = organism-specific ingestion rate of media “i” (mg/kg-d)
AUF = Area Use Factor (unitless)
BW = organism body weight (kg)

C-4.1 Screening-Level Ecological Risk Characterization

C-4.1.1 Preliminary Screening of COPCs

Preliminary COPCs for the 3&4 EHP soil exposure areas were determined by comparing maximum detected concentrations in soil and surface water to the ecological screening levels presented in Section C.2. Background or reference concentrations of metals were also factored into the determination of preliminary COPCs. A site-specific background data set for soil has not been developed, therefore Background Threshold Values (BTV) for Montana surface soils were used for comparison (DEQ/Hydrometrics, 2013). No background data set was available surface water for the 3&4 EHP area.

Surface Water

Preliminary ecological screening results for boron, selenium, chloride and sulfate in surface water and seeps in the 3&4 EHP area are presented in Table C-9. Surface water data represent a total of 42 samples collected from 10 different locations in Cow Creek (CC), South Fork Cow Creek (SFCC), West Seep Diversion, NP Cut, PSW-4 Overflow Pond, and SFCC Diversion. Boron exceeded conservative surface water screening levels in all areas where it was detected (CC3, CC4, NP Cut, PSW-4 Overflow, SFCC Diversion, SP-14, and West Seep Diversion). Boron was not detected in the three SFCC samples. Sulfate was also detected in all samples and exceeded surface water screening levels at PSW-4 Overflow, West Seep Diversion, and NP Cut. Selenium was detected in three of the nineteen surface water samples, exceeding screening levels at locations CC-3, West Seep Diversion, and SFCC Diversion. Chloride was detected in all samples but did not exceed ecological screening levels in any surface water sample. In the interest of screening-level conservatism, boron, selenium, and sulfate were retained for further evaluation in the screening refinement for surface water based on exceedances of their respective ecological screening levels.

Cow Creek and South Fork Cow Creek are ephemeral in nature and only flow in response to precipitation events. According to Administrative Rules of Montana (ARM) 17.30.637, ephemeral streams are not subject to the specific water quality criteria identified in In Montana Circular DEQ-7 for the protection of aquatic life, but they must be free from substances that "create concentrations or combinations of materials which are toxic or harmful to human, animal, plant, or aquatic life" [ARM 17.30.637(1)(d)]. The screening level for selenium presented in Table C-9 is the chronic criteria from Montana DEQ-7 for protection of aquatic life, and thus is not directly applicable to the area of Cow Creek and South Fork Cow Creek where the samples were collected.

Soil

Ecological screening of metals concentrations in soil was conducted on the top 24 inches of soil. Soil samples were collected from two depths in the upper two feet of surface soil: shallow depth (0 - 6 inches), and mid-depth (12 – 24 inches). For the preliminary screening of the soil areas, the maximum concentration across the two depths was used. All ecological receptors included in this evaluation (plants, invertebrates, birds, mammals) were considered to have potential exposure to soils in the top 24 inches.

Drain Pit 3 (DP3) Soil Area

The preliminary ecological screening results for soils in the Drain Pit 3 area are presented in Table C-10. Antimony, arsenic, barium, boron, and selenium had maximum concentrations in the top 24 inches of soil exceeding ecological soil screening levels and Montana surface soil BTVs. These five constituents were retained for evaluation in screening refinement. Lead and manganese had maximum concentrations exceeding soil screening levels but were less than Montana surface soil BTVs. Therefore, lead and manganese are not considered COPCs in surface soil. Beryllium, cadmium, mercury and thallium were not detected in any soil samples in DP3. Chromium, cobalt, fluoride, lithium, molybdenum, Radium-226, and Radium-228 were all detected in surface soil, but at concentrations less than ecological screening levels, and are therefore not retained as COPCs in the DP3 soil area.

Drain Pit 5 (DP5) Soil Area

The preliminary ecological screening results for soils in the Drain Pit 5 area are presented in Table C-11. Barium, boron, selenium, and Radium-228 had maximum concentrations in the top 24 inches of soil exceeding ecological soil screening levels and Montana surface soil BTVs. These four constituents were retained for evaluation in screening refinement. Arsenic, lead and manganese had maximum concentrations exceeding soil screening levels but less than Montana surface soil BTVs. Therefore, arsenic, lead and manganese are not considered COPCs in surface soil. Antimony, beryllium, cadmium, mercury and thallium were not detected in any soil samples in DP5. Chromium, cobalt, fluoride, lithium, molybdenum, and Radium-226 were all detected in surface soil, but at concentrations less than ecological screening levels, and were therefore not retained as COPCs in the DP5 soil area.

Saddle Dam (SD) Soil Area

The preliminary ecological screening results for soils in the Saddle Dam area are presented in Table C-12. Antimony, barium, boron, and Radium-228 had maximum concentrations in the top 24 inches of soil exceeding ecological soil screening levels and Montana surface soil BTVs. These four constituents were retained for evaluation in screening refinement in the SD soil area. Three constituents (arsenic, lead and manganese) had maximum concentrations exceeding soil screening levels but less than Montana surface soil BTVs and were not evaluated further in the ecological risk assessment for this area. Beryllium, cadmium, mercury, and thallium were not detected in any SD soil samples. Chromium, cobalt, fluoride, lithium, molybdenum, and Radium-226, were all detected in surface soil, but at concentrations less than ecological screening levels, and were therefore not retained as COPCs in the SD soil area.

Main Dam (MD) Soil Area

The preliminary ecological screening results for soils in the Main Dam area are presented in Table C-13. Barium, boron, cadmium, and manganese had maximum concentrations in the top 24 inches of soil exceeding ecological soil screening levels and Montana surface soil BTVs. These four constituents were retained for evaluation in screening refinement in the MD soil area. Maximum concentrations of arsenic and lead exceeded soil screening levels but were less than Montana BTVs for surface soil. Therefore, arsenic and lead were not retained as COPCs in the MD soil area. Antimony, fluoride, mercury, selenium, and thallium were not detected in MD area soil samples. Beryllium, chromium, cobalt, lithium, molybdenum, Radium-226, and Radium-228 were all detected in surface soil, but at concentrations less than ecological screening levels, and were therefore not retained as COPCs in the MD soil area.

West Seep (WS) Soil Area

The preliminary ecological screening results for soils in the West Seep soil area are presented in Table C-14. Boron was the only constituent in this area with concentrations exceeding ecological screening levels that could not be eliminated based on comparison to Montana BTVs (no Montana BTV has been calculated for boron). Therefore, boron was retained for evaluation in screening refinement for the West Seep soil area. Arsenic, barium, lead, and manganese had maximum concentrations in West Seep soils exceeding ecological screening levels, but less than Montana BTVs, and were not retained as COPCs in this area. Antimony, beryllium, cadmium, mercury, selenium, and thallium were not detected in WS soils. Chromium, cobalt, fluoride, lithium, molybdenum, Radium-226, and Radium-228 were all detected in at least one WS soil sample, but at concentrations less than ecological screening levels. Therefore, these constituents were not retained as COPCs in the WS soil area.

South Fork Cow Creek (SFCC) Soil Area

Barium, boron, manganese, selenium, and Radium-228 concentrations in the SFCC soil area exceeded ecological soil screening levels and Montana BTVs. These five constituents are retained for evaluation in screening refinement of SFCC soils. Arsenic and lead had maximum concentrations in SFCC soils exceeding ecological screening levels, but less than Montana BTVs, and were not retained as COPCs in this area. Antimony, beryllium, cadmium, mercury, and thallium were not detected in SFCC soils. Chromium, cobalt, fluoride, lithium, molybdenum, and Radium-226 were all detected in at least one SFCC soil sample, but at concentrations less than ecological screening levels and therefore were not retained as COPCs in the SFCC soil area.

Livestock Ingestion of the 3&4 EHP Area Groundwater

A focused screening of analytes in groundwater wells PSW-1 through PSW-11 was performed for livestock who may utilize the water pumped from those wells as a source of drinking water. The screening was conducted using maximum measured chemical concentrations in each well (2010 to 2017) and livestock-specific water quality guidelines published by Colorado State University (Soltenpour and Raley, 1999) and the Canadian Council of Ministers of the Environment (CCME, 2009a). Results of this focused screening are shown in Table C-16. Concentrations of boron and selenium in groundwater were less than livestock water quality guidelines. Concentrations of total sulfates exceeded the CCME guideline of 1,000 mg/L in most, but were within the range of sulfate levels that USDA-ARS defines as “marginal” water quality for livestock watering (1,500 and 3,000 mg/L) (USDA-ARS, 2009).

Table C-9. Preliminary Screening of Surface Water

Area	Detects/Samples	Maximum (ug/L)	Surface Water Screening Levels (ug/L)	HQ	COPC?
CC3					
Boron	4/4	1,500	1.6	937	Yes
Selenium	1/4	65	5	13	Yes
Chloride	4/4	26,000	230,000	0.1	No
Sulfate	4/4	2,800,000	3,000,000	0.9	No
CC4					
Boron	4/4	1,200	1.6	750	Yes
Selenium	0/4	< 5	5	ND	No
Chloride	4/4	20,000	230,000	0.1	No
Sulfate	4/4	2,060,000	3,000,000	0.7	No
NP Cut					
Boron	8/8	1,100	1.6	687	Yes
Selenium	0/8	< 5	5	ND	No
Chloride	8/8	68,000	230,000	0.3	No
Sulfate	8/8	3,820,000	3,000,000	1.3	Yes
PSW-4 Overflow					
Boron	4/4	5,500	1.6	3440	Yes
Selenium	0/4	< 5	5	ND	No
Chloride	4/4	81,000	230,000	0.4	No
Sulfate	4/4	3,720,000	3,000,000	1.2	Yes
SFCC Diversion					
Boron	3/3	1,800	1.6	1125	Yes
Selenium	2/3	13	5	2.6	Yes
Chloride	3/3	32,000	230,000	0.1	No
Sulfate	3/3	2,110,000	3,000,000	0.7	No
SFCC1					
Boron	0/1	< 100	1.6	ND	No
Selenium	0/1	< 5	5	ND	No
Chloride	1/1	2,000	230,000	0.01	No
Sulfate	1/1	4,000	3,000,000	< 0.01	No
SFCC2					
Boron	0/1	< 100	1.6	ND	No
Selenium	0/1	< 5	5	ND	No
Chloride	1/1	1,000	230,000	0.01	No
Sulfate	1/1	4,000	3,000,000	< 0.01	No
SFCC3					
Boron	0/1	< 100	1.6	ND	No
Selenium	0/1	< 5	5	ND	No
Chloride	1/1	2,000	230,000	0.01	No
Sulfate	1/1	39,000	3,000,000	0.01	No
SP-14					
Boron	8/8	1,600	1.6	1000	Yes
Selenium	0/8	< 5	5	ND	No
Chloride	8/8	31,000	230,000	0.1	No
Sulfate	8/8	2,410,000	3,000,000	0.8	No

Table C-9 (continued). Preliminary Screening of Surface Water

Area	Detects/Samples	Maximum (ug/L)	Surface Water Screening Levels (ug/L)	HQ	COPC?
West Seep Diversion					
Boron	8/8	8,900	1.6	5562	Yes
Selenium	1/8	5	5	1.0	Yes
Chloride	8/8	215,000	230,000	0.9	No
Sulfate [(1)]	8/8	10,200,000	3,000,000	3.4	Yes

[1] No ecological screening level is available for sulfate for protection of aquatic life.
Screening level represents recommended limits for livestock watering (3,000,000 ug/L).
ND = Not detected
NA = Not applicable

Table C-10. Ecological Screening of Drain Pit 3 Soil Area (Top 24 Inches)

Analyte	# Detects / # Samples	Maximum	Soil ESL	Montana BTV[1]	HQ	COPC	Reason
Inorganics (mg/kg)							
Antimony (Sb)	1/34	7	0.27	0.4	26	Yes	HQ > 1, Exceeds BTV
Arsenic (As)	34/34	47	6.8	22.5	6.9	Yes	HQ > 1, Exceeds BTV
Barium (Ba)	34/34	787	110	429	7.2	Yes	HQ > 1, Exceeds BTV
Beryllium (Be)	0/34	ND	2.5	1.1	ND	No	Not Detected
Boron (B)	34/34	78	2	NC	39	Yes	HQ > 1, No BTV
Cadmium (Cd)	0/34	ND	0.36	0.7	ND	No	Not Detected
Chromium (Cr)	34/34	21	26	41.7	0.8	No	HQ < 1
Cobalt (Co)	34/34	7	13	10	0.5	No	HQ < 1
Fluoride (F)	2/34	1.6	120	NC	0.0	No	HQ < 1
Lead (Pb)	34/34	16	11	29.8	1.5	No	Max < BTV
Lithium (Li)	33/34	17	75	NA	0.2	No	HQ < 1
Manganese (Mn)	34/34	619	450	880	1.4	No	Max < BTV
Mercury (Hg)	0/34	ND	0.013	NC	ND	No	Not Detected
Molybdenum (Mo)	16/34	3	15	NC	0.2	No	HQ < 1
Selenium (Se)	9/34	1.1	0.52	0.7	2.1	Yes	HQ > 1, Exceeds BTV
Thallium (Tl)	0/34	ND	0.05	0.41	ND	No	Not Detected
Radionuclides (pCi/g)							
Radium 226	34/34	0.8	1.5	NC	0.5	No	HQ < 1
Radium 228	34/34	1.1	1.2	NC	0.9	No	HQ < 1

[1] Background values represent Background Threshold Values for Montana Surface Soils from DEQ/Hydrometrics, 2013.
ND = Not detected
NC = Not calculated
Shaded values = hazard quotients > than 1 and maximum concentration greater than BTV

Table C-11. Ecological Screening of Drain Pit 5 Soil Area (Top 24 Inches)

Analyte	# Detects / # Samples	Maximum	Soil ESL	Montana BTV[1]	HQ	COPC	Reason
Inorganics (mg/kg)							
Antimony (Sb)	0/19	ND	0.27	0.4	ND	No	Not Detected
Arsenic (As)	19/19	10	6.8	22.5	1.5	No	Max < BTV
Barium (Ba)	19/19	2530	110	429	23	Yes	HQ > 1, Exceeds BTV
Beryllium (Be)	0/19	ND	2.5	1.1	ND	No	Not Detected
Boron (B)	19/19	93	2	NC	47	Yes	HQ > 1, No BTV
Cadmium (Cd)	0/19	ND	0.36	0.7	ND	No	Not Detected
Chromium (Cr)	19/19	18	26	41.7	0.7	No	HQ < 1
Cobalt (Co)	19/19	8	13	10	0.6	No	HQ < 1
Fluoride (F)	4/19	5	120	NC	0.0	No	HQ < 1
Lead (Pb)	19/19	15	11	29.8	1.4	No	Max < BTV
Lithium (Li)	19/19	29	75	NA	0.4	No	HQ < 1
Manganese (Mn)	19/19	482	450	880	1.1	No	Max < BTV
Mercury (Hg)	0/19	ND	0.013	NC	ND	No	Not Detected
Molybdenum (Mo)	7/19	2	15	NC	0.1	No	HQ < 1
Selenium (Se)	5/19	2.2	0.52	0.7	4.2	Yes	HQ > 1, Exceeds BTV
Thallium (Tl)	0/19	ND	0.05	0.41	ND	No	Not Detected
Radionuclides (pCi/g)							
Radium 226	19/19	0.6	1.5	NC	0.4	No	HQ < 1
Radium 228	19/19	1.6	1.2	NC	1.3	Yes	HQ > 1, No BTV

[1] Background values represent Background Threshold Values for Montana Surface Soils from DEQ/Hydrometrics, 2013.
ND = Not detected
NC = Not calculated
Shaded values = hazard quotients > than 1 and maximum concentration greater than BTV

Table C-12. Ecological Screening of Saddle Dam Soil Area (Top 24 Inches)

Analyte	# Detects / # Samples	Maximum	Soil ESL	Montana BTV[1]	HQ	COPC	Reason
Inorganics (mg/kg)							
Antimony (Sb)	1/43	1	0.27	0.4	3.7	Yes	HQ > 1, Exceeds BTV
Arsenic (As)	43/43	15	6.8	22.5	2.2	No	Max < BTV
Barium (Ba)	43/43	510	110	429	4.6	Yes	HQ > 1, Exceeds BTV
Beryllium (Be)	0/43	ND	2.5	1.1	ND	No	Not Detected
Boron (B)	42/43	155	2	NC	77.5	Yes	HQ > 1, No BTV
Cadmium (Cd)	0/43	ND	0.36	0.7	ND	No	Not Detected
Chromium (Cr)	43/43	19	26	41.7	0.7	No	HQ < 1
Cobalt (Co)	43/43	9	13	10	0.7	No	HQ < 1
Fluoride (F)	5/43	6	120	NC	0.05	No	HQ < 1
Lead (Pb)	43/43	14	11	29.8	1.3	No	Max < BTV
Lithium (Li)	42/43	30	75	NA	0.4	No	HQ < 1
Manganese (Mn)	43/43	491	450	880	1.1	No	Max < BTV
Mercury (Hg)	0/43	ND	0.013	NC	ND	No	Not Detected
Molybdenum (Mo)	22/43	3	15	NC	0.2	No	HQ < 1
Selenium (Se)	0/43	ND	0.52	0.7	ND	No	Not Detected
Thallium (Tl)	0/43	ND	0.05	0.41	ND	No	Not Detected
Radionuclides (pCi/g)							
Radium 226	43/43	0.7	1.5	NC	0.5	No	HQ < 1
Radium 228	43/43	1.9	1.2	NC	1.6	Yes	HQ > 1, No BTV

[1] Background values represent Background Threshold Values for Montana Surface Soils from DEQ/Hydrometrics, 2013.

ND = Not detected

NC = Not calculated

Shaded values = hazard quotients > than 1 and maximum concentration greater than BTV

Table C-13. Ecological Screening of Main Dam Soil Area (Top 24 Inches)

Analyte	# Detects / # Samples	Maximum	Soil ESL	Montana BTV[1]	HQ	COPC	Reason
Inorganics (mg/kg)							
Antimony (Sb)	0/24	ND	0.27	0.4	ND	No	Not Detected
Arsenic (As)	24/24	18	6.8	22.5	2.6	No	Max < BTV
Barium (Ba)	24/24	931	110	429	8.5	Yes	HQ > 1, Exceeds BTV
Beryllium (Be)	1/24	1	2.5	1.1	0.4	No	HQ < 1
Boron (B)	24/24	47	2	NC	23.5	Yes	HQ > 1, No BTV
Cadmium (Cd)	1/24	4	0.36	0.7	11.1	Yes	HQ > 1, Exceeds BTV
Chromium (Cr)	24/24	20	26	41.7	0.8	No	HQ < 1
Cobalt (Co)	24/24	10	13	10	0.8	No	HQ < 1
Fluoride (F)	0/24	ND	120	NC	ND	No	Not Detected
Lead (Pb)	24/24	13	11	29.8	1.2	No	Max < BTV
Lithium (Li)	23/24	18	75	NA	0.2	No	HQ < 1
Manganese (Mn)	24/24	1790	450	880	4	Yes	HQ > 1, Exceeds BTV
Mercury (Hg)	0/24	ND	0.013	NC	ND	No	Not Detected
Molybdenum (Mo)	3/24	5	15	NC	0.3	No	HQ < 1
Selenium (Se)	0/24	ND	0.52	0.7	ND	No	Not Detected
Thallium (Tl)	0/24	ND	0.05	0.41	ND	No	Not Detected
Radionuclides (pCi/g)							
Radium 226	24/24	0.7	1.5	NC	0.5	No	HQ < 1
Radium 228	24/24	0.7	1.2	NC	0.6	No	HQ < 1

[1] Background values represent Background Threshold Values for Montana Surface Soils from DEQ/Hydrometrics, 2013.

ND = Not detected

NC = Not calculated

Shaded values = hazard quotients > than 1 and maximum concentration greater than BTV

Table C-14. Ecological Screening of West Seep Soil Area (Top 24 Inches)

Analyte	# Detects / # Samples	Maximum	Soil ESL	Montana BTV[1]	HQ	COPC	Reason
Inorganics (mg/kg)							
Antimony (Sb)	0/12	ND	0.27	0.4	ND	No	Not Detected
Arsenic (As)	12/12	8	6.8	22.5	1.2	No	Max < BTV
Barium (Ba)	12/12	352	110	429	3.2	No	Max < BTV
Beryllium (Be)	0/12	ND	2.5	1.1	ND	No	Not Detected
Boron (B)	11/12	17	2	NC	8.5	Yes	HQ > 1, No BTV
Cadmium (Cd)	0/12	ND	0.36	0.7	ND	No	Not Detected
Chromium (Cr)	12/12	21	26	41.7	0.8	No	HQ < 1
Cobalt (Co)	11/12	10	13	10	0.8	No	HQ < 1
Fluoride (F)	1/12	0.5	120	NC	0.0	No	HQ < 1
Lead (Pb)	11/12	16	11	29.8	1.5	No	Max < BTV
Lithium (Li)	11/12	15	75	NA	0.2	No	HQ < 1
Manganese (Mn)	12/12	608	450	880	1.4	No	Max < BTV
Mercury (Hg)	0/12	ND	0.013	NC	ND	No	Not Detected
Molybdenum (Mo)	2/12	1	15	NC	0.1	No	HQ < 1
Selenium (Se)	0/12	ND	0.52	0.7	ND	No	Not Detected
Thallium (Tl)	0/12	ND	0.05	0.41	ND	No	Not Detected
Radionuclides (pCi/g)							
Radium 226	12/12	0.7	1.5	NC	0.5	No	HQ < 1
Radium 228	12/12	0.9	1.2	NC	0.8	No	HQ < 1

[1] Background values represent Background Threshold Values for Montana Surface Soils from DEQ/Hydrometrics, 2013.

ND = Not detected

NC = Not calculated

Shaded values = hazard quotients > than 1 and maximum concentration greater than BTV

Table C-15. Ecological Screening of South Fork Cow Creek Soil Area (Top 24 Inches)

Analyte	# Detects / # Samples	Maximum	Soil ESL	Montana BTV[1]	HQ	COPC	Reason
Inorganics (mg/kg)							
Antimony (Sb)	0/53	ND	0.27	0.4	ND	No	Not Detected
Arsenic (As)	53/53	21	6.8	22.5	3.1	No	Max < BTV
Barium (Ba)	53/53	583	110	429	5.3	Yes	HQ > 1, Exceeds BTV
Beryllium (Be)	0/53	ND	2.5	1.1	ND	No	Not Detected
Boron (B)	51/53	52	2	NC	26.0	Yes	HQ > 1, No BTV
Cadmium (Cd)	0/53	ND	0.36	0.7	ND	No	Not Detected
Chromium (Cr)	53/53	21	26	41.7	0.8	No	HQ < 1
Cobalt (Co)	53/53	10	13	10	0.8	No	HQ < 1
Fluoride (F)	6/53	1	120	NC	0.0	No	HQ < 1
Lead (Pb)	53/53	19	11	29.8	1.7	No	Max < BTV
Lithium (Li)	51/53	23	75	NA	0.3	No	HQ < 1
Manganese (Mn)	53/53	944	450	880	2.1	Yes	HQ > 1, Exceeds BTV
Mercury (Hg)	0/53	ND	0.013	NC	ND	No	Not Detected
Molybdenum (Mo)	24/53	3	15	NC	0.2	No	HQ < 1
Selenium (Se)	1/53	1	0.52	0.7	1.9	Yes	HQ > 1, Exceeds BTV
Thallium (Tl)	0/53	ND	0.05	0.41	ND	No	Not Detected
Radionuclides (pCi/g)							
Radium 226	53/53	0.9	1.5	NC	0.6	No	HQ < 1
Radium 228	53/53	3.4	1.2	NC	2.8	Yes	HQ > 1, No BTV

[1] Background values represent Background Threshold Values for Montana Surface Soils from DEQ/Hydrometrics, 2013.

ND = Not detected

NC = Not calculated

Shaded values = hazard quotients > than 1 and maximum concentration greater than BTV

Table C-16. Screening of the 3&4 EHP Groundwater Wells PSW-1 Through PSW-11 for Use as a Drinking Water Source by Livestock

	Maximum Measured Well Concentration (mg/L)	Livestock Screening Levels		
		Calculated - All Livestock (mg/L) (See Section C-5)	Soltanpour and Raley (1999) (mg/L)	CCME (2009a) (mg/L)
Well PSW-1				
Boron	0.7	39	5	5
Selenium	< 0.005	0.28	0.05	0.05
Sulfate	1020	NA	NA	1000[a] - 3,000[b]
Well PSW-2				
Boron	1.6	39	5	5
Selenium	0.014	0.28	0.05	0.05
Sulfate	2780	NA	NA	1000[a] - 3,000[b]
Well PSW-3				
Boron	0.6	39	5	5
Selenium	<0.005	0.28	0.05	0.05
Sulfate	1250	NA	NA	1000[a] - 3,000[b]
Well PSW-4A				
Boron	2.1	39	5	5
Selenium	0.089	0.28	0.05	0.05
Sulfate	2480	NA	NA	1000[a] - 3,000[b]
Well PSW-5				
Boron	0.2	39	5	5
Selenium	<0.005	0.28	0.05	0.05
Sulfate	741	NA	NA	1000[a] - 3,000[b]
Well PSW-6				
Boron	0.5	39	5	5
Selenium	0.005	0.28	0.05	0.05
Sulfate	1390	NA	NA	1000[a] - 3,000[b]
Well PSW-7				
Boron	0.3	39	5	5
Selenium	0.007	0.28	0.05	0.05
Sulfate	747	NA	NA	1000[a] - 3,000[b]
Well PSW-8				
Boron	1.15	39	5	5
Selenium	0.012	0.28	0.05	0.05
Sulfate	2780	NA	NA	1000[a] - 3,000[b]
Well PSW-9				
Boron	0.7	39	5	5
Selenium	<0.005	0.28	0.05	0.05
Sulfate	992	NA	NA	1000[a] - 3,000[b]
Well PSW-9 Stock Tank				
Boron	0.6	39	5	5
Selenium	<0.005	0.28	0.05	0.05
Sulfate	1410	NA	NA	1000[a] - 3,000[b]
Well PSW-10				
Boron	2.2	39	5	5
Selenium	<0.005	0.28	0.05	0.05

Table C-16. Screening of the 3&4 EHP Groundwater Wells PSW-1 Through PSW-11 for Use as a Drinking Water Source by Livestock

	Maximum Measured Well Concentration (mg/L)	Livestock Screening Levels		
		Calculated - All Livestock (mg/L) (See Section C-5)	Soltanpour and Raley (1999) (mg/L)	CCME (2009a) (mg/L)
Sulfate	1250	NA	NA	1000[a] - 3,000[b]
Well PSW-11				
Boron	0.24	39	5	5
Selenium	< 0.0007	0.28	0.05	0.05
Sulfate	997	NA	NA	1000[a] - 3,000[b]

[a]CCME (2009a) defines the sulfate screening level for livestock as 1000 mg/L.
[b]USDA-ARS (2009) defines sulfate concentrations between 1000 and 3000 mg/L as "marginal" quality for livestock watering.

NA = Not Available
CCME = Canadian Council of Ministers of the Environment

C-4.1.2 Ecological Screening Refinement Results

The refinement of the initial 3&4 EHP area ecological screening results encompasses several refinement steps. The first step considered the frequency of detect of the preliminary COPCs. The frequency of detect of preliminary COPCs within each soil area, and across the 3&4 EHP area as a whole was evaluated. Preliminary COPCs detected in fewer than 5% of the samples were eliminated from further evaluation based on the low frequency of occurrence and unlikelihood that they represent a significant exposure to ecological receptors. Use of the 5% frequency of detect threshold necessitates a minimum sample size of 20 samples. Since all individual surface water bodies within the 3&4 EHP area had fewer than 20 samples collected in each area, the frequency of detect refinement approach applies only to soil samples in the investigation area.

The second step of screening refinement replaced the use of the maximum concentration as the EPC with the 95 UCL concentration to represent a more realistic exposure scenario for ecological receptors. The use of the 95 UCL as the EPC is a more realistic exposure scenario for receptors that move across the area, because COPC concentrations are variable spatially across the site, and in the case of surface water, temporally variable as well. Methods for obtaining the 95 UCLs for each media are detailed in Appendix D. The ecological screening levels for surface water and soil used in this step of the refinement are the same as used in the preliminary screening. For surface water, DEQ-7 values for protection of aquatic life were used where available, even though according to Administrative Rules of Montana (ARM) 17.30.637, ephemeral streams are not subject to the specific water quality criteria identified in In Montana Circular DEQ-7 for the protection of aquatic life. Ephemeral streams are subject to the ARM requirement that the water must be free from substances that "create concentrations or combinations of materials which are toxic or harmful to human, animal, plant, or aquatic life" [ARM 17.30.637(1)(d)]. Any alternatives to the DEQ-7 values are presented as part of the BERA.

The third step of the refinement process was applied to the soil data only. In the third step, maximum and 95 UCL concentrations of COPCs were compared to an expanded list of screening levels specific for each of the eight receptor groups used in the derivation of USEPA EcoSSLs (plants, soil invertebrates, herbivorous mammals, insectivorous mammals, carnivorous mammals, herbivorous birds, insectivorous birds, carnivorous birds). This allowed for a more focused evaluation of potential risk to specific receptor groups in the BERA.

The list of COPCs carried forward to the screening refinement are presented in Table C-17.

Table C-17. Preliminary Soil COPCs Carried Forward to Screening Refinement

Soil Area	Preliminary COPCs
DP3	Antimony, Arsenic, Barium, Boron, Selenium
DP5	Barium, Boron, Selenium, Radium-228
Saddle Dam	Antimony, Barium, Boron, Radium-228
Main Dam	Barium, Boron, Cadmium, Manganese
West Seep	Boron
South Fork Cow Creek	Barium, Boron, Manganese, Selenium, Radium-228
Surface Water (Site-wide)	Boron, Selenium, Sulfate

Evaluation of Frequency of Detection

A summary of the frequency of detection of the preliminary COPCs is presented in Table C-18. Antimony, which was a preliminary COPC in the DP3 and SD soil areas, was detected in less than 5% of the samples in each of those areas. Across all soil areas, antimony was detected in only two out of 185 samples (1.1%). Based on the low frequency of detection, antimony was eliminated as a COPC in all soil areas. Cadmium was detected in a single sample in the MD soil area, which is 3.4% of the MD soil samples, and 0.5% of the overall soil samples. Therefore, cadmium was eliminated from further consideration as a COPC based on the low frequency of detection. Selenium was listed as a preliminary COPC in DP3 soil based on nine detects (26% detection rate); in DP5 based on five detects (26% detection rate); and in SFCC based on a single detect (1.9% detection rate). Based on the low detection rate of selenium in SFCC, selenium is eliminated from further consideration in that area, though it is retained as a COPC for further evaluation in the second step of screening refinement in soil areas DP3 and DP5.

The remaining preliminary COPCs (arsenic, barium, boron, manganese, Radium-228) were detected in greater than 95% of the soil samples and were retained as COPCs in the soil areas outlined in Table C-16 for further evaluation in the second step of screening refinement.

Table C-18. Frequency of Detection of Preliminary COPCs

	# of Samples	# of Detects	Frequency of Detect	Retain as COPC?
DP3				
Antimony	34	1	2.90%	No
Arsenic	34	34	100%	Yes
Barium	34	34	100%	Yes
Boron	34	34	100%	Yes
Selenium	34	9	26%	Yes
DP5				
Barium	19	19	100%	Yes
Boron	19	19	100%	Yes
Selenium	19	5	26%	Yes
Radium-228	19	19	100%	Yes
Saddle Dam				
Antimony	43	1	2.30%	No
Barium	43	43	100%	Yes
Boron	43	42	98%	Yes
Radium-228	43	43	100%	Yes
Main Dam				
Barium	24	24	100%	Yes
Boron	24	24	100%	Yes
Cadmium	24	1	3.40%	No
Manganese	24	24	100%	Yes
West Seep				
Boron	12	11	92%	Yes
SFCC				
Barium	53	53	100%	Yes
Boron	53	51	96%	Yes
Manganese	53	53	100%	Yes
Selenium	53	1	1.90%	No
Radium-228	53	53	100%	Yes
Combined Soil Areas				
Antimony	185	2	1.1%	No
Cadmium	185	1	0.5%	No
Selenium	185	15	8.1%	Yes

Comparison of 95UCL Exposure Point Concentrations to Ecological Screening Levels

Surface water

Two metals (boron and selenium) and one common anion (total sulfates) had maximum concentrations in surface water exceeding their respective ecological screening benchmarks and were carried forward for evaluation of 95 UCL EPCs. Results of the surface water screening refinement based on calculation of 95 EPCs are presented in Table C-19. The 95 UCL concentration of boron exceeded the surface water screening level for boron, therefore boron in surface water was retained for further evaluation in the BERA. The 95 UCL for selenium in surface water must be used with caution because of the large number of non-detects in the data set. Selenium was only detected in four out of forty-one surface water samples. In addition,

reporting limits for selenium non-detects in surface water (5 ug/L) were equal to the surface water screening criteria. The 95 UCL was calculated using one-half the LOD as a substitution for non-detected values. The 95 UCL calculated using this method was 7.3 µg/L, which exceeds the ecological screening value of 5 µg/L. Selenium was retained for further evaluation in the BERA, and the uncertainty associated with the reporting limits for selenium in surface water are discussed further in the uncertainty discussion. The 95 UCL for sulfate in surface water was 2,975 mg/L, which is less than the surface water quality criteria based on livestock ingestion. No appropriate aquatic life criteria exist for sulfate in surface water. Three of the ten sampling areas (NP-Cut, PS4-Overflow, and West Seep Diversion) had sample results exceeding the sulfate water criterion for livestock ingestion. Consideration should be given to the need to exclude livestock utilizing these three areas as a source of drinking water. The lack of an aquatic life criterion for sulfate is discussed further in the uncertainty discussion. Sulfate was not retained for further evaluation as a COPC in surface water.

Soil

Arsenic, barium, boron, manganese, selenium, and radium-228 were carried forward for evaluation of 95 UCL EPCs in screening refinement because maximum concentrations in at least one area exceeded soil screening levels and they could not be eliminated based on frequency of detection or comparison to Montana BTVs. 95 UCLs for these four constituents were calculated for each soil area where they were identified as preliminary COPCs. Radium-228, which was identified as a preliminary COPC in the DP5, SD, and SFCC soil areas, had 95 UCL concentrations in each of these areas less than the soil screening level of 1.2 pCi/g. Therefore, radium-228 was eliminated as a COPC in these areas.

Manganese, which was identified as a preliminary COPC in the MD and SFCC soil areas, has 95 UCL concentrations in both of these areas greater than soil screening levels, and was retained for further evaluation in the expanded screening evaluation and BERA. The 95 UCL concentrations of all barium exceeded soil screening levels in all five of the soil areas in which it was identified as a preliminary COPC (DP3, DP5, SD, MD, SFCC), and 95 UCLs of boron exceeded soil screening levels in all six soil areas. Therefore, barium and boron were retained for further evaluation in expanded screening and the BERA for each of the areas in which they were identified as preliminary COPCs. A 95 UCL for selenium was calculated in soil areas DP3 and DP5 but there is uncertainty around the calculated UCLs due to the fact that selenium was not detected in approximately 75% of the samples in each of those areas. Due to the low frequency of detection for selenium a 95 UCL for selenium is highly sensitive to the method to account for non-detected observations. The 95 UCL calculation substituted one-half the reported limit of detection for each of the non-detected values. The uncertainty surrounding the 95 UCL calculations for selenium is discussed further in Section C-4.3, including the potential range of 95 UCLs when different substitution assumptions are used to represent non-detect values. The 95 UCL concentrations estimated using one-half the limit of detection (LOD) for non-detects exceeded screening levels in both DP3 and DP5. Selenium was retained for further evaluation in expanded screening and the BERA.

Expanded Screening of Soil COPCs

In deriving ecological soil screening levels for metals, both USEPA (2003) and LANL (2014) modeled doses to multiple trophic levels and feeding guilds, and then selected the most sensitive trophic receptor as the basis for the soil screening level. The receptor group/trophic

levels evaluated include plants, invertebrates, herbivorous mammals, herbivorous birds, insectivorous mammals, insectivorous birds, carnivorous mammals, and carnivorous birds. To assist in focusing the BERA to those receptors most at potential risk, the ecological screening levels for all eight receptor categories is compared to the 95 UCL for the mean concentrations in soil. The expanded screening for each of the remaining COPCs (arsenic in DP3, boron in all soil areas, barium in all areas except West Seep, manganese in Main Dam and SFCC, and selenium in DP3 and DP5) in surface soil are shown in Tables C-21 through C-36. The expanded screening shows that 95 UCL concentrations arsenic exceed NOAEL-based screening levels for invertebrates in DP3. 95 UCL concentrations of barium in surface soil exceed NOAEL-based screening levels for plants in DP3, DP5, SD, MD, and SFCC soil areas, and exceed NOAEL-based screening levels for soil invertebrates in DP5. 95 UCL concentrations of boron in surface soil exceed NOAEL screening levels for herbivorous birds and insectivorous birds in all six soil areas. 95 UCL concentrations of manganese in surface soil exceed NOAEL screening levels for plants in SFCC soil, and plant and soil invertebrates in MD soil. 95 UCL concentrations of selenium exceed screening levels for plants in DP3, and plants and insectivorous mammals in DP5. The list of COPCs and the associated endpoints retained for evaluation in the BERA are summarized in Table C-37.

Table C-19. Comparison of 95 UCLs to Surface Water Screening Levels

Analyte	Detects / Samples	95 UCL (µg/L)	Ecological Screening Level (µg/L)	HQ	COPC?	Reason
Boron	38/41	2,800	1.6	1750	Yes	HQ > 1
Selenium	4/41	7.3	5	1.5	Yes	HQ > 1
Sulfate	41/41	2,953,700	3,000,000	1	No	HQ < 1

Table C-20. Comparison of 95 UCLs to Soil Screening Levels

Analyte	Detects / Samples	95 UCL (mg/kg)	Ecological Screening Level (mg/kg)	HQ	COPC?	Reason
DP3						
Arsenic	34/34	12.4	6.8	1.8	Yes	HQ > 1
Barium	34/34	267.7	110	2.4	Yes	HQ > 1
Boron	34/34	30.9	2	15.5	Yes	HQ > 1
Selenium	9/34	0.56	0.52	1.1	Yes	HQ > 1
DP5						
Barium	19/19	706.7	110	6.4	Yes	HQ > 1
Boron	19/19	31.2	2	15.6	Yes	HQ > 1
Radium-228	19/19	0.9	1.2	0.8	No	HQ < 1
Selenium	5/19	0.74	0.52	1.4	Yes	HQ > 1
Saddle Dam						
Barium	43/43	189.3	110	1.7	Yes	HQ > 1
Boron	42/43	41.1	2	20.6	Yes	HQ > 1
Radium-228	43/43	0.9	1.2	0.8	No	HQ < 1
Main Dam						
Barium	24/24	329.6	110	3.0	Yes	HQ > 1
Boron	24/24	25.8	2	12.9	Yes	HQ > 1
Manganese	24/24	569.3	450	1.3	Yes	HQ > 1
West Seep						
Boron	11/12	13.8	2	6.9	Yes	HQ > 1
SFCC						
Barium	53/53	199.1	110	1.8	Yes	HQ > 1
Boron	51/53	15.8	2	7.9	Yes	HQ > 1
Manganese	53/53	421.9	450	0.9	Yes	HQ > 1
Radium-228	53/53	1.1	1.2	0.9	No	HQ < 1

Table C-21. Expanded Screening of Arsenic in DP3 Soil (0 – 24")

Screening-level Receptor	Ecological Soil Screening Level (mg/kg)	Maximum Concentration in Surface Soil (mg/kg)	95 UCL Concentration in Surface Soil (mg/kg)	Does 95 UCL Concentration in Surface Soil Exceed Soil Screening Level?
Plants	18	47	12.4	No
Soil Invertebrates	6.8	47	12.4	**Yes**
Herbivorous Birds	67	47	12.4	No
Insectivorous Birds	43	47	12.4	No
Carnivorous Birds	1100	47	12.4	No
Herbivorous Mammals	170	47	12.4	No
Insectivorous Mammal	46	47	12.4	No
Carnivorous Mammals	170	47	12.4	No

NA = Not available

Table C-22. Expanded Screening of Barium in DP3 Soil (0 – 24")

Screening-level Receptor	Ecological Soil Screening Level (mg/kg)	Maximum Concentration in Surface Soil (mg/kg)	95 UCL Concentration in Surface Soil (mg/kg)	Does 95 UCL Concentration in Surface Soil Exceed Soil Screening Level?
Plants	110	787	268	**Yes**
Soil Invertebrates	330	787	268	No
Herbivorous Birds	NA	787	268	NA
Insectivorous Birds	NA	787	268	NA
Carnivorous Birds	NA	787	268	NA
Herbivorous Mammals	3200	787	268	No
Insectivorous Mammal	2000	787	268	No
Carnivorous Mammals	9100	787	268	No

NA = Not available

Table C-23. Expanded Screening of Boron in DP3 Soil (0 – 24")

Screening-level Receptor	Ecological Soil Screening Level (mg/kg)	Maximum Concentration in Surface Soil (mg/kg)	95 UCL Concentration in Surface Soil (mg/kg)	Does 95 UCL Concentration in Surface Soil Exceed Soil Screening Level?
Plants	36	78	30.9	No
Soil Invertebrates	NA	78	30.9	NA
Herbivorous Birds	2	78	30.9	**Yes**
Insectivorous Birds	7.5	78	30.9	**Yes**
Carnivorous Birds	43	78	30.9	No
Herbivorous Mammals	68	78	30.9	No
Insectivorous Mammal	120	78	30.9	No
Carnivorous Mammals	21,000	78	30.9	No

NA = Not available

Table C-24. Expanded Screening of Selenium in DP3 Soil (0 – 24")

Screening-level Receptor	Ecological Soil Screening Level (mg/kg)	Maximum Concentration in Surface Soil (mg/kg)	95 UCL Concentration in Surface Soil (mg/kg)	Does 95 UCL Concentration in Surface Soil Exceed Soil Screening Level?
Plants	0.52	2	0.56	**Yes**
Soil Invertebrates	4.1	2	0.56	No
Herbivorous Birds	2.2	2	0.56	No
Insectivorous Birds	1.2	2	0.56	No
Carnivorous Birds	83	2	0.56	No
Herbivorous Mammals	2.7	2	0.56	No
Insectivorous Mammal	0.63	2	0.56	No
Carnivorous Mammals	2.8	2	0.56	No

NA = Not available

Table C-25. Expanded Screening of Barium in DP5 Soil (0 – 24")

Screening-level Receptor	Ecological Soil Screening Level (mg/kg)	Maximum Concentration in Surface Soil (mg/kg)	95 UCL Concentration in Surface Soil (mg/kg)	Does 95 UCL Concentration in Surface Soil Exceed Soil Screening Level?
Plants	110	2530	707	**Yes**
Soil Invertebrates	330	2530	707	**Yes**
Herbivorous Birds	NA	2530	707	NA
Insectivorous Birds	NA	2530	707	NA
Carnivorous Birds	NA	2530	707	NA
Herbivorous Mammals	3200	2530	707	No
Insectivorous Mammal	2000	2530	707	No
Carnivorous Mammals	9100	2530	707	No

NA = Not available

Table C-26. Expanded Screening of Boron in DP5 Soil (0 – 24")

Screening-level Receptor	Ecological Soil Screening Level (mg/kg)	Maximum Concentration in Surface Soil (mg/kg)	95 UCL Concentration in Surface Soil (mg/kg)	Does 95 UCL Concentration in Surface Soil Exceed Soil Screening Level?
Plants	36	93	31.2	No
Soil Invertebrates	NA	93	31.2	NA
Herbivorous Birds	2	93	31.2	**Yes**
Insectivorous Birds	7.5	93	31.2	**Yes**
Carnivorous Birds	43	93	31.2	No
Herbivorous Mammals	68	93	31.2	No
Insectivorous Mammal	120	93	31.2	No
Carnivorous Mammals	21,000	93	31.2	No

NA = Not available

Table C-27. Expanded Screening of Selenium in DP5 Soil (0 – 24")

Screening-level Receptor	Ecological Soil Screening Level (mg/kg)	Maximum Concentration in Surface Soil (mg/kg)	95 UCL Concentration in Surface Soil (mg/kg)	Does 95 UCL Concentration in Surface Soil Exceed Soil Screening Level?
Plants	0.52	2	0.74	**Yes**
Soil Invertebrates	4.1	2	0.74	No
Herbivorous Birds	2.2	2	0.74	No
Insectivorous Birds	1.2	2	0.74	No
Carnivorous Birds	83	2	0.74	No
Herbivorous Mammals	2.7	2	0.74	No
Insectivorous Mammal	0.63	2	0.74	**Yes**
Carnivorous Mammals	2.8	2	0.74	No

Table C-28. Expanded Screening of Barium in Saddle Dam Soil (0 – 24")

Screening-level Receptor	Ecological Soil Screening Level (mg/kg)	Maximum Concentration in Surface Soil (mg/kg)	95 UCL Concentration in Surface Soil (mg/kg)	Does 95 UCL Concentration in Surface Soil Exceed Soil Screening Level?
Plants	110	510	189	**Yes**
Soil Invertebrates	330	510	189	No
Herbivorous Birds	NA	510	189	NA
Insectivorous Birds	NA	510	189	NA
Carnivorous Birds	NA	510	189	NA
Herbivorous Mammals	3200	510	189	No
Insectivorous Mammal	2000	510	189	No
Carnivorous Mammals	9100	510	189	No

NA = Not available

Table C-29. Expanded Screening of Boron in Saddle Dam Soil (0 – 24")

Screening-level Receptor	Ecological Soil Screening Level (mg/kg)	Maximum Concentration in Surface Soil (mg/kg)	95 UCL Concentration in Surface Soil (mg/kg)	Does 95 UCL Concentration in Surface Soil Exceed Soil Screening Level?
Plants	36	155	41.1	**Yes**
Soil Invertebrates	NA	155	41.1	NA
Herbivorous Birds	2	155	41.1	**Yes**
Insectivorous Birds	7.5	155	41.1	**Yes**
Carnivorous Birds	43	155	41.1	No
Herbivorous Mammals	68	155	41.1	No
Insectivorous Mammal	120	155	41.1	No
Carnivorous Mammals	21,000	155	41.1	No

NA = Not available

Table C-30. Expanded Screening of Barium in Main Dam Soil (0 – 24")

Screening-level Receptor	Ecological Soil Screening Level (mg/kg)	Maximum Concentration in Surface Soil (mg/kg)	95 UCL Concentration in Surface Soil (mg/kg)	Does 95 UCL Concentration in Surface Soil Exceed Soil Screening Level?
Plants	110	931	330	**Yes**
Soil Invertebrates	330	931	330	**Yes**
Herbivorous Birds	NA	931	330	NA
Insectivorous Birds	NA	931	330	NA
Carnivorous Birds	NA	931	330	NA
Herbivorous Mammals	3200	931	330	No
Insectivorous Mammal	2000	931	330	No
Carnivorous Mammals	9100	931	330	No

NA = Not available

Table C-31. Expanded Screening of Boron in Main Dam Soil (0 – 24")

Screening-level Receptor	Ecological Soil Screening Level (mg/kg)	Maximum Concentration in Surface Soil (mg/kg)	95 UCL Concentration in Surface Soil (mg/kg)	Does 95 UCL Concentration in Surface Soil Exceed Soil Screening Level?
Plants	36	47	25.8	No
Soil Invertebrates	NA	47	25.8	NA
Herbivorous Birds	2	47	25.8	**Yes**
Insectivorous Birds	7.5	47	25.8	**Yes**
Carnivorous Birds	43	47	25.8	No
Herbivorous Mammals	68	47	25.8	No
Insectivorous Mammal	120	47	25.8	No
Carnivorous Mammals	21,000	47	25.8	No

NA = Not available

Table C-32. Expanded Screening of Manganese in Main Dam Soil (0 – 24")

Screening-level Receptor	Ecological Soil Screening Level (mg/kg)	Maximum Concentration in Surface Soil (mg/kg)	95 UCL Concentration in Surface Soil (mg/kg)	Does 95 UCL Concentration in Surface Soil Exceed Soil Screening Level?
Plants	220	1790	569	**Yes**
Soil Invertebrates	450	1790	569	**Yes**
Herbivorous Birds	4300	1790	569	No
Insectivorous Birds	4300	1790	569	No
Carnivorous Birds	65,000	1790	569	No
Herbivorous Mammals	5300	1790	569	No
Insectivorous Mammal	4000	1790	569	No
Carnivorous Mammals	6200	1790	569	No

NA = Not available

Table C-33. Expanded Screening of Boron in West Seep Soil (0 – 24")

Screening-level Receptor	Ecological Soil Screening Level (mg/kg)	Maximum Concentration in Surface Soil (mg/kg)	95 UCL Concentration in Surface Soil (mg/kg)	Does 95 UCL Concentration in Surface Soil Exceed Soil Screening Level?
Plants	36	17	13.8	No
Soil Invertebrates	NA	17	13.8	NA
Herbivorous Birds	2	17	13.8	**Yes**
Insectivorous Birds	7.5	17	13.8	**Yes**
Carnivorous Birds	43	17	13.8	No
Herbivorous Mammals	68	17	13.8	No
Insectivorous Mammal	120	17	13.8	No
Carnivorous Mammals	21,000	17	13.8	No

NA = Not available

Table C-34. Expanded Screening of Barium in SFCC Soil (0 – 24")

Screening-level Receptor	Ecological Soil Screening Level (mg/kg)	Maximum Concentration in Surface Soil (mg/kg)	95 UCL Concentration in Surface Soil (mg/kg)	Does 95 UCL Concentration in Surface Soil Exceed Soil Screening Level?
Plants	110	583	199	**Yes**
Soil Invertebrates	330	583	199	No
Herbivorous Birds	NA	583	199	NA
Insectivorous Birds	NA	583	199	NA
Carnivorous Birds	NA	583	199	NA
Herbivorous Mammals	3200	583	199	No
Insectivorous Mammal	2000	583	199	No
Carnivorous Mammals	9100	583	199	No

NA = Not available

Table C-35. Expanded Screening of Boron in SFCC Soil (0 – 24")

Screening-level Receptor	Ecological Soil Screening Level (mg/kg)	Maximum Concentration in Surface Soil (mg/kg)	95 UCL Concentration in Surface Soil (mg/kg)	Does 95 UCL Concentration in Surface Soil Exceed Soil Screening Level?
Plants	36	52	15.8	No
Soil Invertebrates	NA	52	15.8	NA
Herbivorous Birds	2	52	15.8	**Yes**
Insectivorous Birds	7.5	52	15.8	**Yes**
Carnivorous Birds	43	52	15.8	No
Herbivorous Mammals	68	52	15.8	No
Insectivorous Mammal	120	52	15.8	No
Carnivorous Mammals	21,000	52	15.8	No

NA = Not available

Table C-36. Expanded Screening of Manganese in SFCC Soil (0 – 24")

Screening-level Receptor	Ecological Soil Screening Level (mg/kg)	Maximum Concentration in Surface Soil (mg/kg)	95 UCL Concentration in Surface Soil (mg/kg)	Does 95 UCL Concentration in Surface Soil Exceed Soil Screening Level?
Plants	220	944	422	**Yes**
Soil Invertebrates	450	944	422	No
Herbivorous Birds	4300	944	422	No
Insectivorous Birds	4300	944	422	No
Carnivorous Birds	65,000	944	422	No
Herbivorous Mammals	5300	944	422	No
Insectivorous Mammal	4000	944	422	No
Carnivorous Mammals	6200	944	422	No

NA = Not available

Table C-37. Summary of COPCs for Evaluation in the BERA

	Aquatic Life	Herbivorous Birds	Insectivorous Birds	Carnivorous Birds	Herbivorous Mammals	Insectivorous Mammals	Carnivorous Mammals	Plants	Soil Invertebrates
Surface Water									
Boron	X								
Selenium	X								
DP3 Soil									
Arsenic									X
Barium								X	
Boron		X	X						
Selenium								X	
DP5 Soil									
Barium								X	X
Boron		X	X						
Selenium						X		X	
Saddle Dam Soil									
Barium								X	
Boron		X	X					X	
Main Dam Soil									
Barium								X	
Boron		X	X						
Manganese								X	X
West Seep Soil									
Boron		X	X						
SFCC Soil									
Barium								X	
Boron		X	X						
Manganese								X	

C-4.2 Baseline Ecological Risk Characterization

Based on the results of the SLERA and COPC refinement steps, boron and selenium were carried forward to the BERA for further evaluation in the 3&4 EHP area surface water, and arsenic, barium, boron, manganese, and selenium were retained for further evaluation in the 3&4 EHP area soils. Specific ecological receptor groups evaluated for each chemical in each media are summarized in Table C-37. As discussed in Section C.2.2, Assessment Endpoints, Measures of Effect, and Exposure Pathways, the BERA risk characterization involved calculation of average daily doses of COPCs to wildlife potentially exposed to 3&4 EHP area surface water and soils. The BERA risk characterization also included consideration of LOAEL toxicity levels in addition to NOAEL levels.

C-4.2.1 Surface Water

Aquatic Life

Boron and selenium were retained as surface water COPCs in the BERA for exceeding surface water screening levels. LOAEL-based aquatic life criteria for boron and selenium were derived by LANL in the EcoRisk Database (LANL, 2017). BERA risk characterization for aquatic organisms in the 3&4 EHP area surface water was based on the boron LOAEL thresholds of 16 micrograms per liter (µg/L) for surface water, and the selenium LOAEL thresholds of 20 µg/L.

Boron concentrations exceeded the LOAEL level of 16 µg/L in all surface water samples in which boron was detected. In the three SFCC surface water samples where boron was not detected, reporting limits (100 µg/L) exceeded the boron LOAEL of 16 µg/L. The boron surface water 95 UCL concentration of 2,800 µg/L exceeded the LOAEL threshold of 16 (HQ = 175). More recent reviews of aquatic toxicity information for boron suggest that the NOAEL and LOAEL values used in the SLERA and BERA for protection of aquatic life may be overly conservative. The Canadian Council of Ministers of the Environment (CCME) calculated protective levels of boron in surface water based on six fish studies, six invertebrate studies, six amphibian studies, and ten plant studies, and derived a Canadian Water Quality Guideline for long-term exposure of 1,500 µg/L (CCME, 2009b). The CCME value of 1,500 µg/L represents the 5th percentile effects level derived from the 28 studies mentioned above, of which six were based on fish toxicity endpoints. As discussed, fish are not appropriate receptors for the site due to the ephemeral nature of site surface water. If the six fish studies are removed and the 5th percentile effects level is calculated based only on the invertebrate, amphibian, and plant studies, the 5th percentile toxicity threshold is estimated at 2,100 µg/L. Of the 42 surface water samples collected from the 3&4 EHP area, seven samples from West Seep Diversion and three samples from PSW-4 Overflow Pond exceeded the adjusted CCME value of 2,100 µg/L. Uncertainties associated with the NOAEL and LOAEL surface water criteria for boron are discussed further in the uncertainty evaluation in Section C-4.3.

In the SLERA and SLERA refinement, selenium concentrations exceeded DEQ-7 levels for protection of aquatic life at two locations (CC3, SFCC Diversion). The 95 UCL for selenium in surface water of 7.3 µg/L must be used with caution because of the large number of non-detects in the data set. Selenium was only detected in four out of forty-two surface water samples. In addition, reporting limits for selenium non-detects in surface water (5 ug/L) were equal to the surface water screening criteria. The 95 UCL was calculated using one-half the LOD as a substitution for non-detected values. Of the four detected samples, only the maximum concentration observed in CC3 (65 µg/L) exceeded the selenium surface water LOAEL value of 20 µg/L. Selenium was not detected in the other surface water sample collected at CC3. Due to the low frequency of detect and the fact that only a single sample exceeded the LOAEL concentration for selenium, unacceptable risk from selenium in surface water is unlikely, and selenium was not retained as a COC in surface water. It should be noted that the LOAEL value of 20 µg/L is based on the criteria maximum concentration (CMC) from the 1999 national AWQC for selenium, which was developed using guidelines that utilized a combination of fish, invertebrate, plant, and amphibian endpoints. New selenium AWQC were published by EPA in 2016 that were based solely on fish body burden endpoints, and thus are not relevant to the waters evaluated in this risk assessment. The use of a fish body burden endpoint was due to the fact that fish are more sensitive to selenium in aquatic systems than other aquatic organisms

(USEPA, 2016), and selenium concentrations in fish eggs were a better predictor of toxicity that concentrations in the water column. Water-based concentrations reported by EPA associated with effects on non-fish species were 44.9 µg/L for reproductive effects in frogs, and 108 µg/L for zooplankton. Only the maximum observed concentration of 65 µg/L in CC3 exceeded the effects concentration from the frog study referenced by EPA.

No background data were available for surface water in the 3&4 EHP area in the Cow Creek or South Fork Cow Creek drainages. The background screening level (BSL) for boron in the East Fork Armells Creek drainage (Neptune and Company, 2017), which includes the Plant Site and Units 1 & 2 areas, is 880 ug/L, though this area is potentially influenced by upstream mining activities that are not present upstream of the 3&4 EHP. Comparison to surface water background conditions was not used to eliminate any chemicals from the risk assessment due to the fact that the derived BSL for the East Fork Armells Creek may not be relevant for surface water within the 3&4 EHP area.

C-4.2.2 Soil

Plants

Risk characterization for plants exposed to barium, boron, manganese, and selenium in soil was based on the plant LOAEL toxicity values of 260 mg/kg for barium, 86 mg/kg for boron, 1,100 mg/kg for manganese, and 3 mg/kg for selenium.

95 UCL concentrations of barium exceeded the LOAEL toxicity threshold for protection of plants (260 mg/kg) in three of the soil areas: DP3, DP5, and MD. Barium is discussed further below.

Manganese, which was carried forward from screening refinement based on potential risk to plants in soil areas MD and SFCC, had 95 UCL concentrations less than the LOAEL toxicity threshold for protection of plants in both of those areas, and was therefore determined not to pose unacceptable risk to plants. Therefore, manganese was not retained as a COC for plants.

Boron was carried forward from screening refinement based on potential risk to plants in the SD soil area. 95 UCL concentrations of boron in the SD area (41.1 mg/kg) were less than the plant LOAEL of 86 mg/kg, therefore boron does not pose unacceptable risk to plants in the SD area and was not retained as a COC for plants.

Selenium was carried forward from screening refinement based on potential risk to plants from 95 UCL concentrations in soil in DP3 and DP5. Selenium was detected in nine of 34 samples in DP3, and five of nineteen samples in the top 24-inches of soil in DP5. Nineteen of the twenty-five non-detects in DP3 and twelve of the fourteen non-detects in DP5 had limits of detection equal to the ecological screening levels. However, detected concentrations of selenium in DP3 and DP5 were all less than the plant LOAEL of 3 mg/kg, as were limits of detection in all samples, therefore selenium does not pose unacceptable risk to plants in the DP3 and DP5 soil areas and was not retained as a COC for plants.

In evaluating risk from barium to plants, it should be noted that the Montana BTV for barium (429 mg/kg) is also higher than the LOAEL threshold for plants (260 mg/kg). In soil area DP3, only two sample locations out of sixteen exceeded the Montana BTV of 429 mg/kg (three out of 34 samples in total). Barium at sample location DP3-5 exceeded the Montana BTV in the 0 – 6”

and 12 – 24" depth intervals (concentrations of 489 mg/kg and 498 mg/kg, respectively), and barium at location DP3-3 exceeded the Montana BTV in the 12 – 24" depth interval (concentration of 787 mg/kg). Locations DP3-3 and DP3-5 are located on opposite ends of the drain pit itself, and along with location DP3-4 are the closest sampling locations to the drain pit.

In soil area DP5, two of nine sampling locations (two of eighteen samples in total) had barium concentrations exceeding the LOAEL toxicity threshold for plants. These same two locations also exceeded the Montana BTV for barium. The maximum barium concentration in soil, 2,530 mg/kg, was observed at soil location DP5-2 in the 0 – 6" depth interval. The barium concentration at location DP5-1 in the 0 – 6" depth (772 mg/kg) also exceeded the Montana BTV for barium. Samples DP5-1 and DP5-2 are the two western-most samples in the DP5 soil area and are immediately adjacent to the drain pit itself. Together these two samples represent an area of approximately 0.25 acres in extent.

Three of eleven sampling locations in the MD soil area contained barium concentration higher than the plant LOAEL, and three of those samples contained barium concentrations higher than the Montana BTV. Barium concentrations were 931 mg/kg at location MD-7 (0 – 6"), 634 mg/kg at location MD-6 (0 – 6"), and 537 mg/kg at location MD-11 (12 – 24"). Locations MD-6 and MD-7 are the two sampling locations closest to the Main Dam sump and are less than 75 feet apart. Location MD-11 is the northern most MD sampling location, and is closest to the current Main Dam interception trench.

Across all soil areas within the 3&4 EHP area, barium exceeded the Montana BTV in twelve of 185 samples. The samples suggest possible localized releases of barium may have occurred in the DP5 and MD soil areas, though areas of potential risk to plants that are greater than background conditions are limited in extent (< 0.25 acres). Due to the limited areal extent of potential risk at the 3&4 EHP area, unacceptable risk to plant communities is unlikely, and barium was not retained as a COC.

Soil Invertebrates

Risk characterization for soil invertebrates was based on the invertebrate LOAEL toxicity values of 68 mg/kg for arsenic, 3,200 mg/kg for barium, and 4,500 mg/kg for manganese (LANL, 2017).

Arsenic was carried forward from screening refinement as a COPC because 95 UCL concentrations exceeded invertebrate screening levels in soil area DP3. However, 95 UCL concentrations of arsenic were less than the LOAEL toxicity threshold for protection of soil invertebrates (68 mg/kg) in MD soil, therefore arsenic does not pose unacceptable risk to soil invertebrates and was not retained as a COC for soil invertebrates.

Barium was carried forward from screening refinement as a COPC because 95 UCL concentrations exceeded invertebrate screening levels in soil area DP5. 95 UCL concentrations of barium were less than the LOAEL toxicity threshold for protection of soil invertebrates (3,200 mg/kg) in DP5, therefore barium does not pose unacceptable risk to soil invertebrates in the SD area, and was not retained as a COC for soil invertebrates.

Manganese was identified as a COPC for invertebrates in the MD soil area where 95 UCL concentrations exceeded invertebrate screening levels. However, 95 UCL concentrations of manganese were less than the LOAEL toxicity threshold for protection of soil invertebrates

(4,500 mg/kg) in MD soil, therefore manganese does not pose unacceptable risk to soil invertebrates and was not retained as a COC for soil invertebrates.

Terrestrial Wildlife

Average daily doses to wildlife receptors were calculated using Equation 3 presented in Section C-4. Boron was retained as a COPC in the SLERA based on potential risk to terrestrial wildlife receptors as summarized in Table C-37. Selenium was retained as a COPC based on potential risk to insectivorous mammals in the DP5 soil area. Baseline risk characterization for terrestrial wildlife potentially exposed to boron in soil was based on the calculated average daily doses presented in Tables C-38 and C-39 for insectivorous birds and herbivorous birds, respectively. Baseline risk characterization for insectivorous mammals exposed to selenium in DP5 soil was based on the calculated average daily doses presented in Table C-40.

Boron doses to insectivorous birds exceeded NOAEL TRVs in all areas, but did not exceed LOAEL TRVs in any soil area (Table C-38), using the conservative assumption that an individual bird could receive all of its exposure from any given individual soil area. Boron doses to herbivorous birds exceeded NOAEL TRVs in all areas, and exceeded LOAEL TRVs in DP3, DP5, SD, and MD soil areas (Table C-39). The LOAEL exceedances occur under the conservative assumption that herbivorous birds such as the lark sparrow would receive all of their exposure from each individual soil area (i.e. AUF = 1). Dechant, et al (2002) reported the lark sparrow foraging range of about 6 hectare (15 acres), which is approximately three times larger than the largest of the soil areas, DP3, which encompasses about 4.8 acres. The distance between each of the soil areas makes it unlikely that an individual bird with a 15-acre foraging area would receive exposure from more than a single soil area. When the AUF for each area are adjusted based on the lark sparrow foraging area, LOAEL HQ values are less than one. NOAEL and LOAEL HQs based on adjusted area use factors (AUF) are presented in Table C-41.

A Montana BTV value was not developed for boron. Eisler (1990) presents an average boron background concentration in U.S. soils of 30 mg/kg, with a range of 10 to 300 mg/kg. Shacklette and Boerngen (1984) provide a geometric mean concentration of boron of 26 mg/kg in U.S. soils. The geometric mean of boron concentrations across the 3&4 EHP area is 15.1 mg/kg.

Boron concentrations in the 3&4 EHP area soils do not result in adjusted doses to birds and mammals exceeding LOAEL TRVs, and the geometric mean and range of boron concentrations in the 3&4 EHP area soil are similar to those reported for background conditions across the U.S. as a whole. Therefore, boron in the 3&4 EHP soil areas does not pose unacceptable risk to birds and mammals utilizing the site, and boron was not retained as a COC in soil.

Selenium doses to insectivorous mammals in DP5 exceed the NOAEL TRV (HQ = 1.2) and were less than the LOAEL TRV (HQ = 0.8) based on an AUF = 1 for short-tailed shrew (Table C-40). The BTV for selenium in Montana is 0.7 mg/kg, which also results in doses to short-tailed shrew exceeding NOAEL and LOAEL TRVs, with identical HQs as when the DP5 95 UCL concentration is used to estimate dose. Though slight risk may be posed to insectivorous mammals from selenium in DP5 soils, the risk is not distinguishable from risk posed by Montana background concentrations of selenium, therefore selenium was not retained as a COC in soil.

C-4.3 Evaluation of Uncertainties

Uncertainties in the risk characterization originate from a cumulative effect of the uncertainties in the Exposure Assessment, the Toxicity Assessment, and the Characterization of Risk, including lack of toxicity information for certain chemicals, uncertainties in exposure parameters, and uncertainties associated with deriving exposure point concentrations for specific chemicals and organisms given the spatial and temporal variability observed in the data.

Available Ecological Toxicity Information. Availability of ecological toxicity information represents an uncertainty for a number of chemicals in 3&4 EHP soil and surface water. Uncertainty exists for a number of the constituents for which screening-levels are available due to methodologies used in deriving screening-levels and the scarcity of toxicity information for some chemicals. As an example, the SLERA uses a surface water screening level of 1.6 µg/L and a LOAEL threshold of 16 µg/L for boron. These numbers are based on a Tier II value derived from a limited amount of toxicity information by Sample et. al in 1996. Tier II values were developed so that aquatic benchmarks could be established with fewer data than are required for the National Ambient Water Quality Criteria, which are the equivalent of DEQ-7 aquatic life criteria. More recent publications from the Canadian Council of Ministers of the Environment calculated protective levels of boron in surface water based on six fish studies, six invertebrate studies, six amphibian studies, and ten plant studies, and derived a Canadian Water Quality Guideline for long-term exposure of 1,500 µg/L (CCME, 2009b). This guideline represents a 5th percentile low-effects species sensitivity distribution, meaning that 95% percent of species have a low-effects threshold for boron greater than 1,500 µg/L. When the six fish studies are removed from the calculations and the 5th percentile effects level is recalculated based on only the plant, invertebrate, and amphibian studies, the 5th percentile effects level is estimated at 2,100 µg/L . Thus, the use of the Tier II derived screening level and LOAEL value for boron is likely overly conservative. The CCME review indicates that fish and aquatic plants are more sensitive to boron in surface water than aquatic invertebrates and reptiles/amphibians (see Table 4 and Figure 2 of CCME, 2009b). Fish and aquatic plant populations and communities are not present in West Seep Diversion, NP Cut, and PSW-4 Overflow due to the ephemeral nature of the surface water in this area. Therefore, the true risk of boron concentrations to aquatic organisms in these areas is uncertain.

Limited aquatic life information is available to assess the potential for sulfate toxicity to aquatic life in waters where fish are not expected to be present. The British Columbia Ministry for the Environment published aquatic life criteria of 429 mg/L for sulfate (BCME, 2013) in water with hardness of 250 mg/L, but the recommended guidelines were based on protection of early life-stage rainbow trout, which were the most sensitive organism tested. Results also showed that sulfate toxicity was hardness dependent, and guidelines were only published for hardness values up to 250 mg/L, with the recommendation that site-specific water should be tested for hardness values greater than 250. Hardness in the majority of site water samples was over 400 mg/L, and ranged as high as 4,000 mg/L. A variety of fish, invertebrate, plant, and amphibian studies were evaluated by BCME for incorporation into aquatic life criteria development. Sulfate EC_{10} concentrations (the concentration at which 10% of the test organisms exhibit effect) for non-fish test organisms ranged from 253 mg/L for the waterflea *Ceriodaphnia dubia* to 2,548 mg/L for the algae *Pseudokirchneriella subcapitata* at the maximum tested hardness of 250 mg/L. The authors suggest that increased toxicity with water hardnesses above 160 mg/L for *C. dubia* may

be due to osmotic stress presented by total ionic strength of the water, and not solely due to sulfate toxicity. Maximum sulfate concentrations exceed the range of EC_{10} concentrations presented in BCME (2013), however there is uncertainty how those concentrations apply to 3&4 EHP waters where water hardness greatly exceeds the maximum hardness evaluated in development of the BCME sulfate criterion. Use of the livestock drinking water standard may overestimate or underestimate risk to non-fish aquatic life.

No field evaluations were performed for visual signs of toxicity in vegetation, and no bioassay testing of site soils and water was conducted. This lack of field information represents uncertainty in interpolating from literature effect levels to actual Site population effects.

Uncertainties in Exposure Point Calculations. In the screening refinement and BERA, exposure for each ecological receptor group is estimated based on a central tendency estimate of COPC concentrations in the various exposure media. The 95 UCL of the mean concentration is the typical central tendency estimator used as the EPC in ecological risk assessment. Surface water EPC calculations for the 3&4 EHP area are based ten different surface water sampling locations across a number of surface water sources that do not have continuous hydrologic connections. Sample sizes from individual surface water sources were too small to allow for calculation of 95 UCLs for each surface water source, therefore a 95 UCL was calculated across all surface water data in the 3&4 EHP area. While this may be appropriate for animals with larger home ranges, animals with more restricted home ranges may be exposed to surface water on a smaller spatial scale than that represented by the 95 UCL.

Uncertainties in Exposure Parameters. The SLERA utilized conservative assumptions regarding site use by ecological receptors by assuming that an individual organism gets 100% of its exposure from the site. While this may be a valid assumption for some of the receptors which may conduct all of their foraging in a small area, it likely overestimates exposure to an individual area for animals that range more widely. Initial calculations in the BERA assumed an AUF = 1 for all receptors in each individual soil area. AUF assumptions were only adjusted to represent more realistic exposure for those animals whose LOAEL HQs exceeded one under the conservative AUF assumption. The focus of the ERA is protection of populations of ecological receptors, and all of the organisms included in this ERA have populations that extend beyond the water and soil boundaries included in this investigation. Ryti et al. (2004) proposed the use of a population area use factor (PAUF) for assessing risk to populations. The PAUF concept assumes that population areas for wildlife are correlated to the median dispersal distance of individuals within the population. In this approach, the population area is defined as a circle where the radius of the circle is the median dispersal distance of the organism. For instance, a masked shrew with a dispersal distance of 150 meters, would have a PAUF of approximately 17.5 acres, or three and a half times the size of the largest soil area (DP3) included in the ERA. Therefore, assessing risk to an individual of a population overestimates risk to the population itself.

All COPCs were conservatively assumed to be 100 percent bioavailable for all receptors. Depending on the COPC and receptor, however, bioavailability may be significantly less than 100 percent. This is particularly true for metals in the environment, where bioavailability is often tied to chemical form present, and geochemical parameters such as soil pH, organic carbon, and oxidation-reduction potential. Consideration of bioavailability and bioaccumulation potential of chemicals is important with regard to understanding the risk implications and the

potential ecotoxicological effects of total concentrations of chemicals detected in soils. This conservative estimate of 100 percent bioavailability may overestimate risk.

Site-specific tissue residue data were not collected; thus, concentrations in food items for food chain receptors were estimated based on literature bioaccumulation factors and other parameters. This approach is generally associated with more uncertainty than an approach based on collection of site-specific prey/food tissue concentrations. Estimates of food concentration based on literature values do not include accurate predictors of assimilation and depuration of COPCs in the same way as time-averaged tissue concentrations. The estimates of prey concentrations at the 3&4 EHP soil areas may be either overestimated or underestimated because conditions at the site are likely different from those in the literature.

Wildlife receptors integrate exposure across an area that is generally defined by their home range or foraging range, and are not exposed solely to any single location within an area. The exposure modeling attempts to account for this by using a 95 UCL on the mean concentration across an area to represent the "average" exposure for the organism. Calculation of the 95 UCL is confounded when the sample results include a high number on non-detects in the data set. An example of this occurred with selenium in soil at DP3 and DP5. In those cases, the LOD was used as a basis for estimating concentrations, where one-half the LOD was included in the 95 UCL calculation to estimate the selenium concentration at each location. The LOD for non-detects can be defined as the minimum value that we can say with certainty that the chemical does not occur above that concentration. The true concentration of the chemical is unknown - it may be close to the LOD, or it may be well below the LOD. Depending on the substitution method used to represent the LOD, the 95 UCL ranged from 0.25 mg/kg to 0.99 mg/kg in DP3, and 0.45 mg/kg to 1.19 mg/kg in DP5. Therefore, use of one-half the LOD in the 95 UCL calculation may overestimate or underestimate the actual concentration present. Specific details of the 95 UCL calculation for selenium, the different substitution methods, and the use of non-detects in the calculation are presented in Appendix D.

C-4.4 Ecological Clean-up Goals

Based on the results of the ecological risk characterization, no risk-based clean up levels were derived for chemicals in the 3&4 EHP surface water and soil. Concentrations of boron exceed aquatic life criteria in some West Seep Diversion, PSW-4 Overflow, and SFCC Diversion samples, but fish and aquatic plant communities are not expected in these areas due to the ephemeral nature of the surface water at these sites. Aquatic invertebrates, which may exploit temporary surface water resources, are less sensitive to boron in surface water than fish and aquatic plants (CCME, 2009b). Selenium had one detected concentration in surface water exceeding the surface water LOAEL, but was not detected in 38 of the 42 surface water samples and does not pose significant risk to aquatic life. In addition, Cow Creek and South Fork Cow Creek are ephemeral in nature and only flow in response to precipitation events. According to Administrative Rules of Montana (ARM) 17.30.637, ephemeral streams are not subject to the specific water quality criteria identified in In Montana Circular DEQ-7 for the protection of aquatic life.

Barium in surface soil exceeded the Montana BTV in twelve of 185 samples but only two of those 185 samples had concentrations that fell outside the range of the data used in the

calculation of the Montana BTV for barium. The samples suggest possible localized releases of barium may have occurred in the DP5 and MD soil areas, though areas of potential risk to plants that is greater than background conditions are limited in extent (< 0.25 acres). Due to the limited areal extent of potential risk at the 3&4 EHP, unacceptable risk to plant communities is unlikely.

Boron in soil does not pose unacceptable risk to birds and mammals when the LOAEL HQs are calculated using realistic area use factors to quantify site exposure.

Selenium exceeded livestock-based screening levels in three of the ten sampling areas (NP-Cut, PS4-Overflow, and West Seep Diversion). Consideration should be given to the need to exclude livestock utilizing these three areas as a source of drinking water.

C-5 Derivation of Groundwater Clean-up Levels for Livestock

The groundwater clean-up levels protective of livestock were NOAEL TRVs for water ingestion. The clean-up levels were back-calculated using TRVs, livestock Body Weights (BW), and livestock Water Ingestion Rates (IR_{wat}), and are based on a hazard quotient of one. The drinking-water TRVs were extracted from the Los Alamos National Laboratory (LANL) EcoRisk Database v3.3 (LANL, 2014), and the BW and IR_{wat} parameters were extracted from Pattanayek and DeShields (2004). The clean-up levels were calculated for six categories of livestock for seven chemicals found in the groundwater (barium, boron, cadmium, cobalt, fluoride, manganese, and selenium). Clean-up levels could not be calculated directly for sulfate or total dissolved solids (TDS) due to lack of TRVs, but clean-up values for these parameters were taken from published literature. The livestock categories were comprised of six mammals commonly found at Montana farms including dairy cattle, beef cattle, calves, horses, sheep, and goats. The NOAEL values and equation parameters can be found in Table C-39 and Table C-40, respectively.

$$Clean\ up\ Level = \frac{(TRV \times BW)}{IR_{wat}}$$

Dose-based radionuclide clean-up levels for radium-226 and radium-228 in groundwater were also calculated using the equation for mammalian radionuclide doses from a water-based media presented in the LANL EcoRisk Database v3.3 Ecological Screening Level Model Equations (LANL, 2014). The radionuclide doses assume a NOAEL-based dose limit of 0.1 rad/day (Table C-39). The radionuclide dose equations include a lifespan parameter, therefore, the radium clean-up levels were calculated using the average lifespans of cattle, horse, sheep, and goats.

The NOAEL-based clean-up levels for livestock are shown in Table C-38. The order of the lowest to highest clean-up levels for all seven non-radionuclide chemicals in each livestock category is as follows: calves, goats, sheep, beef cattle, dairy cattle, and horses. Clean-up levels based on protection of calves were approximately half that of the next highest category (goats), and were approximately 10-times lower than clean-up levels based on protection of horses. Radium-226 and -228 clean-up levels are lowest for cattle.

Clean-up levels were also identified for TDS and sulfate (Table C-41). The values given are the upper limits that distinguish marginal water quality from poor water quality for livestock

consumption (USDA-ARS, 2009). MDEQ specifies that Class 3 groundwater must be of at least marginal quality for consumption by livestock. TDS concentrations greater than 5000 mg/L are considered of poor quality, which decreases performance and health of livestock. Sulfate concentrations greater than 3,000 mg/L are also indicative of poor quality, which may increase cases of polio and decrease performance of grazing livestock.

Table C-38. Food Chain Model Dose Calculations for Sprague's Pipit as Surrogate for Insectivorous Birds

Analyte	95%UCL Soil Conc. (mg/kg dw)	95%UCL Water Conc. (mg/L), total	Modeled Invert. Conc. (mg/kg dw)	Invert. Ingestion Rate (kg/d)	Soil Ingestion Rate (kg/d)	Water Ingestion Rate (L/d)	Body Weight (kg)	AUF	Average Daily Dose (mg/kg-d)	NOAEL TRV (mg/kg-d)	LOAEL TRV (mg/kg-d)	NOAEL HQ	LOAEL HQ
DP3 Soil Area													
Boron	30.9	2.8	30.9	0.00588	0.00012	0.005	0.02375	1	8.396	2.92	14.5	2.9	0.6
DP5 Soil Area													
Boron	31.2	2.8	31.2	0.00588	0.00012	0.005	0.02375	1	8.472	2.92	14.5	2.9	0.6
SD Soil Area													
Boron	41.1	2.8	41.1	0.00588	0.00012	0.005	0.02375	1	10.973	2.92	14.5	3.8	0.8
MD Soil Area													
Boron	25.8	2.8	25.8	0.00588	0.00012	0.005	0.02375	1	7.107	2.92	14.5	2.4	0.5
WS Soil Area													
Boron	13.8	2.8	13.8	0.00588	0.00012	0.005	0.02375	1	4.076	2.92	14.5	1.4	0.3
SFCC Soil Area													
Boron	15.8	2.8	15.8	0.00588	0.00012	0.005	0.02375	1	4.581	2.92	14.5	1.6	0.3

Table C-39. Food Chain Model Dose Calculations for Lark Sparrow as Surrogate for Herbivorous Birds

Analyte	95%UCL Soil Conc. (mg/kg dw)	95%UCL Water Conc. (mg/L)	Modeled Plant Conc. (mg/kg dw)	Modeled Invert Conc. (mg/kg dw)	Plant Ingestion Rate (kg/d)	Invert. Ingestion Rate (kg/d)	Soil Ingestion Rate (kg/d)	Water Ingestion Rate (L/d)	Body Weight (kg)	AUF	Average Daily Dose (mg/kg-d)	NOAEL TRV (mg/kg-d)	LOAEL TRV (mg/kg-d)	NOAEL HQ	LOAEL HQ
DP3															
Boron	30.9	2.8	123.6	30.9	0.00521	0.00174	0.00014	0.005	0.029	1	24.75	2.92	14.5	8.5	1.7
DP5															
Boron	31.2	2.8	124.8	31.2	0.00521	0.00174	0.00014	0.005	0.029	1	24.99	2.92	14.5	8.6	1.7
SD															
Boron	41.1	2.8	164.4	41.1	0.00521	0.00174	0.00014	0.005	0.029	1	32.76	2.92	14.5	11.2	2.3
MD															
Boron	25.8	2.8	103.2	25.8	0.00521	0.00174	0.00014	0.005	0.029	1	20.75	2.92	14.5	7.1	1.4
WS															
Boron	13.8	2.8	55.2	13.8	0.00521	0.00174	0.00014	0.005	0.029	1	11.32	2.92	14.5	3.9	0.8
SFCC															
Boron	15.8	2.8	63.2	15.8	0.00521	0.00174	0.00014	0.005	0.029	1	12.89	2.92	14.5	4.4	0.9

Table C-40. Food Chain Model Dose Calculations for Masked Shrew as Surrogate for Insectivorous Mammals

Analyte	95%UCL Soil Conc. (mg/kg dw)	95%UCL Water Conc. (mg/L), total	Modeled Invert. Conc. (mg/kg dw)	Invert. Ingestion Rate (kg/d)	Soil Ingestion Rate (kg/d)	Water Ingestion Rate (L/d)	Body Weight (kg)	AUF	Average Daily Dose (mg/kg-d)	NOAEL TRV (mg/kg-d)	LOAEL TRV (mg/kg-d)	NOAEL HQ	LOAEL HQ
DP5 Soil Area													
Selenium	0.74	0.0073	0.744	0.00084	0.000084	0.0005	0.004	1	0.164	0.143	0.215	1.2	0.80

Table C-41. Lark Sparrow HQs for Boron Using Adjusted AUF

Soil Area	Approximate Size (acres)	Lark Sparrow Adjusted AUF	NOAEL HQ (Adjusted AUF)	LOAEL HQ (Adjusted AUF)
DP3	4.8	0.32	2.7	0.5
DP5	2	0.13	1.1	0.2
SD	2.6	0.17	1.9	0.4
MD	0.6	0.09	0.6	0.1

Table C-42. TRVs for Chemicals and Radionuclides in Groundwater.

Chemical	NOAEL-TRV (mg/kg-d)	LOAEL-TRV (mg/kg-d)
Barium	1.38	1.98
Boron	28	280
Cadmium	1.08	3.94
Cobalt	0.02	0.5
Fluoride	26.6	49
Manganese	44	158
Selenium	0.2	0.33
Radionuclide dose	**(rad/d)**	**(rad/d)**
Radium-226	0.1	1
Radium-228	0.1	1

Table C-43. Exposure Parameters for Livestock Consuming Groundwater.

Livestock	Ingestion Rate Water (L/d)	Body Weight (kg)	Lifespan (days)
Calf	36	50	3650
Dairy Cattle	95	540	
Beef Cattle	86	454	
Horse	42	550	9125
Sheep	14	56.7	3650
Goat	10	29.5	5475

Table C-44. Protective Groundwater Clean-up levels for Livestock Ingesting Groundwater.

	Livestock (mg/L)					
Chemical	Calf	Dairy Cattle	Beef Cattle	Horse	Sheep	Goat
Barium	1.9	7.8	7.3	18	5.6	4.0
Boron	39	160	148	370	113	83
Cadmium	1.5	6.1	5.7	14	4.4	3.2
Cobalt	0.03	0.11	0.11	0.26	0.08	0.06
Fluoride	37	151	140	348	108	78
Manganese	61	250	230	576	178	130
Selenium	0.28	1.1	1.0	2.6	0.8	0.60
Radionuclide	**(pCi/L)**					
Radium-226	63[a]			150	290	210
Radium-228	88[a]			350	410	360
Parameter	**(mg/L)**					
TDS	NR	5000	5000	NR	NR	NR
Sulfate	NR	3000	3000	NR	NR	NR

[a] Radionuclide dose calculations require a lifespan parameter, therefore, one dose was calculated for the general lifespan of cattle.
NR = values were not reported.

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APPENDIX D

Statistical Analysis

Appendix D:
Statistical Analysis for the Colstrip Power Plant, Units 3 & 4 EHP AOC Area Risk Analysis

Prepared for Hydrometrics, Inc.

12 June 2019

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D-1 Introduction

D-1.1 **Executive Summary**

Appendix D describes the exploratory data analysis and estimation of Exposure Point Concentrations (EPCs) for the Units 3 & 4 EHP AOC Area, Colstrip Stream Electric Station, Colstrip, MT to support the human health risk assessment (HHRA) and ecological risk assessment (ERA). Statistical analyses and results are described for surface water (Section D-2) and soil (Section D-3). Preliminary chemicals of potential concern (COPCs) identified after first stage screening for the human health and ecological RAs are the focus of the graphical and statistical summaries presented in this report.

For the HHRA, boron was identified as the only preliminary COPC for surface water. The preliminary COPCs identified for soil were arsenic, barium, cobalt, lithium, manganese, radium-226, and radium-228, with radium identified in all exposure units and in both depth intervals defined by the exposure scenarios (0-24'' and 0-7'). The other preliminary COPCs were identified in one or more areas and were identified for both depth intervals.

The ecological risk assessment identified boron, selenium, and sulfate as preliminary surface water COPCs in the SLERA. The HHRA identified a single EU to cover all surface water within the Units 3 & 4 EHP AOC Area (see Figure 5 in the main CCRA document), while the ERA evaluated surface water both as a single EU and separate smaller surface water bodies associated with single sampling locations. 95% UCLs were used to estimate EPCs only for the single EU scenario due to sample size limitations with the water body data sets based on a single location. In soil, the SLERA identified antimony, arsenic, barium, boron, cadmium, manganese, selenium, and radium-228 as preliminary COPCs in at least one soil area within the first two depth intervals defined by the ecological exposure scenarios (0-6'' and 12-24''). Antimony and cadmium were eliminated as ecological COPCs in SLERA refinement based on low frequency of detection (< 5% of samples). 95% UCLs were calculated as estimates of EPCs for arsenic, barium, boron, manganese, and radium-228 for use in SLERA refinement and the baseline ERA in the soil areas where they were identified as preliminary COPCs. Due to the low frequency of detection for selenium (4 out of 41 total observations in surface water, 8 out of 32 total observations in the DP-3 soil area, and 4 out of 18 total observations in the DP-5 soil area), estimated EPCs based on 95% UCLs are highly sensitive to the method to account for censored observations (i.e., "non-detects"). The 95% UCL-based estimated EPCs are calculated for selenium using substitution at half the detection limit based on characteristics of the reported detection limits relative to the uncensored concentrations; to convey uncertainty in these estimates due to limited information in the data, the range of reporting limits associated with the data and the range of 95% UCLs obtained under commons methods for incorporating censored data are provided alongside the estimates. Estimated EPCs for each preliminary COPC and exposure scenario are presented for each medium within each respective section.

General information applicable to estimation of EPCs using 95% upper confidence limits for the mean (95% UCL) for all media (surface water and soil) is presented in Sections D-1.2, D-1.3, and D-1.4, with additional medium-specific information provided within the subsequent sections. Summary tables of relevant data are included within each section and graphical displays of the data available to support the risk assessment and inform the estimation of EPCs are included in the Figures section. In summary, Appendix D documents the work performed to explore and evaluate the available data for analytes identified as preliminary COPCs and to calculate 95% UCLs to be used as estimates of EPCs to inform subsequent stages of the assessments. The quality and quantity of data available for the intended use are discussed throughout the report.

D-1.2 **Background for Statistical Analysis**

The Cleanup Criteria and Risk Assessment Work Plan (Canty, 2018) specifies that upper confidence limits on the mean (UCLs) will be used to represent exposure point concentrations (EPCs) for chemicals identified through the human health risk assessment (HHRA) and ecological risk assessment (ERA) screening process. The following subsections provide general background statistical information related to the use of a 95% UCL as an estimate of the mean concentration in an exposure unit.

D-1.2.1 **Use of the UCL of the mean as an exposure point concentration (EPC)**

In the context of estimating EPCs, the 95% UCL of the mean is often recommended as an estimate of the mean to provide a protective (conservative) estimate of the mean concentration over a spatial area defined by a specified exposure unit (EU) and a specified time interval for inclusion of data. Using an estimate of the mean as an EPC is justified under two scenarios: (1) the concentration of the preliminary COPC is homogeneous over the EU so that receptors are only exposed to concentrations close to the mean, or (2) the concentration is not homogeneous, but the receptors make a random walk around the EU over time so that their average exposure is the mean concentration over the EU.

The use of a single point estimate (e.g., an average or a UCL) as the recommended EPC does not explicitly incorporate uncertainty in the estimate into the risk assessment. A confidence interval is typically developed to express uncertainty in estimation of the mean due to randomness inherent in the specific data obtained through a random sampling procedure. When a UCL is used as the EPC to calculate risk (using a single number), it does build conservatism into the calculation of exposure, but it does not explicitly allow uncertainty to be considered in decision-making. For example, the same UCL could be reported for two problems with very different degrees of uncertainty (one with a high estimated mean and little uncertainty in the estimate and another with a low estimated mean and a great deal of uncertainty in the estimate). A probabilistic risk assessment explicitly incorporates uncertainty in a mean concentration based on available data (USEPA, 2001) using distributions rather than point estimates. However, this risk assessment is specified to be deterministic, meaning a single number is used to represent exposure for each scenario; uncertainty is dealt with informally through discussions of data quantity and quality and careful investigation of available data.

The concept of “confidence” is based on the idea of quantifying statistical outcomes over different possible random sets of data (referred to as “random samples” in statistical literature) that could have been taken from the population under the specified sampling procedure. Different random samples from the same exposure unit will lead to different estimates of the mean of the concentration and different 95% UCLs. By definition, the 95% UCL is expected to be smaller than the true mean concentration of the exposure unit in 5% of datasets from random sampling, and larger than the mean in 95% of other possible datasets that could be collected using different randomly selected locations and/or times. Therefore, the 95% UCL is *expected* to overestimate the mean 95% of the time (i.e. be “protective”); however, for a particular set of data, it cannot be known whether the mean is over- or underestimated even when using a 95% UCL as the estimate.

D-1.2.2 **Choice of method for calculating an upper confidence limit (UCL)**

There are many methods currently used for calculating UCLs to be used as estimated EPCs in risk assessment, and it is common to simply choose the suggested method as provided by the ProUCL software (Singh & Singh, 2015a; Singh & Singh, 2015b; USEPA, 2015). The focus of ProUCL has been

finding methods with a minimum specified "coverage" of the mean, which is translated into a desired underestimation rate of 5% or less for 95% UCLs, under strict assumptions about the underlying distributions of concentrations in the population. ProUCL's data-specific recommendations for methods are based on outcomes of goodness-of-fit hypothesis tests based on particular distributions; the outcomes of these tests are often misinterpreted as evidence *for* a particular distribution and such results are often given too much weight in the process of choosing a UCL estimator of the mean. The applicability and defensibility of statistical results, particularly for small data sets and non-random samples, are context dependent and therefore the methods should not be applied blindly or automatically to any data set. For example, restricting methods to those in ProUCL does not allow for use of fairly basic methods for dealing with clear violations of the assumption of independence in data sets due to repeat measurements on the same locations and/or on the same days (see discussion of this problem in USEPA 2006). The methods available in ProUCL for calculating UCLs assume all observations are independent and random measurements from the population of interest over the specified time period. Often, results for estimating a mean are more sensitive to violations of independence than they are to departures from an assumed distribution for the underlying population of values. The data for this risk assessment have clear violations of independence. Methods used in this report to obtain 95% UCLs may appear non-traditional from a risk assessment perspective, but are very traditional from the perspective of statistical data analysis focused on estimating the mean.

In June 2016, Neptune conducted a large simulation study, using artificial data generated under different scenarios, to compare many UCL estimators in terms of their coverage of the mean (i.e., how often they under- or overestimate the mean over different random samples), as well as their bias (average distance from the mean) and variability over possible random samples (Flagg et al., in preparation). This differs from the focus of ProUCL, which has been almost solely on coverage to summarize how often estimates are expected to be above or below the mean. A method can achieve a specified coverage rate but have estimates that are extremely far from the actual population mean; which is clearly undesirable for risk assessment (such behavior has been documented for methods such as Land's H, Hall's, and Chebyshev's). Therefore, it is important to also consider how close possible estimates obtained from a method are to the true mean (i.e., consider the size of errors). This can be assessed through quantifying bias (average size of estimation errors) and variability of possible estimates based on different random sampling outcomes (or equivalently, variability of estimation errors).

The Neptune simulation study was performed over a wide range of population distributions with varying degrees of skewness and kurtosis and at sample sizes of 5, 10, 20, and 30. The goal of study was to identify methods with relatively low bias and variability over a wide range of population distributions that still maintained reasonable underestimation rates, to help simplify the decision flow chart and reduce reliance on inappropriate use of goodness-of-fit hypothesis tests. Two estimators were identified as having reasonable properties when considered simultaneously over all scenarios and all sample sizes: (1) the Student's *t* method based on the assumption that the sampling distribution of the average is well-approximated by a *t* distribution, and (2) the bias-corrected and accelerated (BCa) bootstrap method based on resampling from the observed data, along with bias and skew adjustments, to approximate the sampling distribution of the average. These two methods were expected to perform well based on foundational statistical theory. When the distribution of the sample is relatively symmetric and sample sizes are greater than approximately 10, the two methods produce very similar estimates. When the sample is skewed to the right, the BCa typically results in larger estimates, though avoids extreme overestimation common with other methods available in ProUCL intended to account for potential skew in population distributions (e.g., Chebyshev's). For small sample sizes, bootstrap

methods are generally not appropriate because they tend to underestimate variance, and therefore the *t*-UCL is recommended because the sample size available for estimating the variance is accounted for in its calculation through the multiplier obtained as a quantile of the associated t-distribution (smaller samples sizes lead to larger *t*-multipliers). Neptune's simulation study indicates that simple rule of choosing the maximum between the *t* and the BCa estimates typically provides a nice balance of underestimation rate, bias, and variance, across a broad range of population distribution shapes, and is thus a reasonable starting place for obtaining a 95% UCL of the mean for use as an estimated EPC.

However, as with any statistical analysis, each study design and data set should be checked individually to assess the reasonableness of the approach. For example, the implications of violations of independence on UCL estimator performance have not been assessed in simulation studies comparing options for UCL estimators of the mean, though they are well studied in general outside the specific context of UCLs used in risk assessment. The presence of clear violations of assumptions may require more sophisticated methods to produce defensible UCLs, such as random effects models, other methods explicitly incorporating dependence among observations from the same site or same date, or models allowing for spatial and/or temporal correlation. For the analysis in this report, the *t*- and BCa-based UCLs represent a starting point, and other methods meant to account for clear violations of the independence assumption are implemented as needed.

D-1.2.3 **Use of sample maximum as the EPC**

In risk assessments, the maximum observed value is often considered for use as the estimated EPC when the 95% UCL exceeds the maximum observed value. For relatively large sample sizes, it is rare to obtain a sample maximum that is less than the true mean. Therefore, the logic behind the decision to choose the sample maximum as the EPC in such cases is that the sample maximum is expected to be larger than the mean (so it is still "protective"), but it is closer to the mean than the 95% UCL. However, there is a tendency to assume the sample maximum is always greater than the true population mean, which is not true for small sample sizes, particularly if areas with higher concentrations are not captured in the sampling locations just by chance. Likewise, it is tempting to assume that the sample maximum should be greater than the 95% UCL. However, with very small sample sizes, it is not rare for the sample maximum to be less than the true 95% UCL (theoretically defined as the 95th percentile of the distribution of possible sample averages). Therefore, in practice, a choice must be made between using a 95% UCL or the maximum observed sample value as the EPC, and the decision should be problem dependent, depending on both the conceptual model for the site and the observed data.

Generally, when confronted with a 95% UCL estimate of the mean that is greater than the sample maximum, the high uncertainty surrounding the value used for the EPC should be acknowledged. The USEPA (2004) states in Section 5.2.2 that "when data are insufficient to estimate the 95% UCL, any value used [as an EPC estimate] (such as the maximum value or arithmetic mean) is likely to contribute significantly to the uncertainty in estimates" of risk. USEPA (2002) allows use of the sample maximum as the EPC when the UCL exceeds the max, but only if the sample size is large because the maximum may not be protective if the sample size is small.

For this risk assessment, uncertainty in the EPCs should be considered large given the small number of locations informing each EPC. Further information regarding expectations of the maximum and the 95% UCL, relative to the mean, are provided in individual sections in the context of estimating the EPC for the smaller location-specific ecological EUs with only four observations each.

D-1.2.4 **Software used for UCL calculations**

Analyses are performed using R statistical software (R Core Team, 2016). This software allows for flexibility in exploratory data analysis and in methods for calculating UCLs. By not restricting methods to only those available in packages such as ProUCL, methods addressing violations of assumptions can be investigated and more defensible EPCs can be produced. Methods for addressing violations of independence assumptions are described in further detail in Sections D-2, D-3, and D-4. For exploratory data analysis, the ggplot2 R package (Wickham, 2009) is used to create all figures in this report with support from the ggrepel package to label points (Slowikowski, 2018) and the cowplot package to save plots (Wilke, 2017). Several other packages are used behind the scenes: the dplyr R package was used to manipulate and subset the data (Wickham et al., 2015), the lubridate package to manipulate dates within the data (Grolemund et al., 2011), the knitr package (Xie, 2016) and kableExtra package (Zhu, 2018) to make tables, the openxlsx package to make tables in Excel from R (Walker, 2015), and the rgdal package to make plots referenced to spatial locations or distances (Bivand et al. 2018).

D-1.3 **Information Available for Censored Observations ("non-detects")**

Laboratory data are often reported with multiple "detection limits" (e.g. method detection limit, quantitation limit, reporting limit, etc.), and censored using one of them (i.e. instrument measurements are only reported if above the chosen limit). For UCLs meant to describe an entire population, it is desirable to retain as much information from the lab data as possible, which corresponds to using the smallest detection limit deemed appropriate for censoring (resulting in fewer observations labeled as "non-detect"). Method detection limits (MDLs), if available, often fill that need. The lowest detection limits are suggested because they provide the most information available to estimate mean concentrations using all data from an exposure unit, rather than make datum-based decisions from individual concentrations. For the data used in this report, the laboratory measurements were censored using the contract required quantitation limits (CRQLS), meaning that any laboratory measurements below the CRQL were labeled as "non-detects" and assigned a label "< CRQL". The CRQLs are also referred to as "contract required reporting limits" and simply "reporting limits" (RLs). CRQLs are targets the lab is required to meet and may not be appropriate for use as reporting limits. Lower detection limits are available (MDLs), but the data were censored using the CRQLs and there are no concentrations available for those original instrument readings falling between the MDL and CRQL (used as the RL); therefore, it is impossible to re-censor the data using the lower MDL. Additionally, Montana Department of Environmental Quality (MT DEQ) recommends use of the RL over the MDL. Using larger detection limits in UCL calculations does not necessarily lead to larger UCLs because the detection limits used also affect the estimated standard deviation, which can be smaller with use of larger detection limits. Any discussion in the following sections using the term "detection limits" is referring to CRQLs (referred to as RLs in the dataset). Information about associated MDLs for observations summarized in this report is provided as footnotes with tables when appropriate.

Six of the identified preliminary COPCs for the ecological and human health RA for which 95% UCLs were calculated as estimated EPCs contain censored observations labeled as "non-detects" (antimony, arsenic, boron, cadmium, lithium, selenium). In one instance, the non-detect has an RL that is greater than any uncensored observation ("detect") due to a large dilution factor. Three of the analytes (antimony, cadmium, selenium) have large numbers of censored observations ("non-detects") relative to uncensored and RLs are near the uncensored concentrations.

There were 172 and 173 censored observations ("non-detects") out of 174 total observations respectively for antimony and cadmium among combinations of EU and depth intervals considered for

each analyte; each combination of EU, depth interval, and analyte were ruled out by way of the SLERA refinement. There were 198 censored observations ("non-detects") out of 215 total observations across matrix type, EU, and depth interval combinations considered for selenium. Selenium was ruled out by way of the SLERA refinement for four out of seven combinations of matrix type, EU, and depth intervals. In one instance for selenium, the RL was larger than any uncensored observation ("detect").

Among the 12 combinations of matrix type, EU, and depth interval for the remaining three preliminary COPCs with at least one censored observation (arsenic, boron, lithium), there are 13 censored observations out of 338 total observations across analytes, matrix type, EUs, and depth intervals. In nine of the combinations, censored observations are a rarity and the RLs associated with the censored observations are lower than all uncensored observations ("detects"), and in two cases the RLs associated with the censored observations are equal to the minimum concentration of uncensored observations.

Therefore, for all but selenium and the very large RL for lithium, it is not expected that the estimated EPCs will be overly sensitive to method for incorporating the censored observations into the analysis. Sensitivity of results to dealing with violations of independence is greater than the sensitivity of results to method of dealing with censored observations. Therefore, the simplest approach of substitution was investigated further by assessing sensitivity of the 95% UCLs to several commonly used methods of substitution: substituting zero for any non-detects, substituting the RL for any non-detects, substituting half the RL for any non-detects, using equally-spaced intervals to substitute (ESSM, equal spaced substitution method) values for any non-detects, and using equi-probable substitution (EPSM, equi-probable substitution method) for any non-detects. With the high frequency of censored data for selenium (4 uncensored observations out of 41 total in surface water, 8 uncensored out of 32 total in the DP-3 soil area, and 4 uncensored out of 18 total in the DP-5 soil area), a range of possible 95% UCLs will be provided using these different methods to convey uncertainty in estimated EPCs due to lack of information beyond the RLs.

The first method, substituting zero for any non-detects, results in the smallest possible average, but has the potential to increase the standard error. In contrast, substituting the RL may reduce the standard error, but results in the largest possible average. The next three substitution methods (substitute half the RL, ESSM, EPSM) are a balance between the first two methods. Assuming the k non-detects for an analyte are reported with the same RL, ESSM substitutes the non-detects values with the values $RL \times \left(\frac{1}{k+1}\right),\ RL \times \left(\frac{2}{k+1}\right), \ldots, RL \times \left(\frac{k}{k+1}\right)$. EPSM is similar to ESSM, only when k non-detects for an analyte are reported with the same RL, the non-detects values are substituted with the values $RL \times \sqrt{\frac{1}{k+1}},\ RL \times \sqrt{\frac{2}{k+1}}, \ldots, RL \times \sqrt{\frac{k}{k+1}}$. Were a right triangle drawn such that the right angle is at the RL, the values chosen for substitution would split the triangle into $(k+1)$ pieces of equal area. Additionally, the values chosen for substitution with EPSM results in values closer to the RL than ESSM. Neptune performed a simulation study testing the various methods of substitution for non-detects and found that EPSM performed well (Neptune, 2015).

There are additional methods commonly used that do not rely on substitution, such as maximum likelihood methods (ML), non-parametric Kaplan-Meier method (K-M), and the semi-parametric robust regression on order statistics method (rROS). These three methods are explained in the following subsections. For most EU/COPC combinations, sensitivity of results to violations of independence is greater than the sensitivity of results to method of dealing with censored observations. As a result,

methods chosen in this analysis for dealing with censored observations allow for ease of accounting for dependence of samples taken from the same locations.

D-1.3.1 **Kaplan-Meier (K-M) method based on survival analysis**

The Kaplan-Meier method (or product limit estimation method) is a non-parametric approach based on an estimate of a cumulative distribution function (cdf) including information from both censored and uncensored observations. The empirical distribution function is estimated from the uncensored observations, but only after incorporating the information in the censored observations about the probability of observations being less than any particular value. The K-M method has a long history within survival analysis, used for right-censored survival data.

D-1.3.2 **Robust regression on order statistics (rROS) method**

The robust regression on order statistics method is a semi-parametric approach. It relies on a distributional assumption to impute values for the collection of censored observations (non-detects) from information in to the uncensored data, but then uses non-parametric methods to compute summary statistics after combining the uncensored concentrations with the imputed values. The imputed values should be used as a collection to estimate population level quantities, but they should not be identified with a particular uncensored observation.

D-1.3.3 **Method of maximum-likelihood (ML)**

This fully parametric method relies on the assumption that the population of concentrations follows a particular distribution and then estimates are obtained using maximum likelihood methods where censored observations are explicitly defined to lie in an interval, not at a point (see Millard and Neerchal, 2000; Helsel 2012; or Liu 2012 for more details). The method is very sensitive to the distributional assumption needed, and the assumption is often very difficult to check for small samples sizes. This method initially held a lot of promise because it can be extended to the regression setting (as is done for survival analysis) to provide the ability to account for location and censored observations simultaneously (see Liu 2012; Therneau 2015; Therneau & Grambsch 2000; and Millard et al., 2016). This avoids the difficult decision of having to choose between accounting for sources of dependence (e.g., location) or using a more theoretically justified approach for incorporating censored data into the analysis (this tradeoff is discussed in more detail in following subsections).

D-1.3.4 **Tradeoffs when choosing among methods**

As previously mentioned, substitution at half the detection limit or another value has been a common method for obtaining UCLs in the presence of non-detects. More recently, the more formal statistical methods introduced in the previous subsections have become more widely available and are generally recommended for use in estimating means and upper confidence limits on means (as well as other summary measures). Having these methods available and accessible is a step forward. However, decisions about statistical methods and their assumptions are rarely black and white, though they are often portrayed that way to a non-statistics audience. The move toward saying that substitution should *never* be used is unfortunate because there are often tradeoffs in assumptions that should be weighed relative to each other when choosing a method. The implications of using substitution very much depend on the characteristics of the data set and the magnitudes of the detection limits relative to zero and relative to the reported concentrations (from the “detects”), and few simulation studies have examined UCLs as well as estimated means.

A problem (rarely discussed) is that the K-M and rROS methods are developed for a collection of independent random samples from a population, which often does not match the method of data collection used for risk assessments. For example, soil samples to support the ecological or human health risk assessment for the Units 3 & 4 EHP Area are collected at different depths (or dates) from the same location and therefore should not automatically be treated as a set of independent samples (unless explicitly justified through knowledge of the data and the system being studied). Therefore, difficult decisions must be made by the data analyst – is it more important to account for the dependence due to the study design (e.g. locations) in the analysis or is it more important to use a method other than substitution for the censored observations? It is possible to do both within the maximum likelihood framework, but often the distributional assumptions needed are so severely violated that this is not a reasonable option, as found for the data used to support this report. For the Units 3 & 4 EHP Area, the clustering of concentrations by locations is very apparent for most EU-chemical combinations and the importance of accounting for locations is clear. UCL results are generally sensitive to whether locations are accounted for, and not as sensitive to the method chosen to incorporate censored observations. Therefore, on a case-by-case basis, implications of accounting for location (while using substitution at half the detection limit) as compared to using a more sophisticated approach for censored observations are weighed. Choices for statistical analysis should be judged by their reasonableness in a given situation. The automatic use of methods for censored data, without careful examination of the data and thinking about the study design and potentially serious sources of violations in assumptions, is unwise.

The field of Statistics is a thriving and evolving scientific discipline and not all statisticians agree on the appropriateness of different methods. The statisticians at Neptune disagree with some of the recommendations and approaches used by ProUCL. The ProUCL software is deemed very useful to those with limited background in Statistics, but is overly restrictive for a risk assessment when statisticians are hired to be part of the risk assessment team. Having statisticians involved, rather than relying on automatic methods programmed to often work, leads to a more defensible risk assessment. ProUCL documentation (Singh & Singh, 2015) does suggest that the "project team should make the determination in difficult situations," which is the approach taken for the statistical analysis supporting this work plan. The following statement from the ProUCL v5.1 technical user's guide (Singh & Singh, 2015) summarizes the situation for the Units 3 & 4 EHP Area analysis: "It should be pointed out that a typical simulation study cannot cover all data sets … the user/project team may select the most appropriate UCL based upon the site CSM, expert site knowledge, toxicity of the analyte, and exposure risks associated with that analyte. **The project team should make the final decision regarding using or not using the suggestions/recommendations made by ProUCL. If deemed necessary, the project team may want to consult a statistician.** "

D-1.4 **Data Quantity and Scope of Inference**

The data used to inform this risk assessment were collected as part of the monitoring and investigation of the area around the Colstrip Steam Electric Station. The scope of inference for the risk assessment refers to how broadly the results from statistical analysis should be applied over time and space (i.e. over what spatial area and temporal span can the results be justifiably applied?) and depends on the sampling design or availability of data over time and space. A particular scope of inference can be justified based on the study design and expert considerations regarding the context of the risk problem.

Data to inform this risk assessment are restricted to 2014, 2015, 2016, and 2017 for surface water and 2018 for soil under the assumption that recent data best reflect the current conditions. Assuming the

results apply into the future assumes conditions will remain approximately constant. For surface water, there were ten sampling locations with typically less than four sampling events; three locations (NP Cut, SP-14, West Seep Diversion) had eight sampling events with one sampling event in each spring and fall of 2014, 2015, 2016, and 2017. All soil sampling was performed in May of 2018.

The spatial extent of this risk assessment is defined as Units 3 & 4 EHP AOC Area. Surface water estimates are based on only ten total sampling locations along Cow Creek (CC), South Fork Cow Creek (SFCC), south of Drain Pit 3 and Drain Pit 5, and near the SP-14 Pond within the area of interest. Therefore, use of the data to make statements about all surface water in the Units 3 & 4 EHP AOC Area should be done with caution. For soil, sampling areas are spatially restricted to areas that may have been affected by process wastewater (as per the AOC) and do not necessarily support generalization to all soil in the Area.

It is important to not only consider the total number of samples available, but the larger context in which they were collected over space and time. The total number of available concentrations might not seem limited when ignoring the number of unique locations and/or number of unique sampling events, but may be limited when considering the degree of dependence among the observations. The common methods available for UCL calculations (e.g., available in ProUCL) assume independence among samples and have been tested under the assumption of independent samples.

D-1.5 **Organization of the Report**

This report is organized into two additional sections, one for surface water (D-2) and one for soil (D-3). Within each section, exposure scenarios, preliminary chemicals of potential concern (preliminary COPCs), and available data are described. Data summary tables are provided for identified preliminary COPCs, EPCs estimated with 95% UCLs for the mean are reported for each EU and preliminary COPC at the end of each section, and graphical summaries are presented in the Figures section.

D-2 Surface Water

The relevant surface water sources within the Units 3 & 4 EHP AOC Area are Cow Creek (CC), South Fork Cow Creek (SFCC), south of Drain Pit 3 and Drain Pit 5, and near the SP-14 Pond which is East of the Units 3 & 4 Effluent Holding Pond (see Figure 5 in the main CCRA document and Figure 2-1 in the figures included in this report). Exposure point concentrations (EPCs) are estimated for each preliminary chemical of potential concern (COPC) identified for each identified exposure unit (EU). Exposure units are defined for each exposure scenario identified for the human health and/or ecological risk assessments.

D-2.1 **Exposure Units and Chemicals of Potential Concern**

The human health risk assessment (HHRA) identified only boron as a preliminary COPC for surface water. Boron, selenium, and sulfate were preliminary COPCs identified for the ecological risk assessment (ERA) based on SLERA. 95% UCLs are estimated for boron to assist in the HHRA and ERA, and 95% UCLs are estimated for sulfate to assist in the ERA; alternative methods were implemented for selenium based on the large number of censored observations and the details are explained in Appendix C. A single EU is defined to cover all surface water within the Units 3 & 4 EHP AOC Area (see Figure 5 in the main CCRA document). All data from available sampling locations (CC3, CC4, NP Cut, West Seep Diversion, SP-14, SFCC1, SFCC2, SFCC3, PSW-4 Overflow Pond, and SFCC Diversion) were used to screen for preliminary COPCs.

D-2.2 **Available Data**

D-2.2.1 **Sampling locations**

There are ten sampling locations (CC3, CC4, NP Cut, West Seep Diversion, SP-14, SFCC1, SFCC2, SFCC3, PSW-4 Overflow Pond, and SFCC Diversion) surrounding the Units 3 & 4 EHP used to inform EPCs (please see Figure D-2.1).

D-2.2.2 **Sampling dates**

Data from 2014, 2015, 2016, and 2017 were used to inform EPCs, with the goal of representing recent conditions at the site given available data. The number of samples taken per year varied by location and preliminary COPC. For surface water, some locations were sampled once in multiple years, some locations were sampled multiple times within a year, and some locations were only sampled on one occasion. Three locations (SFCC1, SFCC2, SFCC3) had only one sampling event; two locations (CC3, CC4) had one sampling event in each spring of 2014, 2015, 2016, and 2017; one location (SFCC Diversion) had three sampling events (spring of 2014, fall of 2014, and spring 2016); one location (PSW-4 Overflow Pond) had four sampling events with (spring of 2014, fall of 2014, and spring in 2015 and 2016); and three locations (NP Cut, SP-14, West Seep Diversion) had eight sampling events with one sampling event in both spring and fall of 2014, 2015, 2016, and 2017 (see Figure D-2.3).

D-2.3 **Exploratory Data Analysis**

D-2.3.1 **Graphical displays and general observations**

Surface water data available for boron are plotted for all years with available data by location in Figures D-2.2 and D-2.4, as well as only the 2014, 2015, 2016, and 2017 data used for estimation of EPCs in Figures D-2.3 and D-2.5. Summaries of the individual sample concentrations in tabular form can be found in Appendix C. Summary tables of the data are provided for the preliminary COPCs within this report in following sections. All available data used for surface water are reported as dissolved concentrations.

D-2.3.2 **Field duplicates**

There was one field duplicate pair taken from West Seep Diversion among the available data from 2014, 2015, 2016, and 2017 in surface water in the Units 3 & 4 EHP AOC Area. The pairs of field duplicates generally had similar concentrations relative to variability among observations that were not duplicates, and pairs of concentrations for the preliminary COPCs are provided in Table D-2.1. MT DEQ requires that the maximum of the field duplicate pair be used in estimation of the EPC, and therefore this approach is used for the analysis**.**

Table D-2.1. Surface water field duplicate measurements for boron, selenium, and sulfate from West Seep Diversion. The first concentration in the pair is labeled as the field duplicate in the database. The maximum concentrations of the field duplicate pair are displayed in bold. Both concentrations provided for selenium were non-detects, in that they were censored observations.

Location	Analyte	Units	FD Pair Concentrations	
West Seep Diversion	Boron	mg/L	**2.5**	2.4
	Selenium		0.005	0.005
	Sulfate		**3240**	3080

D-2.3.3 **Summary statistics**

Summary statistics for data used to estimate EPCs for surface water and sediment are provided in Table D-2.2 for all ecological (boron, sulfate, and selenium) and human health (boron) preliminary COPCs.

Table D-2.2. Surface water summary statistics (mg/L) for all ecological and human health preliminary COPCs using available data from 2014, 2015, and 2017.

	Locations	Total	Detects (mg/L)					Non-detects		
	#	samples	#	Min	Median	Average	Max	#	Min	Max
Boron	10	41	38	0.2	1.1	2.06	8.9	3[a]	0.1	0.1
Selenium	10	41	4	0.005	0.0095	0.0222	0.065	37[b]	0.005	0.005
Sulfate	10	41	41	4	2180	2762.1	10200	0	-	-

[a] The three non-detects for boron were reported with an RL (CRQL) of 0.1 mg/L and an MDL of 0.006 mg/L.

[b] Among the non-detects for selenium, all were reported as being < 0.005 mg/L, with 23 of 37 having identified the type of limit of detection as the RL (CRQL) and 14/37 did not have the type of limit of detection reported. The MDL was not reported for 14 cases, five cases reported an MDL at 0.0001 mg/L, seven at 0.0003 mg/L, two at 0.0005 mg/L, five at 0.0007 mg/L, one at 0.001, and eight at an MDL of 0.002.

D-2.4 **Assessing Assumptions and Available Data for EPC Calculations**

D-2.4.1 **Quantity of data**

Surface water EPCs are based on data from ten locations and, at most, eight sampling occasions within a location (seven locations observed four or fewer sampling occasions). Therefore, all estimates of EPCs are based on a very small quantity of data informing the mean concentration in time and space, and as such are highly uncertain in their representativeness of the mean concentration over the defined EU. EPCs are estimated using 95% upper confidence limits (95% UCLs) for the mean with the goal of providing estimates that are protective of human and ecological health based on expected sampling variability. However, use of point estimates, even conservative ones, does not explicitly incorporate uncertainty into decision-making and UCLs do not account for all sources of uncertainty.

D-2.4.2 **Implications of independence violations on calculating UCLs**

The statistical properties of the common UCL estimators of the mean are assessed under the assumption that independent samples from the population are available. Violations of the independence assumption can be identified by describing reasons why some samples are expected to have more similar concentrations to each other than other samples (e.g., samples coming from the same location and/or same sampling period). For surface water, the assumption is violated due to repeat measurements taken at the same locations. That is, samples are naturally clustered into groups by location and sampling date, and observations within a cluster are expected to be more similar than those from different clusters, as seen in general in Figures D-2.2 and D-2.3 where some locations tend to be greater than average for all dates. Due to the small quantity of data and lack of overlap in sampling occasions, it is difficult to assess if there are and temporal trends present.

The total number of measurements should not be automatically assumed to constitute the same number of independent pieces of information about the mean concentration over the EU during 2014, 2015, 2016, and 2017 because of the sampling design; measurements from the same location and/or time are expected to be more similar than those from different locations and/or times. The extent of this similarity (i.e. dependence) depends on the data set and the severity can be assessed to make a decision about how important it is to account for one or both sources of dependence (location and/or sampling event). If judged severe enough, UCL methods should account for the dependence in the data in order to obtain defensible estimated EPCs.

In the context of producing protective estimates of the mean, the potential negative implication of not accounting for sources of dependence in the data is that the standard deviation of the population of interest may be underestimated (smaller variability is expected among dependent measurements than among the same number of independent measurements). Additionally, the degrees of freedom (meant to reflect the number of independent pieces of information being used to estimate the mean) may be inflated because the reported sample size is larger than the number of independent pieces of information contained in the data. These two implications can lead to a UCL that is smaller than would be obtained under independence. In practice, the effect on the UCL depend on the severity of the violation of independence. Violation of independence is a very common problem in data analysis and there are many statistical strategies and tools available to help account for it; ranging from calculating cluster-specific averages before subsequent analysis to more complicated models with built-in correlation structures, such as random effects models. Methods to account for spatial dependence

from measurements coming from the same sampling location are explored and implemented for UCL calculations and are described in more detail here for surface water (Section D-2.5.1).

For the analyses of surface water, the observations over time from a sampling location are assumed to be of different seasons, or far enough apart in time within a season, that the dependence is not severe for the goal of estimating the mean concentration of the sampling location over 2014, 2015, 2016, and 2017. However, the lack of independence due to observations coming from the same location is potentially severe and should be accounted for in the analysis. Therefore, to estimate the mean over the ten sampling locations, the location is considered the primary sampling unit and the number of locations is the sample size used in the calculation; the t-UCLs are calculated using the averages over time for each location as the data going into the UCL calculations. For comparison, a UCL is also estimated assuming independence among all measurements.

D-2.5 **95% UCLs**

This section further describes the methods used to obtain 95% UCLs and provides the estimated EPCs for exposure units described in Section D-2.1.1.

D-2.5.1 **Surface water: Boron**

As described in Section D-1.2, the recommended EPC is generally the maximum of the 95% *t*-UCL and the BCa-UCL. Additionally, as described in Section D-1.3, different methods of substitution for the three non-detects are implemented to test the sensitivity on the UCL. To account for dependence due to repeat samples being drawn from the same sampling location, Table D-2.2 presents the estimated UCLs using sampling location as the primary sampling unit as discussed in Section D-2.4.2.

The estimated mean concentration of boron in surface water is 2.06 mg/L with an associated two-sided 90% confidence interval from 1.62 to 2.50 mg/L; the recommended 95% UCL for use as the surface water EPC for boron is 2.50 mg/L.

Table D-2.3. Surface water 95% UCLs (mg/L) and estimated EPCs for boron, which was identified as a preliminary COPC for both the human health and ecological risk assessment. The estimates provided were based on 2014, 2015, 2016, and 2017 data. The measurements are averaged within location prior to estimation of the UCLs to account for spatial dependence.

Analyte	Average	Max	*t*-UCL	BCa-UCL	95% UCL
Boron	2.06	8.9	2.40	2.50[a]	2.50

[a] 95% BCa-UCLs using different substitution methods for non-detects were estimated to be 2.50 mg/L.

D-2.5.2 **Surface water: Sulfate**

As described in Section D-1.2, the recommended EPC is the maximum of the 95% *t*-UCL and the BCa-UCL. To account for dependence due to repeat samples being drawn from the same sampling location, Table D-2.4 presents the estimated UCLs using sampling location as the primary sampling unit as discussed in Section D-2.4.2.

The estimated mean concentration of sulfate in surface water is 2762.1 mg/L with an associated two-sided 90% confidence interval from 2570.5 to 2953.7 mg/L; the recommended 95% UCL for use as the surface water EPC for sulfate is 2953.7 mg/L.

Table D-2.4. Surface water 95% UCLs (mg/L) and estimated EPCs for sulfate, which was identified as a preliminary COPC for the ecological risk assessment. The estimates provided were based on 2014, 2015, 2016, and 2017 data. The measurements are averaged within location prior to estimation of the UCLs to account for spatial dependence.

Analyte	Average	Max	*t*-UCL	BCa-UCL	95% UCL
Sulfate	2762.1	10200	2933.9	2953.7	2953.7

D-2.5.3 **Surface water: Selenium**

As described in Section D-1.2, the recommended EPC is generally the maximum of the 95% *t*-UCL and the BCa-UCL. Additionally, as described in Section D-1.3, different methods of substitution for the 37 non-detects are implemented to assess the sensitivity of the 95% UCL to methods with different assumptions, and the range of 95% UCLs obtained are provided in Table D-2.4 to convey the uncertainty. To account for dependence due to repeat samples being drawn from the same sampling location, Table D-2.4 presents the estimated UCLs using sampling location as the primary sampling unit as discussed in Section D-2.4.2. The estimated mean concentration of selenium in surface water was calculated using substitution at half the detection limit for non-detects.

The estimated mean concentration of selenium using half the detection limit for censored observations in surface water is 0.0044 mg/L with an associated two-sided 90% confidence interval from 0.0015 to 0.0073 mg/L. The estimated 95% UCL varied between 0.0049 and 0.0112 mg/L using different methods to account for censored observations. The reported 95% UCL for use as the surface water estimated EPC for selenium is 0.0073 mg/L and was obtained using half the detection limit for censored observations.

Table D-2.4. Surface water 95% UCLs (mg/L) and estimated EPCs for selenium, which was identified as a preliminary COPC for the ecological risk assessment. The estimates provided were based on 2014, 2015, 2016, and 2017 data. There were 37 non-detects out of a total of 41 observations in the EHP area surface water, all with an RL of 0.005 mg/L.

Analyte	Average [(1)]	Max	Exposure Point Concentration [(2)]		
			95% UCL [(3)]	Min [(4)]	Max [(5)]
Selenium	0.0044	0.065	0.0073	0.0049	0.0112

[(1)] The estimated mean is calculated using substitution at half the detection limit for non-detects.

[(2)] Estimates based on fewer than 5 uncensored observations (detects) and should be used with extreme caution.

[(3)] The estimated 95% UCL is the 95% t-UCL calculated using substitution at half the detection limit for non-detects.

[(4)] The minimum 95% UCL is the 95% t-UCL calculated using substitution at a value of 0 for non-detects.

[(5)] The maximum 95% UCL is the 95% BCa-UCL calculated using substitution at the detection limit for non-detects.

D-3 Soil

The soil samples taken within the Units 3 & 4 EHP AOC Area were from six areas where surface spills occurred to investigate to what extent, if any, these spills may be affecting the soil: (1) near Drain Pit #3 which is close to the northwest border of the Units 3 & 4 EHP AOC Area, (2) near Drain Pit #5 which is northwest of the EHP, (3) west of the EHP and close to the border of the Units 3 & 4 EHP AOC Area (called West Seep), (4) north of the EHP near the Main Dam Valley Drain Sump Pipeline, (5) east of the EHP and near the Saddle Dam Valley Drain Sump, and (6) south of the EHP near South Fork Cow Creek (SFCC) (see Figure 1 in the main CCRA document and Figure D-3.1 in the figures included in this report). The sampling is therefore limited in spatial scale relative to the entire Units 3 & 4 EHP AOC Area, but covers areas with known history of process water seeps, spills, sump pump failures, pipeline failures, and water overflow. EPCs are estimated for each COPC identified for each identified EU and exposure scenario identified for the human health or ecological risk assessments.

D-3.1 **Exposure Units and Preliminary Chemicals of Potential Concern**

Exposure units (EUs) and preliminary COPCs are defined and identified separately for the HHRA and ERA. For human health, six EUs (EU9 – EU14) are defined by the areas of known spills and seeps, consistent with where soil samples were taken, as described above. The Drain Pit #3 area (DP3), which is near the northwest border of the Units 3 & 4 EHP AOC Area is EU9; the Drain Pit #5 area (DP5) is EU10; the area west of the EHP (WS, for West Seep) is defined as EU11; the Main Dam area (MD) is EU12; the Saddle Dam area (SD) is EU13; and the area near SFCC is EU14 (see Figures 10 thru 15 in the main CCRA report). These six areas are also used in the ERA.

D-3.1.1 **Human health**

The six EUs are defined in general over all depths, and 95% UCLs are calculated using data from different depth intervals to correspond to different exposure scenarios depending on soil depth.

Radium-226 and radium-228 were identified as preliminary COPCs in all six EUs in the first stage screening process based on maximum concentrations. Lithium was identified as a preliminary COPC in all but EU11; arsenic was identified in all but EU11 and EU13; and cobalt was identified in three EUs: EU10, EU12, and EU14. Additionally, barium was identified as a preliminary COPC for EU10 and manganese was identified in EU12 and EU14.

For each analyte and EU pairing, data from the following depth intervals are used to obtain 95% UCLs to be used in subsequent steps in HHRA: (1) the first two depth intervals make up the surface soil (0-24'') and (2) the entire soil column (subsurface soil) which consists of at most three soil sampling depth intervals per sampling location down to at most 7'. For EU11, samples were only taken from for surface soil (0-6'' and 12-24''), meaning estimated EPCs are only available for the surface soil exposure scenarios. General descriptions of the available data are provided in the next section and summaries of data available to inform each estimated EPC (95% UCL) are presented in Tables D-3.3 through D-3.13 and Figures D-3.1 through D-3.11.

D-3.1.2 **Ecological**

The six areas defined for the HHRA are also used in the ERA; however, exposure scenarios are defined only for surface soil. Antimony, arsenic, barium, boron, cadmium, manganese, selenium, and radium-228 were identified as potential COPCs from the SLERA; however, the SLERA refinement eliminated

antimony, cadmium, and selenium. Radium-228 was identified as a preliminary COPC for DP5, MD, SD, and SFCC, while arsenic, barium, boron, and manganese were identified for each area. For each analyte and area pairing, data from the first two depth intervals (0-24") are used to obtain estimate EPCs using 95% UCLs. General descriptions of the available data are provided in the next section and summaries of data available to inform each 95% UCL are presented in Tables D-3.3 through D-3.13 and Figures D-3.1 through D-3.11.

D-3.2 **Available Data**

D-3.2.1 **Soil sampling areas and sampling depths**

The six distinct sampling areas are shown in Figure D-3.1 and each corresponds to an area with previous history of seepage from the Units 3 & 4 EHP Saddle Dam, sump pump failure, pipeline failure, spills, and/or water overflow. There are 87 sampling locations in total from the Units 3 & 4 EHP AOC Area. Of the 87, 16 are from the EU9 (DP3 area), 9 from EU10 (DP5 area), 6 from EU11 (WS area), 11 from EU12 (MD area), 20 from EU13 (SD area), and 25 from EU14 (SFCC area). Soil sampling locations in each area of the Units 3 & 4 EHP Area were chosen based on historical seeps and/or spills. EU9 (DP3 area) had clear water come in contact with surface soil, EU10 (DP5 area) had releases of scrubber slurry come in contact with surface soil, process water seeped in EU11 (WS area), process water seeped to surface soil and collection water spilled in EU13 (SD area), water seeped in EU14 (SFCC area) and flowed over the ground, and process water seeped and collection water spilled in EU12 (MD area) (Canty, 2018).

Samples were obtained from two surface soil depth intervals (0-6", 12-24") from each of the 87 sampling locations. The locations were all chosen based on where previous releases had occurred. At 28 of the sampling locations, one additional sample was taken from an additional subsurface depth. The depth intervals for subsurface samples taken beneath the first two feet differ by location, with some taken from a larger portion of the column and others taken from smaller intervals further below the soil surface. Subsurface depth intervals for sampling locations with additional subsurface samples collected are presented in Table D-3.1. At locations where release water could have ponded allowing for infiltration, subsurface samples were also collected. The intent was to have all subsurface samples collected between 6-7' but changes were made either due to encountering bedrock at a shallower depth or a shallower water table at the sampling location. Note that there were no locations from EU11 (WS area) with a subsurface sample.

Table D-3.1. Subsurface depths for locations with an additional subsurface sample collected.

Sampling Locations	Subsurface Depth Interval
DP3-6, MD-5	30-36”
DP3-2, DP3-3, DP5-5, SFCC-20	36-48”
MD-6, MD-9, MD-10	40-52”
DP5-1, SFCC-18	48-60”
DP3-4, DP3-5, DP5-2, DP5-3, MD-1, MD-2, MD-3, MD-4, MD-7, SD-2, SD-11, SD-12, SD-13, SD-14, SFCC-2 SFCC-8, SFCC-21	72-84”

D-3.2.2 **Field duplicates**

There were two pairs of field duplicates taken at two different locations in EU 9 (DP3 area; DP3-6, DP3-11), one field duplicate pair in EU10 (DP5 area: DP5-3), three pairs of field duplicates from three different locations in EU14 (SFCC area; SFCC-3, SFCC-9, SFCC-19), two pairs of field duplicates at two different locations in EU12 (MD area; MD-2, MD-6), and three pairs of field duplicates at three different locations in EU13 (SD area; SD-5, SD-9, SD-15). Field duplicate pairs reported as coming from the 12-24” depth interval were from a location in EU14 (SFCC area), all other field duplicate pairs were from the 0-6” depth interval and came from EU9 (DP3 area), EU10 (DP5 area), EU12 (MD area), or EU13 (SD area). There were no field duplicate pairs at any location in EU11 (WS area). The field duplicate pair collected from SFCC-19 contained one detect and one non-detect for both boron and lithium; the same detection scenario was observed antimony in SD-9, in which the RL (CRQL) was equal to the non-censored result. The pairs of field duplicates generally had similar concentrations relative to variability among observations that were not duplicates, and pairs of concentrations for the preliminary COPCs are provided in Table D-3.2 and plotted together in Figure D-3.13. MT DEQ requires that the maximum of the field duplicate pair be used in estimation of the EPC, and therefore this approach is used for the analysis**.**

Table D-3.2. Soil field duplicate measurements for arsenic, barium, cobalt, lithium, manganese, radium-226, and radium-228 from EU9 (DP3 area), EU10 (DP5 area), EU12 (MD area), EU13 (SD area), and EU14 (SFCC area). All samples were taken between 7 August 2018 and 10 August 2018. The first concentration in the pair is labeled as the field duplicate in the database. The maximum concentrations of the field duplicate pair are displayed in bold.

Depth	EU (area)	Location	Analyte	Units	FD Pair Concentrations	
0-6"	EU-9	DP3-6	Antimony	mg/kg	<1	<1
			Arsenic		5	5
			Barium		193	**258**
			Boron		72	**78**
			Cadmium		<1	<1
			Cobalt		5	5
			Lithium		11	**12**
			Manganese		190	**234**
			Selenium		0.5	0.6
			Radium-226	pCi/g-dry	0.2	0.2
			Radium-228		**0.7**	0.05
		DP3-11	Antimony	mg/kg	<1	<1
			Arsenic		5	5
			Barium		114	**134**
			Boron		15	**17**
			Cadmium		<1	<1
			Cobalt		6	6
			Lithium		11	**12**
			Manganese		**266**	249
			Selenium		<1	<1
			Radium-226	pCi/g-dry	**0.7**	0.5
			Radium-228		**0.5**	0.4
	EU-10	DP5-3	Antimony	mg/kg	<1	<1
			Arsenic		**10**	8
			Barium		204	**206**
			Boron		**11**	10
			Cadmium		<1	<1
			Cobalt		7	7
			Lithium		**12**	11
			Manganese		**385**	376
			Selenium		**2.2**	0.5
			Radium-226	pCi/g-dry	**0.5**	0.4
			Radium-228		0.6	**0.7**
	EU-12	MD-2	Antimony	mg/kg	<1	<1
			Arsenic		4	4
			Barium		**183**	141
			Boron		17	17
			Cadmium		<1	<1
			Cobalt		**6**	5
			Lithium		9	**11**
			Manganese		**322**	274
			Selenium		<1	<1
			Radium-226	pCi/g-dry	**0.7**	0.4
			Radium-228		0.4	**0.7**
		MD-6	Antimony	mg/kg	<1	<1
			Arsenic		5	**7**
			Barium		543	**634**
			Boron		**28**	25
			Cadmium		<1	<1
			Cobalt		6	**7**
			Lithium		14	**15**
			Manganese		286	**302**
			Selenium		<1	<1
			Radium-226	pCi/g-dry	0.5	0.5
			Radium-228		0.3	**0.6**

Depth	EU (area)	Location	Analyte	Units	FD Pair Concentrations	
		SD-5	Antimony	mg/kg	<1	<1
			Arsenic		7	**9**
			Barium		**223**	190
			Boron		**31**	29
			Cadmium		<1	<1
			Cobalt		8	8
			Lithium		**18**	17
			Manganese		**421**	398
			Selenium		<1	<1
			Radium-226	pCi/g-dry	**0.6**	0.5
			Radium-228		0.4	**1.1**
		SD-9	Antimony	mg/kg	**1**	<1[a]
			Arsenic		**15**	7
			Barium		**223**	218
			Boron		**20**	17
			Cadmium		<1	<1
	EU-13		Cobalt		8	8
			Lithium		13	**14**
			Manganese		265	**357**
			Selenium		<1	<1
			Radium-226	pCi/g-dry	0.4	0.4
			Radium-228		0.8	0.8
		SD-15	Antimony	mg/kg	<1	<1
			Arsenic		5	5
			Barium		127	**144**
			Boron		10	10
			Cadmium		<1	<1
			Cobalt		5	**6**
			Lithium		11	11
			Manganese		288	**294**
			Selenium		<1	<1
			Radium-226	pCi/g-dry	0.3	**0.4**
			Radium-228		0.4	**0.6**
12-24"	EU-14	SFCC-3	Antimony	mg/kg	<1	<1
			Arsenic		**12**	11
			Barium		**155**	130
			Boron		19	**22**
			Cadmium		<1	<1
			Cobalt		7	7
			Lithium		**12**	11
			Manganese		395	**460**
			Selenium		<1	<1
			Radium-226	pCi/g-dry	**0.8**	0.5
			Radium-228		0.6	0.5
		SFCC-9	Antimony	mg/kg	<1	<1
			Arsenic		6	6
			Barium		93	**107**
			Boron		13	**14**
			Cadmium		<1	<1
			Cobalt		6	**7**
			Lithium		12	12
			Manganese		377	**413**
			Selenium		<1	<1
			Radium-226	pCi/g-dry	0.3	0.3
			Radium-228		0.2	**0.3**
		SFCC-19	Antimony	mg/kg	<1	<1
			Arsenic		7	7
			Barium		154	**158**
			Boron		<5[b]	**5**
			Cadmium		<1	<1
			Cobalt		6	6
			Lithium		<5[c]	**10**

Depth	EU (area)	Location	Analyte	Units	FD Pair Concentrations	
			Manganese		**319**	289
			Selenium		<2	<2
			Radium-226	pCi/g-dry	0.5	0.5
			Radium-228		0.5	0.5

[a] The antimony concentration from SD-9 was labeled as a "non-detect" and was censored at the RL of 1 mg/kg.
[b] The boron concentration from SFCC-19 was labeled as a "non-detect" and was censored at the RL of 5 mg/kg.
[c] The lithium concentration from SFCC-19 was labeled as a "non-detect" and was censored at the RL of 5 mg/kg.

D-3.2.3 **Negative concentrations**

Both radium 226 and radium 228 concentrations are calculated relative to a measured background level (using a laboratory blank). The reported concentrations are then calculated by subtracting the background level from the detected result, also adjusting for other factors affecting sensitivity. As a result of subtracting the background level, negative concentrations are possible. The soil data contain one negative concentration (-0.03 pCi/g) from one location (MD-9) at depth interval (40-52").

Negative values typically indicate that the radiation count from the instrument was less than the long-term average background radiation typically reported by the instrument (TROYER and others, 1991; cited in Caldwell and others, 2014). There exist different methods for dealing with negative concentrations before carrying out calculations of statistical summaries over samples (Caldwell and others, 2014; Szabo and others, 2012), including the use of the reported negative values (NCRP, 1985). In general, one should investigate and describe sensitivity of 95% UCLs to the approach used for dealing with the negative reported concentrations. For these data, sensitivity was assessed by calculating the UCLs using both the negative values and substituting zero. Note that while substituting a negative concentration with zero before calculating a UCL will increase the average, it will decrease the standard deviation, meaning the UCL can increase or decrease as a result of the decision. The results for these data (both ground water and soil) were not sensitive to the approach, and it was decided to use the method of substituting zero for the negative values.

D-3.3 **Exploratory Data Analysis and Data Summaries**

Tabular summaries of available data are presented in this section, along with graphical displays of the raw data in the Figures section. General observations from the figures and tables are presented in Section 3.3.1.

D-3.3.1 **Graphical displays and general observations**

Concentrations of arsenic (mg/kg) at each sampling location and depth interval are shown in Figure D-3.2. Arsenic is identified as a preliminary COPC for the ERA for all soil areas and for HH EU9 (DP3 area), HH EU10 (DP5 area), HH EU12 (MD area), and HH EU14 (SFCC area). The concentrations are shown for all soil areas defined in D-3.1.1 for comparison. The maximum reported arsenic concentration is 47 mg/kg, reported from two different locations (DP3-2 between 12-24", DP5-3 between 72-84"). There does appear to be a strong correlation between concentrations reported in the first depth interval (0-6") and those reported in the second depth interval (12-24") within each location, providing evidence of spatial dependence within locations. Additionally, concentrations within an area appear to be strongly correlated, providing evidence of spatial dependence among locations; for example, in EU14 (SFCC area), the sampling locations SFCC-1 through SFCC-5 (clustered in the northwest portion of the area) exhibit similar concentrations larger than the similar concentrations observed in locations SFCC-14 through SFCC-18 which are clustered further southeast in the area. There was one

censored observation, censored because it was reported as a non-detect, for arsenic from DP3-5 with an RL of 2 mg/kg.

Concentrations of barium (mg/kg) at each location and depth are shown in Figure D-3.3. Barium is identified as a preliminary COPC for the ERA and for HH EU10 (DP5 area). The concentrations are shown for all soil areas defined in D-3.1.1 for comparison. The maximum reported barium concentration is 2530 mg/kg, reported from location DP5-2 from the depth interval 0-6". There does appear to be a strong correlation between concentrations reported in the first depth interval (0-6") and those reported in the second depth interval (12-24") within each location, providing evidence of spatial dependence within locations. There were no censored observations reported for barium.

Concentrations of cobalt (mg/kg) at each sampling location and sampling depth are shown in Figure D-3.4. Cobalt is identified as a preliminary COPC for HH EU10 (DP5 area), HH EU12 (MD area), and HH EU14 (SFCC area), but the concentrations are shown for all soil areas defined in D-3.1.1 for comparison. The maximum reported cobalt concentration is 15 mg/kg, reported from the location DP5-3 and depth 72-84". There does appear to be a moderately strong correlation between concentrations reported in the first depth interval (0-6") and those reported in the second depth interval (12-24") within each location, providing evidence of spatial dependence within locations. There was one censored observation reported for cobalt from WS-1; however, cobalt was not identified as a preliminary COPC for this area.

Concentrations of lithium (mg/kg) at each location and depth are shown in Figure D-3.5. Lithium is identified as a preliminary COPC for all EUs for the HHRA except HH EU11 (WS area), but the concentrations are shown for all soil areas defined in D-3.1.1 for comparison. The maximum reported lithium concentration was 30 mg/kg, reported from location SD-2 from a depth between 12-24". There appears to be a strong correlation between concentrations reported in the first depth interval (0-6") and those reported in the second depth interval (12-24") within each location, providing evidence of spatial dependence within locations. Additionally, locations nearby within an area tend to be similar, providing evidence of spatial dependence among locations; EU13 (SD area) is an example of the spatial dependence among locations that is present with locations SD-1 through SD-5 (located near each other in the northwest of the SD area) exhibit similar concentrations which are higher than the similar concentrations reported for SD-17 through SD-20 (which are clustered together in the northern portion of the SD area). There are several censored observations reported for lithium, but of most concern is the non-detect from DP3-13 in the depth interval 12-24" which has an RL of 20 mg/kg, due to a large dilution factor, which is larger than most reported detects in the Units 3 & 4 EHP AOC Area.

Concentrations of manganese (mg/kg) at each location and depth are shown in Figure D-3.6. Manganese is identified as a preliminary COPC for the ERA as well as for HH EU12 (MD area) and HH EU14 (SFCC area). The concentrations are shown for all soil areas defined in D-3.1.1 for comparison. The two largest reported manganese concentrations were from EU12 (MD area; MD-4, MD-11) with the maximum concentration of 2410 mg/kg from the location MD-4 and depth 72-84". There appears to be a strong correlation between concentrations reported in the first depth interval (0-6") and those reported in the second depth interval (12-24") within each location, providing evidence of spatial dependence from within sampling locations. There were no censored observations reported for manganese.

Concentrations of radium-226 (pCi/g) at each location and depth are shown in Figure D-3.7. Radium-226 is identified as a preliminary COPC for every HH EU. The maximum reported radium-226 concentration

was 0.9 pCi/g, reported from the location SFCC-14 for depth 12-24". There appears to be a moderate correlation between concentrations reported in the first depth interval (0-6") and those reported in the second depth interval (12-24") within each location.

Concentrations of radium-228 (pCi/g) at each location and depth are shown in Figure D-3.8. Radium-228 is identified as a preliminary COPC for every HH EU as well as for each sampling area for the ERA except for the DP3 area and WS area. The maximum reported radium-228 concentration was 3.4 pCi/g, reported from the location SFCC-1 for depth 0-6". There was also a relatively high concentration reported from SFCC-1 at 12-24", and the nearby location SFCC-2 at a depth of 0-6", providing evidence of spatial dependence among locations. Additionally, there appears to be strong correlation between concentrations reported in the first depth interval (0-6") and those reported in the second depth interval (12-24") within each location, providing evidence of spatial dependence from within locations.

Concentrations of boron (mg/kg) at each sampling location and sampling depth are shown in Figure D-3.9. Boron is identified as a preliminary COPC for the ERA, and the concentrations are shown for all soil areas defined in D-3.1.1 for comparison. The two largest reported boron concentrations are from EU13 (SD area; SD-2, SD-3) with the maximum concentration of 155 mg/kg from location SD-2 for depth 12-24". There appears to be a strong correlation between concentrations reported in the first depth interval (0-6") and those reported in the second depth interval (12-24") within each location, providing evidence of spatial dependence from within locations. Additionally, concentrations of boron from nearby locations tend to be similar – this is especially clear in EU13 (SD area) – providing evidence of spatial dependence among locations. There were four censored observations among the available data for boron; the censored observation in EU11 (WS area) had an RL of 1 mg/kg and the other censored observations (one in the SD area, two in the SFCC area) had an RL of 5 mg/kg.

Antimony and cadmium were considered for the ERA, but SLERA refinement ruled each out as a COPC. Selenium was also ruled out as a COPC by SLERA refinement for all EUs except EU-9 (DP-3 area) and EU-10 (DP-5 area). Summary statistics are provided in Section D-3.3.2 but 95% UCLs are not calculated for antimony or cadmium. Out of the 174 concentrations observed in the EHP area, two antimony concentrations were uncensored (detects), one cadmium concentration was uncensored, and 15 selenium concentrations were uncensored. Concentrations of antimony (mg/kg) at each sampling location and sampling depth are shown in Figure D-3.10. Concentrations of cadmium (mg/kg) at each sampling location and sampling depth are shown in Figure D-3.11. Concentrations of selenium (mg/kg) at each sampling location and sampling depth are shown in Figure D-3.12.

D-3.3.2 **Summary tables**

Summary statistics are presented for data used for each 95% UCL calculation performed to estimate EPCs for soil. Antimony and cadmium were considered for the ERA, but were eliminated from the analyte list in the SLERA refinement; no UCLs are calculated for these two analytes but summary statistics are provided up to the first two depth intervals. Summary statistics are also provided for selenium which was not ruled out from the SLERA refinement. 95% UCLs are calculated for selenium but are sensitive to methods used because of its low frequency of detection. The maximums from field duplicate pairs are used in estimating EPCs as required by Montana DEQ, and thus are used in these tables. The data summarized in each table correspond to the descriptions of areas and exposure scenarios as defined by the HHRA and ERA provided in Section D-3.1, with one table presented for surface soil (first two depth intervals) from an area and another table presented for the entire soil column.

Table D-3.3. Summary of analytes from all samples within the 0-6" and 12-24'' depth intervals from EU9 (the DP3 area). Arsenic, lithium, radium-226, and radium-228 are of interest for the HHRA. Antimony, arsenic, barium, boron, cadmium, manganese, and selenium are of interest for the ERA. There were two field duplicate occasions. The summary statistics are calculated over the two surface soil depth intervals.

		#	#		Detects					Non-detects	
Analyte	Units	Locations	Samples	RA	#	Min	Med	Avg	Max	#	RL
Antimony[a]	mg/kg	16	32	ERA	1	7	7	7	7	31	1
Arsenic	mg/kg	16	32	HHRA/ERA	32	2	5	7.3	47	0	-
Barium	mg/kg	16	32	ERA	32	46	137	198.4	787	0	-
Boron	mg/kg	16	32	ERA	32	7	15	20.4	78	0	-
Cadmium[a]	mg/kg	16	32	ERA	0	-	-	-	-	32	1
Lithium	mg/kg	16	32	HHRA	31	7	10	10.5	17	1	20
Manganese	mg/kg	16	32	ERA	32	102	276.5	285.3	619	0	-
Radium-226	pCi/g	16	32	HHRA	32	0.1	0.5	0.47	0.8	0	-
Radium-228	pCi/g	16	32	HHRA	32	0.09	0.5	0.57	1.1	0	-
Selenium[b]	mg/kg	16	32	ERA	8	0.5	0.6	0.65	1.1	24	3.0[c]

[a] SLERA refinement ruled out antimony and cadmium. Summary statistics are provided but no UCLs are calculated for these two analytes.

[b] SLERA refinement did not rule out selenium but due to the high frequency of censored observations, UCLs are not recommended for use as EPC for selenium.

[c] The RL (CRQL) of selenium concentrations varied between 0.5 mg/kg and 3 mg/kg.

Table D-3.4. Summary of analytes from all sample locations and all depth intervals from EU9 (the DP3 area). Arsenic, lithium, radium-226, and radium-228 are of interest for the HHRA. There were two field duplicate occasions. The summary statistics are calculated over the three surface and subsurface soil depth intervals. Subsurface samples were taken between 30-36", 36-48", or 72-84".

		#	#		Detects					Non-detects	
Analyte	Units	Locations	Samples	RA	#	Min	Med	Avg	Max	#	RL
Arsenic	mg/kg	16	37	HHRA	36	2	5	7. 4	47	1	2
Lithium	mg/kg	16	37	HHRA	36	5	10	10.3	17	1	20
Radium-226	pCi/g	16	37	HHRA	37	0.1	0.5	0.48	0.8	0	-
Radium-228	pCi/g	16	37	HHRA	37	0.05	0.5	0.58	1.2	0	-

Table D-3.5. Summary of analytes from all samples within the surface soil (0-6" and 12-24'' depth intervals) from EU10 (the DP5 area). Arsenic, barium, cobalt, lithium, radium-226, and radium-228 are of interest for the HHRA. Antimony, arsenic, barium, boron, cadmium, manganese, radium-228, and selenium are of interest for the ERA. There was one field duplicate occasion. The summary statistics are calculated over the two surface soil depth intervals.

		#	#		Detects					Non-detects	
Analyte	Units	Locations	Samples	RA	#	Min	Med	Avg	Max	#	RL
Antimony[a]	mg/kg	9	18	ERA	0	-	-	-	-	18	1
Arsenic	mg/kg	9	18	HHRA/ERA	18	4	7	7.3	10	0	-
Barium	mg/kg	9	18	HHRA/ERA	18	103	185.5	344.7	2530	0	-
Boron	mg/kg	9	18	ERA	18	5	10.5	20.3	93	0	-
Cobalt	mg/kg	9	18	HHRA	18	5	6	6.3	8	0	-
Cadmium[a]	mg/kg	9	18	ERA	0	-	-	-	-	18	1
Lithium	mg/kg	9	18	HHRA	18	8	11	12.6	29	0	-
Manganese	mg/kg	9	18	ERA	18	206	305	326.9	482	0	-
Radium-226	pCi/g	9	18	HHRA	18	0.3	0.5	0.49	0.6	0	-
Radium-228	pCi/g	9	18	HHRA/ERA	18	0.3	0.7	0.72	1.6	0	-
Selenium[b]	mg/kg	9	18	ERA	4	0.5	0.7	1.025	2.2	14	2.0[c]

[a] SLERA refinement ruled out antimony and cadmium. Summary statistics are provided but no UCLs are calculated for these two analytes.

[b] SLERA refinement did not rule out selenium but due to the high frequency of censored observations, UCLs are not recommended for use as EPC for selenium.

[c] The RL (CRQL) of selenium concentrations varied between 0.5 mg/kg and 2 mg/kg.

Table D-3.6. Summary of analytes from all samples from all locations over all depth intervals from EU10 (the DP5 area). Arsenic, barium, cobalt, lithium, radium-226, and radium-228 are of interest for the HHRA. There was one field duplicate occasion. The summary statistics are calculated over the three surface and subsurface soil depth intervals. Subsurface samples are taken between 36-48", 48-60", or 72-84".

		#	#		Detects					Non-detects	
Analyte	Units	Locations	Samples	RA	#	Min	Med	Avg	Max	#	RL
Arsenic	mg/kg	9	22	HHRA	22	4	7.0	9.0	47	0	-
Barium	mg/kg	9	22	HHRA	22	43	185.5	318.8	2530	0	-
Cobalt	mg/kg	9	22	HHRA	22	5	7	7.0	15	0	-
Lithium	mg/kg	9	22	HHRA	22	8	11	12.2	29	0	-
Radium-226	pCi/g	9	22	HHRA	22	0.3	0.5	0.47	0.6	0	-
Radium-228	pCi/g	9	22	HHRA	22	0.2	0.65	0.72	1.6	0	-

Table D-3.7. Summary of analytes from all samples within the surface soil (0-6" and 12-24'' depth intervals) from EU11 (the WS area). These two intervals are the only depth intervals that samples were taken from in this area. Radium-226 and radium-228 are of interest for the HHRA. Antimony, arsenic, barium, boron, cadmium, manganese, and selenium are of interest for the ERA. There were no field duplicate occasions. The summary statistics are calculated over the two surface soil depth intervals. There were no subsurface samples collected from EU11 (the WS area).

		#	#		Detects					Non-detects	
Analyte	Units	Locations	Samples	RA	#	Min	Med	Avg	Max	#	RL
Antimony[a]	mg/kg	6	12	ERA	0	-	-	-	-	12	1
Arsenic	mg/kg	6	12	ERA	12	5	6	6.4	8	0	-
Barium	mg/kg	6	12	ERA	12	73	140	148.2	352	0	-
Boron	mg/kg	6	12	ERA	11	6	10	11.8	17	1	1
Cadmium[a]	mg/kg	6	12	ERA	0	-	-	-	-	12	1
Manganese	mg/kg	6	12	ERA	12	213	284	323.4	608	0	-
Radium-226	pCi/g	6	12	HHRA	12	0.4	0.45	0.48	0.7	0	-
Radium-228	pCi/g	6	12	HHRA	12	0.4	0.6	0.63	0.9	0	-
Selenium[a]	mg/kg	6	12	ERA	0	-	-	-	-	12	1.0

[a] SLERA refinement ruled out antimony, cadmium, and selenium. Summary statistics are provided but no UCLs are calculated for these three analytes.

Table D-3.8. Summary of analytes from all samples within the surface soil (0-6" and 12-24'' depth intervals) from EU12 (the MD area). Arsenic, cobalt, lithium, manganese, radium-226, and radium-228 are of interest for the HHRA. Antimony, arsenic, barium, boron, cadmium, manganese, radium-228, selenium are of interest for the ERA. There were two field duplicate occasion. The summary statistics are calculated over the two depth intervals.

		#	#		Detects					Non-detects	
Analyte	Units	Locations	Samples	RA	#	Min	Med	Avg	Max	#	RL
Antimony[a]	mg/kg	11	22	ERA	0	-	-	-	-	22	1
Arsenic	mg/kg	11	22	HHRA/ERA	22	2	6	6.5	18	0	-
Barium	mg/kg	11	22	ERA	22	20	186.5	244.2	931	0	-
Boron	mg/kg	11	22	ERA	22	9	15.5	19.9	47	0	-
Cadmium[a]	mg/kg	11	22	ERA	1	4	4	4	4	21	1
Cobalt	mg/kg	11	22	HHRA	22	5	6	6.5	10	0	-
Lithium	mg/kg	11	22	HHRA	21	6	11	10.8	18	1	5
Manganese	mg/kg	11	22	HHRA/ERA	22	176	306.5	362.3	1790	0	-
Radium-226	pCi/g	11	22	HHRA	22	0.2	0.4	0.44	0.7	0	-
Radium-228	pCi/g	11	22	HHRA/ERA	22	0.1	0.4	0.44	0.7	0	-
Selenium[a]	mg/kg	11	22	ERA	0	-	-	-	-	22	1.0

[a] SLERA refinement ruled out antimony, cadmium, and selenium. Summary statistics are provided but no UCLs are calculated for these three analytes.

Table D-3.9. Summary of analytes from all samples from all locations and all depth intervals from EU12 (the MD area). Arsenic, cobalt, lithium, manganese, radium-226, and radium-228 are of interest for the HHRA. There were two field duplicate occasions. The summary statistics are calculated over the three surface and subsurface soil depth intervals. Subsurface samples were taken between 30-36", 40-52", 48-60", or 72-84".

		#	#		Detects					Non-detects	
Analyte	Units	Locations	Samples	RA	#	Min	Med	Avg	Max	#	RL
Arsenic	mg/kg	11	31	HHRA	31	2	6	7.7	38	0	-
Cobalt	mg/kg	11	31	HHRA	31	5	6	6.6	11	0	-
Lithium	mg/kg	11	31	HHRA	28	6	11	10.7	18	3	5
Manganese	mg/kg	11	31	HHRA	31	98	322	436.0	2410	0	-
Radium-226	pCi/g	11	31	HHRA	31	0.2	0.4	0.45	0.7	0	-
Radium-228	pCi/g	11	31	HHRA	31	-0.03	0.5	0.48	1.1	0	-

Table D-3.10. Summary of analytes from all samples within the surface soil (0-6" and 12-24'' depth intervals) from EU13 (the SD area). Lithium, radium-226, and radium-228 are of interest for the HHRA. Antimony, arsenic, barium, boron, manganese, cadmium, radium-228, and selenium are of interest for the ERA. There were three field duplicate occasions. The summary statistics are calculated over the two surface soil depth intervals.

		#	#		Detects					Non-detects	
Analyte	Units	Locations	Samples	RA	#	Min	Med	Avg	Max	#	RL
Antimony[a]	mg/kg	20	40	ERA	1	1	1	1	1	39	1
Arsenic	mg/kg	20	40	ERA	40	2	5	5.6	15	0	-
Barium	mg/kg	20	40	ERA	40	28	133.5	159.7	510	0	-
Boron	mg/kg	20	40	ERA	39	6	19	30.0	155	1	5
Cadmium[a]	mg/kg	20	40	ERA	0	-	-	-	-	40	1
Lithium	mg/kg	20	40	HHRA	39	8	12	13.7	30	1	5
Manganese	mg/kg	20	40	ERA	40	158	323	324.3	491	0	-
Radium-226	pCi/g	20	40	HHRA	40	0.2	0.5	0.43	0.7	0	-
Radium-228	pCi/g	20	40	HHRA/ERA	40	0.3	0.7	0.74	1.9	0	-
Selenium[a]	mg/kg	20	40	ERA	0	-	-	-	-	40	2.0[b]

[a] SLERA refinement ruled out antimony, cadmium, and selenium. Summary statistics are provided but no UCLs are calculated for these three analytes.

[b] The RL (CRQL) of selenium concentrations varied between 1 mg/kg and 2 mg/kg.

Table D-3.11. Summary of analytes from all samples from all locations and all depth intervals from EU13 (the SD area). Lithium, radium-226, and radium-228 are of interest for the HHRA. There were three field duplicate occasions. The summary statistics are calculated over the three surface and subsurface soil depth intervals. Subsurface samples were taken between 72-84".

		#	#		Detects					Non-detects	
Analyte	Units	Locations	Samples	RA	#	Min	Med	Avg	Max	#	RL
Lithium	mg/kg	20	45	HHRA	44	8	12	13.7	30	1	5
Radium-226	pCi/g	20	45	HHRA	45	0.2	0.5	0.45	0.8	0	-
Radium-228	pCi/g	20	45	HHRA	45	0.3	0.7	0.74	1.9	0	-

Table D-3.12. Summary of analytes from all samples within the 0-6" and 12-24'' depth intervals from EU14 (the SFCC area). Arsenic, cobalt, lithium, manganese, radium-226, and radium-228 are of interest for the HHRA. Antimony, arsenic, barium, boron, cadmium, manganese, radium-228, and selenium are of interest for the ERA. There were three field duplicate occasions. The summary statistics are calculated over the two surface soil depth intervals.

		#	#		Detects					Non-detects	
Analyte	Units	Locations	Samples	RA	#	Min	Med	Avg	Max	#	RL
Antimony[a]	mg/kg	25	50	ERA	0	-	-	-	-	50	1
Arsenic	mg/kg	25	50	HHRA/ERA	50	5	8	9.0	21	0	-
Barium	mg/kg	25	50	ERA	50	70	141	166.5	583	0	-
Boron	mg/kg	25	50	ERA	49	5	13	13.7	52	1	5
Cadmium[a]	mg/kg	25	50	ERA	0	-	-	-	-	50	1
Cobalt	mg/kg	25	50	HHRA	50	5	7	7.1	10	0	-
Lithium	mg/kg	25	50	HHRA	49	10	12	13.0	23	1	5
Manganese	mg/kg	25	50	HHRA/ERA	50	230	359	380.4	944	0	-
Radium-226	pCi/g	25	50	HHRA	50	0.3	0.6	0.57	0.9	0	-
Radium-228	pCi/g	25	50	HHRA/ERA	50	0.3	0.6	0.86	3.4	0	-
Selenium[a]	mg/kg	25	50	ERA	1	1.0	1.0	1.0	1.0	49	3.0[b]

[a] SLERA refinement ruled out antimony, cadmium, and selenium. Summary statistics are provided but no UCLs are calculated for these three analytes.

[b] The RL (CRQL) of selenium concentrations varied between 1 mg/kg and 3 mg/kg.

Table D-3.13. Summary of analytes of interest for the HHRA based on all samples from all depth intervals from EU14 (the SFCC area). There were three field duplicate occasions. The summary statistics are calculated over the three surface and subsurface soil depth intervals. Subsurface samples were taken between 36-48", 48-60", or 72-84".

		#	#		Detects					Non-detects	
Analyte	Units	Locations	Samples	RA	#	Min	Med	Avg	Max	#	RL
Arsenic	mg/kg	25	55	HHRA	55	5	8	9.6	24	0	-
Cobalt	mg/kg	25	55	HHRA	55	5	7	7.3	13	0	-
Lithium	mg/kg	25	55	HHRA	54	10	12	13.1	23	1	5
Manganese	mg/kg	25	55	HHRA	55	230	359	392.3	944	0	-
Radium-226	pCi/g	25	55	HHRA	55	0.3	0.6	0.57	0.9	0	-
Radium-228	pCi/g	25	55	HHRA	55	0.2	0.6	0.84	3.4	0	-

D-3.4 **Assessing Assumptions**

D-3.4.1 **Quantity of data**

As discussed in Section D-3.1, the areas represented by the soil samples are limited in spatial scale relative to the entire Units 3 & 4 EHP AOC Area; the estimated EPCs in this report apply only to their associated sampling areas and defined EUs.

D-3.4.2 **Implications of independence violations**

Common methods for calculating 95% UCLs assume all observations are independent. However, samples taken closer together in space tend to be more similar than those taken far apart, known as spatial autocorrelation. The general idea is that if samples are taken close enough together in space, the samples actually overlap in their information about the mean concentration over the area and therefore contain less information than independent samples would. See Section D-1.1 for more discussion about the potential implications of violations of independence on UCLs. Dependence due to samples coming from different depths from the same locations is accounted for within the UCL calculations using the number of locations as the sample size and the location averages as the observations in the usual t- and BCa- confidence interval calculations. This is a simple method to correct for dependence while still using common methods for obtaining UCLs.

D-3.4.3 **Choice of UCL estimator for the mean**

The general approach to estimating 95% UCLs is described in Section D-1.1. For EU9 (DP3 area), EU10 (DP5 area), EU12 (MD area), EU13 (SD area), and EU14 (SFCC area) the approach involves choosing the maximum of the t-UCL or the BCa-UCL. For EU11 (WS area), with only six samples, only the t-UCL is used. For preliminary COPCs with censored observations ("non-detects"), several methods for incorporating the censored data into the analyses were explored to investigate the sensitivity of the results to method. This exploration is particular to lithium for EU9 (DP3 area), EU12 (MD area), EU13 (SD area), and EU14 (SFCC area); arsenic in the entire soil column of EU9 (DP3 area); boron in EU11 (WS area), EU13 (SD area), and EU14 (SFCC area); and selenium in EU9 (DP3 area) and EU10 (DP5 area). The 95% UCLs for selenium in EU9 (DP3 area) and EU10 (DP5 area) are expected to be the most sensitive to

the method used given the high frequency of censored observations (non-detects). The 95% UCLs for lithium in EU9 (DP3 area) for both the surface soil and entire soil column are also expected to be sensitive to the method when the censoring limit (the RL) is greater than the maximum detected measurement.

D-3.5 **95% UCLs**

95% UCLs are calculated for the exposure units for human health using soil samples in the surface soil (0-24'') for each EU (or soil sampling area) and for the entire soil column (max depth interval 0-84'') for all areas except WS, for which there were no samples taken for subsurface.

Details of the 95% UCLs calculated for the HHRA are described in sections D-3.5.1 through D-3.5.6, the results of which are presented in Tables D-3.14 through D-3.19.

Details of the 95% UCLs calculated for the ERA (for all COPCs but selenium) are described in sections D-3.5.7 through D-3.5.12, the results of which are presented in Tables D-3.20 through D-3.25. Details of the 95% UCLs calculated for selenium for the ERA are described in sections D-3.5.13, the results are presented in Table D-3.26 and Table D-3.27.

D-3.5.1 **HHRA 95% UCLs for EU9 (DP3 area)**

The estimated mean concentration of arsenic in surface soil for EU9 (DP3 area) is 7.3 mg/kg with an associated two-sided 90% confidence interval from 2.2 mg/kg to 12.4 mg/kg; the recommended estimated EPC is 12.4 mg/kg. The estimated mean concentration of lithium is 10.6 mg/kg, with an associated two-sided 90% confidence interval from 9.4 to 11.8 mg/kg; the recommended EPC is 11.8 mg/kg. The estimated mean concentration of radium-226 is 0.47 pCi/g with an associated two-sided 90% confidence interval from 0.44 pCi/g to 0.5 pCi/g; the recommended estimated EPC is 0.5 pCi/g. Finally, the estimated mean concentration of radium-228 is 0.57 pCi/g, with an associated two-sided 90% confidence interval from 0.54 to 0.6 pCi/g; the recommended EPC is 0.6 pCi/g (Table D-3.14).

The estimated mean concentration of arsenic in soil for EU9 (DP3 area) for the sampled soil column (all depths) is 7.4 mg/kg with an associated two-sided 90% confidence interval from 3.7 mg/kg to 11.1 mg/kg; the recommended estimated EPC is 11.1 mg/kg. The estimated mean concentration of lithium is 10.4 mg/kg, with an associated two-sided 90% confidence interval from 9.3 to 11.5 mg/kg; the recommended EPC is 11.5 mg/kg. The estimated mean concentration of radium-226 is 0.48 pCi/g with an associated two-sided 90% confidence interval from 0.46 pCi/g to 0.5 pCi/g; the recommended estimated EPC is 0.5 pCi/g. Finally, the estimated mean concentration of radium-228 is 0.58 pCi/g, with an associated two-sided 90% confidence interval from 0.46 to 0.7 pCi/g; the recommended EPC is 0.7 pCi/g (Table D-3.14).

Table D-3.14. Estimated EPCs for the preliminary COPCs identified for the HHRA for EU9 (DP3 area) for surface soil (using samples from 0-6'' and 12-24'') and the entire sampled soil column (also including subsurface soil samples). EU9 (DP3 area) had 16 locations. Each location had a sample collected from 0-6" and from 12-24"; 5 of the 16 locations had an additional sample collected from subsurface soil.

Depth	EU9 (DP3 area) 16 Locations	Arsenic (mg/kg)	Lithium (mg/kg)	Radium-226 (pCi/g)	Radium-228 (pCi/g)
Surface	Average	7.3	10.6	0.47	0.57
	Max	47	17	0.8	1.1
	95% t-UCL	10.4	11.8	0.5	0.6
	95% BCa-UCL	12.4	11.4	0.5	0.6
	Estimated EPC	**12.4**	**11.8**[a]	**0.5**	**0.6**
Surface and subsurface	Average	7.4	10.4	0.48	0.58
	Max	47	17	0.8	1.2
	95% t-UCL	9.5	11.1	0.5	0.7
	95% BCa-UCL	11.1	11.5	0.5	0.7
	Estimated EPC	**11.1**[b]	**11.5**[c]	**0.5**	**0.7**

[a] 95% t-UCLs using different substitution methods for non-detects were between 11.3 and 11.8 mg/kg, and 95% BCa-UCLs were between 11.2 and 11.8 mg/kg; the method of substituting the RL for non-detects resulted in the largest UCL.

[b] 95% t-UCLs using different substitution methods for non-detects were between 9.4 and 9.5 mg/kg, and 95% BCa-UCLs were between 11.0 and 11.1 mg/kg; the method of substituting the RL for non-detects resulted in the largest 95% UCL.

[c] 95% t-UCLs using different substitution methods for non-detects were estimated to be between 11.0 and 11.5 mg/kg, and 95% BCa-UCLs were between 10.8 and 11.5 mg/kg; the method of substituting the RL for non-detects resulted in the largest 95% UCL.

D-3.5.2 **HHRA 95% UCLs for EU10 (DP5 area)**

The estimated mean concentration of arsenic in surface soil for EU10 (DP5 area) is 7.3 mg/kg with an associated two-sided 90% confidence interval from 6.3 mg/kg to 8.3 mg/kg; the recommended estimated EPC is 8.3 mg/kg. The estimated mean concentration of barium is 344.7 mg/kg, with an associated two-sided 90% confidence interval from 0 to 706.7 mg/kg; the recommended EPC is 706.7 mg/kg. The estimated mean concentration of cobalt is 6.3 mg/kg, with an associated two-sided 90% confidence interval from 5.8 to 6.8 mg/kg; the recommended EPC is 6.8 mg/kg. The estimated mean concentration of lithium is 12.6 mg/kg, with an associated two-sided 90% confidence interval from 10.0 to 15.2 mg/kg; the recommended EPC is 15.2 mg/kg. The estimated mean concentration of radium-226 is 0.49 pCi/g with an associated two-sided 90% confidence interval from 0.48 pCi/g to 0.5 pCi/g; the recommended estimated EPC is 0.5 pCi/g. Finally, the estimated mean concentration of radium-228 is 0.72 pCi/g, with an associated two-sided 90% confidence interval from 0.54 to 0.9 pCi/g; the recommended EPC is 0.9 pCi/g (Table D-3.15).

The estimated mean concentration of arsenic in soil for EU10 (DP5 area) for the sampled soil column (all depths) is 9.0 mg/kg with an associated two-sided 90% confidence interval from 4.5 mg/kg to 13.5 mg/kg; the recommended estimated EPC is 13.5 mg/kg. The estimated mean concentration of barium is 318.8 mg/kg, with an associated two-sided 90% confidence interval from 112.6 to 525.0 mg/kg; the recommended EPC is 525.0 mg/kg. The estimated mean concentration of cobalt is 7.0

mg/kg, with an associated two-sided 90% confidence interval from 6.3 to 7.7 mg/kg; the recommended EPC is 7.7 mg/kg. The estimated mean concentration of lithium is 12.2 mg/kg, with an associated two-sided 90% confidence interval from 10.5 to 13.9 mg/kg; the recommended EPC is 13.9 mg/kg. The estimated mean concentration of radium-226 is 0.47 pCi/g with an associated two-sided 90% confidence interval from 0.44 pCi/g to 0.5 pCi/g; the recommended estimated EPC is 0.5 pCi/g. Finally, the estimated mean concentration of radium-228 is 0.72 pCi/g, with an associated two-sided 90% confidence interval from 0.54 to 0.9 pCi/g; the recommended EPC is 0.9 pCi/g (Table D-3.15).

Table D-3.15. Estimated EPCs for the preliminary COPCs identified for the HHRA for EU10 (DP5 area) for surface soil (using samples from 0-6'' and 12-24'') and the entire sampled soil column (also including subsurface soil samples). EU10 (DP5 area) had nine locations. Each location had a sample collected from 0-6" and from 12-24"; four of the nine locations had an additional sample collected from subsurface soil.

Depth	DP5 area 9 Locations	Arsenic (mg/kg)	Barium (mg/kg)	Cobalt (mg/kg)	Lithium (mg/kg)	Radium-226 (pCi/g)	Radium-228 (pCi/g)
Surface	Average	7.3	344.7	6.3	12.6	0.49	0.72
	Max	10	2530	8	29	0.6	1.6
	95% t-UCL	8.3	594.1	6.8	15.2	0.5	0.9
	95% BCa-UCL	8.2	706.7	6.7	15.2	0.5	0.8
	Estimated EPC	**8.3**	**706.7**	**6.8**	**15.2**	**0.5**	**0.9**
Surface and subsurface	Average	9.0	318.8	7.0	12.2	0.47	0.72
	Max	47	2530	15	29	0.6	1.6
	95% t-UCL	11.9	456.0	7.7	13.9	0.5	0.9
	95% BCa-UCL	13.5	525.0	7.7	13.7	0.5	0.9
	Estimated EPC	**13.5**	**525.0**	**7.7**	**13.9**	**0.5**	**0.9**

D-3.5.3 **HHRA 95% UCLs for EU11 (WS area)**

The estimated mean concentration of radium-226 in surface soil for EU11 (WS area) is 0.48 pCi/g with an associated two-sided 90% confidence interval from 0.36 pCi/g to 0.6 pCi/g; the recommended estimated EPC is 0.6 pCi/g. The estimated mean concentration of radium-228 is 0.63 pCi/g, with an associated two-sided 90% confidence interval from 0.56 to 0.7 pCi/g; the recommended EPC is 0.7 pCi/g (Table D-3.16).

Table D-3.16. Estimated EPCs for the preliminary COPCs identified for the HHRA for EU11 (WS area) within the depth intervals 0-6" and 12-24''. EU11 (WS area) had 6 locations; each location had a sample collected from 0-6" and from 12-24".

Depth	WS area 6 Locations	Radium-226 (pCi/g)	Radium-228 (pCi/g)
Surface	Average	0.48	0.63
	Max	0.7	0.9
	95% t-UCL	0.6	0.7
	Estimated EPC	**0.6**	**0.7**

D-3.5.4 **HHRA 95% UCLs for EU12 (MD area)**

The estimated mean concentration of arsenic in surface soil for EU12 (MD area) is 6.5 mg/kg with an associated two-sided 90% confidence interval from 5.1 mg/kg to 7.9 mg/kg; the recommended estimated EPC is 7.9 mg/kg. The estimated mean concentration of cobalt is 6.5 mg/kg, with an associated two-sided 90% confidence interval from 6.0 to 7.0 mg/kg; the recommended EPC is 7.0 mg/kg. The estimated mean concentration of lithium is 10.9 mg/kg, with an associated two-sided 90% confidence interval from 10.2 to 11.6 mg/kg; the recommended EPC is 11.6 mg/kg. The estimated mean concentration of manganese is 362.3 mg/kg, with an associated two-sided 90% confidence interval from 156.6 to 568.0 mg/kg; the recommended EPC is 568.0 mg/kg. The estimated mean concentration of radium-226 is 0.44 pCi/g with an associated two-sided 90% confidence interval from 0.38 pCi/g to 0.5 pCi/g; the recommended estimated EPC is 0.5 pCi/g. Finally, the estimated mean concentration of radium-228 is 0.44 pCi/g, with an associated two-sided 90% confidence interval from 0.38 to 0.5 pCi/g; the recommended EPC is 0.5 pCi/g (Table D-3.17).

The estimated mean concentration of arsenic in soil for EU12 (MD area) for the sampled soil column (all depths) is 7.7 mg/kg with an associated two-sided 90% confidence interval from 5.4 mg/kg to 10.0 mg/kg; the recommended estimated EPC is 10.0 mg/kg. The estimated mean concentration of cobalt is 6.6 mg/kg, with an associated two-sided 90% confidence interval from 6.0 to 7.2 mg/kg; the recommended EPC is 7.2 mg/kg. The estimated mean concentration of lithium is 10.6 mg/kg, with an associated two-sided 90% confidence interval from 10.0 to 11.2 mg/kg; the recommended EPC is 11.2 mg/kg. The estimated mean concentration of manganese is 436.0 mg/kg, with an associated two-sided 90% confidence interval from 234.7 to 637.3 mg/kg; the recommended EPC is 637.3.0 mg/kg. The estimated mean concentration of radium-226 is 0.45 pCi/g with an associated two-sided 90% confidence interval from 0.4 pCi/g to 0.5 pCi/g; the recommended estimated EPC is 0.5 pCi/g. Finally, the estimated mean concentration of radium-228 is 0.48 pCi/g, with an associated two-sided 90% confidence interval from 0.36 to 0.6 pCi/g; the recommended EPC is 0.6 pCi/g (Table D-3.17).

Table D-3.17. Estimated EPCs for the preliminary COPCs identified for the HHRA for EU12 (MD area) for surface soil (using samples from 0-6'' and 12-24'') and the entire sampled soil column (also including subsurface soil samples). EU12 (MD area) had 11 locations. Each location had a sample collected from 0-6" and from 12-24"; 9 of the 11 locations had an additional sample collected from subsurface soil. As discussed in Section D-3.2.5, a value of zero was substituted for the one negative concentration to estimate 95% UCLs for radium-228 in the combined surface and sub-surface depths.

Depth	MD area 11 Locations	Arsenic (mg/kg)	Cobalt (mg/kg)	Lithium (mg/kg)	Manganese (mg/kg)	Radium-226 (pCi/g)	Radium-228 (pCi/g)
Surface	Average	6.5	6.5	10.9	362.3	0.44	0.44
	Max	18	10	18	1790	0.7	0.7
	95% t-UCL	7.9	7.0	11.6	488.5	0.5	0.5
	95% BCa-UCL	7.9	7.0	11.4	568.0	0.5	0.5
	Estimated EPC	**7.9**	**7.0**	**11.6**[a]	**568.0**	**0.5**	**0.5**
Surface and subsurface	Average	7.7	6.6	10.6	436.0	0.45	0.48
	Max	38	11	18	2410	0.7	1.1
	95% t-UCL	10.0	7.2	11.2	606.5	0.5	0.6
	95% BCa-UCL	9.9	7.2	10.9	637.3	0.5	0.6
	Estimated EPC	**10.0**	**7.2**	**11.2**[b]	**637.3**	**0.5**	**0.6**[c]

[a] 95% t-UCLs using different substitution methods for non-detects were each estimated to be 11.6 mg/kg, and 95% BCa-UCLs were estimated to be between 11.3 and 11.4 mg/kg.

[b] 95% t-UCLs using different substitution methods for non-detects were each estimated to be 11.2 mg/kg, and 95% BCa-UCLs were estimated to be between 10.9 and 11.0 mg/kg.

[c] 95% t- and BCa-UCLs using different substitution methods for negative concentrations for radium-228 in combined surface and subsurface depths were each estimated to be 0.6 pCi/g.

D-3.5.5 **HHRA 95% UCLs for EU13 (SD area)**

The estimated mean concentration of lithium in surface soil for EU13 (SD area) is 13.7 mg/kg, with an associated two-sided 90% confidence interval from 12.3 to 15.1 mg/kg; the recommended EPC is 15.1 mg/kg. The estimated mean concentration of radium-226 is 0.43 pCi/g with an associated two-sided 90% confidence interval from 0.36 pCi/g to 0.5 pCi/g; the recommended estimated EPC is 0.5 pCi/g. The estimated mean concentration of radium-228 is 0.74 pCi/g, with an associated two-sided 90% confidence interval from 0.58 to 0.9 pCi/g; the recommended EPC is 0.9 pCi/g (Table D-3.18).

The estimated mean concentration of lithium in soil for EU13 (SD area) for the sampled soil column (all depths) is 13.7 mg/kg with an associated two-sided 90% confidence interval from 12.5 mg/kg to 14.9 mg/kg; the recommended estimated EPC is 14.9 mg/kg. The estimated mean concentration of radium-226 is 0.45 pCi/g with an associated two-sided 90% confidence interval from 0.4 pCi/g to 0.5 pCi/g; the recommended estimated EPC is 0.5 pCi/g. Finally, the estimated mean concentration of radium-228 is 0.74 pCi/g, with an associated two-sided 90% confidence interval from 0.58 to 0.9 pCi/g; the recommended EPC is 0.9 pCi/g (Table D-3.18).

Table D-3.18. Estimated EPCs for the preliminary COPCs identified for the HHRA for EU13 (SD area) for surface soil (using samples from 0-6'' and 12-24'') and the entire sampled soil column (also including subsurface soil samples). EU13 (SD area) had 20 locations. Each location had a sample collected from 0-6" and from 12-24"; 5 of the 20 locations had an additional sample collected from subsurface soil.

Depth	SD area 20 Locations	Lithium (mg/kg)	Radium-226 (pCi/g)	Radium-228 (pCi/g)
Surface	Average	13.7	0.43	0.74
	Max	30	0.7	1.9
	95% t-UCL	14.9	0.5	0.9
	95% BCa-UCL	15.1	0.5	0.9
	Estimated EPC	**15.1**[a]	**0.5**	**0.9**
Surface and subsurface	Average	13.7	0.45	0.74
	Max	30	0.8	1.9
	95% t-UCL	14.8	0.5	0.9
	95% BCa-UCL	14.9	0.5	0.9
	Estimated EPC	**14.9**[b]	**0.5**	**0.9**

[a] 95% t-UCLs using different substitution methods for non-detects were each estimated to be 14.9 mg/kg, and 95% BCa-UCLs were estimated to be between 14.9 and 15.1 mg/kg. In this case, the method of substituting the RL for non-detects resulted in the largest estimated UCL.

[a] 95% t-UCLs using different substitution methods for non-detects were each estimated to be 14.8 mg/kg, and 95% BCa-UCLs were estimated to be between 14.8 and 14.9 mg/kg. In this case, the method of substituting the RL for non-detects resulted in the largest estimated UCL.

D-3.5.6 **HHRA 95% UCLs for EU14 (SFCC area)**

The estimated mean concentration of arsenic in surface soil for EU14 (SFCC area) is 9.0 mg/kg with an associated two-sided 90% confidence interval from 7.8 mg/kg to 10.2 mg/kg; the recommended estimated EPC is 10.2 mg/kg. The estimated mean concentration of cobalt is 7.1 mg/kg, with an associated two-sided 90% confidence interval from 6.8 to 7.4 mg/kg; the recommended EPC is 7.4 mg/kg. The estimated mean concentration of lithium is 12.9 mg/kg, with an associated two-sided 90% confidence interval from 12.3 to 13.5 mg/kg; the recommended EPC is 13.5 mg/kg. The estimated mean concentration of manganese is 380.4 mg/kg, with an associated two-sided 90% confidence interval from 338.9 to 421.9 mg/kg; the recommended EPC is 421.9 mg/kg. The estimated mean concentration of radium-226 is 0.57 pCi/g with an associated two-sided 90% confidence interval from 0.54 pCi/g to 0.6 pCi/g; the recommended estimated EPC is 0.6 pCi/g. Finally, the estimated mean concentration of radium-228 is 0.86 pCi/g, with an associated two-sided 90% confidence interval from 0.62 to 1.1 pCi/g; the recommended EPC is 1.1 pCi/g (Table D-3.19).

The estimated mean concentration of arsenic in soil for EU14 (SFCC area) for the sampled soil column (all depths) is 9.6 mg/kg with an associated two-sided 90% confidence interval from 8.6 mg/kg to 10.6 mg/kg; the recommended estimated EPC is 10.6 mg/kg. The estimated mean concentration of cobalt is 7.3 mg/kg, with an associated two-sided 90% confidence interval from 7.1 to 7.5 mg/kg; the recommended EPC is 7.5 mg/kg. The estimated mean concentration of lithium is 13.0 mg/kg, with an associated two-sided 90% confidence interval from 12.7 to 13.3 mg/kg; the recommended EPC is 13.3 mg/kg. The estimated mean concentration of manganese is 392.3 mg/kg, with an associated two-sided

90% confidence interval from 351.3 to 433.3 mg/kg; the recommended EPC is 433.3 mg/kg. The estimated mean concentration of radium-226 is 0.57 pCi/g with an associated two-sided 90% confidence interval from 0.54 pCi/g to 0.6 pCi/g; the recommended estimated EPC is 0.6 pCi/g. The estimated mean concentration of radium-228 is 0.84 pCi/g, with an associated two-sided 90% confidence interval from 0.58 to 1.1 pCi/g; the recommended EPC is 1.1 pCi/g (Table D-3.19).

Table D-3.19. Estimated EPCs for the preliminary COPCs identified for the HHRA for EU14 (SFCC area) for surface soil (using samples from 0-6'' and 12-24'') and the entire sampled soil column (also including subsurface soil samples). EU14 (SFCC area) had 25 locations. Each location had a sample collected from 0-6" and from 12-24"; 5 of the 25 locations had an additional sample collected from subsurface soil.

Depth	SFCC area 25 Locations	Arsenic (mg/kg)	Cobalt (mg/kg)	Lithium (mg/kg)	Manganese (mg/kg)	Radium-226 (pCi/g)	Radium-228 (pCi/g)
Surface	Average	9.0	7.1	12.9	380.4	0.57	0.86
	Max	21	10	23	944	0.9	3.4
	95% t-UCL	10.1	7.4	13.4	415.1	0.6	1.1
	95% BCa-UCL	10.2	7.4	13.5	421.9	0.6	1.1
	Estimated EPC	**10.2**	**7.4**	**13.5**[a]	**421.9**	**0.6**	**1.1**
Surface and subsurface	Average	9.6	7.3	13.0	392.3	0.57	0.84
	Max	24	13	23	944	0.9	3.4
	95% t-UCL	10.5	7.5	13.4	428.1	0.6	1.0
	95% BCa-UCL	10.6	7.5	13.5	433.3	0.6	1.1
	Estimated EPC	**10.6**	**7.5**	**13.3**[b]	**433.3**	**0.6**	**1.1**

[a] 95% t-UCLs using different substitution methods for non-detects were estimated to be between 13.4 and 13.5 mg/kg, and 95% BCa-UCLs were estimated to be between 13.4 and 13.5 mg/kg. In this case, the method of substituting the RL for non-detects resulted in the largest estimated UCL.

[b] 95% t-UCLs using different substitution methods for non-detects were estimated to be between 13.3 and 13.4 mg/kg, and 95% BCa-UCLs were estimated to be between 13.4 and 13.5 mg/kg. In this case, the method of substituting the RL for non-detects resulted in the largest estimated UCL.

D-3.5.7 **ERA 95% UCLs for the DP3 area**

The estimated mean concentration of arsenic in surface soil for the DP3 area is 7.3 mg/kg with an associated two-sided 90% confidence interval from 2.2 mg/kg to 12.4 mg/kg; the recommended estimated EPC is 12.4 mg/kg. The estimated mean concentration of barium is 198.4 mg/kg, with an associated two-sided 90% confidence interval from 129.1 to 267.7 mg/kg; the recommended EPC is 267.7 mg/kg. The estimated mean concentration of boron is 20.4 mg/kg, with an associated two-sided 90% confidence interval from 9.9 to 30.9 mg/kg; the recommended EPC is 30.9 mg/kg. Finally, the estimated mean concentration of manganese is 285.3 mg/kg, with an associated two-sided 90% confidence interval from 251.5 to 319.1 mg/kg; the recommended EPC is 319.1 mg/kg.

Table D-3.20. Estimated EPCs for the preliminary COPCs identified for the ERA for the DP3 area for surface soil (using samples from 0-6'' and 12-24''). The DP3 area had 16 locations; each location had a sample collected from 0-6" and from 12-24".

Depth	DP3 area	Arsenic (mg/kg)	Barium (mg/kg)	Boron (mg/kg)	Manganese (mg/kg)
16 Locations	Average	7.3	198.4	20.4	285.3
	Max	47	787	78	619
Surface	95% t-UCL	10.4	258.9	28.0	319.1
	95% BCa-UCL	12.4	267.7	30.9	317.8
	Estimated EPC	**12.4**	**267.7**	**30.9**	**319.1**

D-3.5.8 **ERA 95% UCLs for the DP5 area**

The estimated mean concentration of arsenic in surface soil for the DP5 area is 7.3 mg/kg with an associated two-sided 90% confidence interval from 6.3 mg/kg to 8.3 mg/kg; the recommended estimated EPC is 8.3 mg/kg. The estimated mean concentration of barium is 344.7 mg/kg, with an associated two-sided 90% confidence interval from 0 to 706.7 mg/kg; the recommended EPC is 706.7 mg/kg. The estimated mean concentration of boron is 20.3 mg/kg, with an associated two-sided 90% confidence interval from 9.4 to 31.2 mg/kg; the recommended EPC is 31.2 mg/kg. The estimated mean concentration of manganese is 329.5 mg/kg, with an associated two-sided 90% confidence interval from 288.2 to 370.8 mg/kg; the recommended EPC is 370.8 mg/kg. Finally, the estimated mean concentration of radium-228 is 0.72 pCi/g, with an associated two-sided 90% confidence interval from 0.54 to 0.9 pCi/g; the recommended EPC is 0.9 pCi/g.

Table D-3.21. Estimated EPCs for the preliminary COPCs identified for the ERA for the DP5 area for surface soil (using samples from 0-6'' and 12-24''). The DP5 area had 9 locations; each location had a sample collected from 0-6" and from 12-24".

Depth	DP5 area	Arsenic (mg/kg)	Barium (mg/kg)	Boron (mg/kg)	Manganese (mg/kg)	Radium-228 (pCi/g)
9 Locations	Average	7.3	344.7	20.3	326.9	0.72
	Max	10	2530	93	482	1.6
Surface	95% t-UCL	8.3	594.1	30.8	370.8	0.9
	95% BCa-UCL	8.2	706.7	31.2	367.8	0.8
	Estimated EPC	**8.3**	**706.7**	**31.2**	**370.8**	**0.9**

D-3.5.9 **ERA 95% UCLs for the WS area**

The estimated mean concentration of arsenic in surface soil for the WS area is 6.4 mg/kg with an associated two-sided 90% confidence interval from 5.5 mg/kg to 7.3 mg/kg; the recommended estimated EPC is 7.3 mg/kg. The estimated mean concentration of barium is 148.2 mg/kg, with an associated two-sided 90% confidence interval from 104.6 to 191.8 mg/kg; the recommended EPC is 191.8 mg/kg. The estimated mean concentration of boron is 11.8 mg/kg, with an associated two-sided

90% confidence interval from 9.8 to 13.8 mg/kg; the recommended EPC is 13.8 mg/kg. Finally, the estimated mean concentration of manganese is 323.4 mg/kg, with an associated two-sided 90% confidence interval from 230.7 to 416.1 mg/kg; the recommended EPC is 416.1 mg/kg.

Table D-3.22. The WS area has 6 locations. Estimated EPCs for the preliminary COPCs identified for the ERA for the WS area for surface soil (using samples from 0-6'' and 12-24''). The WS area had six locations; each location had a sample collected from 0-6" and from 12-24".

Depth	WS area	Arsenic (mg/kg)	Barium (mg/kg)	Boron (mg/kg)	Manganese (mg/kg)
6 Locations	Average	6.4	148.2	11.8	323.4
	Max	8	352	17	608
Surface	95% t-UCL	7.3	191.8	13.8	416.1
	Estimated EPC	**7.3**	**191.8**	**13.8**[a]	**416.1**

[a] 95% t-UCLs using different substitution methods for non-detects were estimated to be between 13.7 and 13.8 mg/kg. In this case, the method of substituting the RL for non-detects resulted in the largest estimated UCL.

[b] 95% t-UCLs using different substitution methods for non-detects were estimated to be between 14.4 and 13.5 mg/kg. In this case, the method of substituting zero for non-detects resulted in the largest estimated UCL.

D-3.5.10 **ERA 95% UCLs for the MD area**

The estimated mean concentration of arsenic in surface soil for the MD area is 6.5 mg/kg with an associated two-sided 90% confidence interval from 5.1 mg/kg to 7.9 mg/kg; the recommended estimated EPC is 7.9 mg/kg. The estimated mean concentration of barium is 244.2 mg/kg, with an associated two-sided 90% confidence interval from 158.8 to 329.6 mg/kg; the recommended EPC is 329.6 mg/kg. The estimated mean concentration of boron is 19.9 mg/kg, with an associated two-sided 90% confidence interval from 14.0 to 25.8 mg/kg; the recommended EPC is 25.8 mg/kg. The estimated mean concentration of manganese is 362.3 mg/kg, with an associated two-sided 90% confidence interval from 155.3 to 569.3 mg/kg; the recommended EPC is 569.3 mg/kg. Finally, the estimated mean concentration of radium-228 is 0.44 pCi/g, with an associated two-sided 90% confidence interval from 0.38 to 0.5 pCi/g; the recommended EPC is 0.5 pCi/g.

Table D-3.23. Estimated EPCs for the preliminary COPCs identified for the ERA for the MD area for surface soil (samples from 0-6'' and 12-24''). The MD area had 11 locations; each location had a sample collected from 0-6" and from 12-24".

Depth	MD area	Arsenic (mg/kg)	Barium (mg/kg)	Boron (mg/kg)	Manganese (mg/kg)	Radium-228 (pCi/g)
11 Locations	Average	6.5	244.2	19.9	362.3	0.44
	Max	18	931	47	1790	0.7
Surface	95% t-UCL	7.9	323.5	25.6	488.5	0.5
	95% BCa-UCL	7.9	329.6	25.8	569.3	0.5
	Estimated EPC	**7.9**	**329.6**	**25.8**	**569.3**	**0.5**

D-3.5.11 **ERA 95% UCLs for the SD area**

The estimated mean concentration of arsenic in surface soil for the SD area is 5.6 mg/kg with an associated two-sided 90% confidence interval from 4.8 mg/kg to 6.4 mg/kg; the recommended estimated EPC is 6.4 mg/kg. The estimated mean concentration of barium is 159.7 mg/kg, with an associated two-sided 90% confidence interval from 130.1 to 189.3 mg/kg; the recommended EPC is 189.3 mg/kg. The estimated mean concentration of boron is 29.2 mg/kg, with an associated two-sided 90% confidence interval from 17.3 to 41.1 mg/kg; the recommended EPC is 41.1 mg/kg. The estimated mean concentration of manganese is 324.3 mg/kg, with an associated two-sided 90% confidence interval from 302.0 to 346.6 mg/kg; the recommended EPC is 346.6 mg/kg. Finally, the estimated mean concentration of radium-228 is 0.74 pCi/g, with an associated two-sided 90% confidence interval from 0.58 to 0.9 pCi/g; the recommended EPC is 0.9 pCi/g.

Table D-3.24. Estimated EPCs for the preliminary COPCs identified for the ERA for the SD area for surface soil (samples from 0-6'' and 12-24''). The DP3 area had 20 locations; each location had a sample collected from 0-6" and from 12-24".

Depth	SD area	Arsenic (mg/kg)	Barium (mg/kg)	Boron (mg/kg)	Manganese (mg/kg)	Radium-228 (pCi/g)
20 Locations	Average	5.6	159.7	29.2	324.3	0.74
	Max	15	510	155	491	1.9
Surface	95% t-UCL	6.3	187.5	39.1	346.6	0.9
	95% BCa-UCL	6.4	189.3	41.1	345.7	0.9
	Estimated EPC	**6.4**	**189.3**	**41.1**[a]	**346.6**	**0.9**

[a] 95% t-UCLs using different substitution methods for non-detects were estimated to be between 39.0 and 39.1 mg/kg, and 95% BCa-UCLs were estimated to be between 40.9 and 41.1 mg/kg. In this case, the method of substituting with half the RL for non-detects resulted in the largest estimated UCL.

D-3.5.12 **ERA 95% UCLs for the SFCC area**

The estimated mean concentration of arsenic in surface soil for the SFCC area is 9.0 mg/kg with an associated two-sided 90% confidence interval from 7.8 mg/kg to 10.2 mg/kg; the recommended estimated EPC is 10.2 mg/kg. The estimated mean concentration of barium is 166.5 mg/kg, with an

associated two-sided 90% confidence interval from 133.9 to 199.1 mg/kg; the recommended EPC is 199.1 mg/kg. The estimated mean concentration of boron is 13.7 mg/kg, with an associated two-sided 90% confidence interval from 11.6 to 15.8 mg/kg; the recommended EPC is 15.8 mg/kg. The estimated mean concentration of manganese is 380.4 mg/kg, with an associated two-sided 90% confidence interval from 338.9 to 421.9 mg/kg; the recommended EPC is 421.9 mg/kg. Finally, the estimated mean concentration of radium-228 is 0.86 pCi/g, with an associated two-sided 90% confidence interval from 0.62 to 1.1 pCi/g; the recommended EPC is 1.1 pCi/g.

Table D-3.25. Estimated EPCs for the preliminary COPCs identified for the ERA for the SFCC area for surface soil (samples from 0-6'' and 12-24''). The SFCC area had 25 locations; each location had a sample collected from 0-6" and from 12-24".

Depth	SFCC area	Arsenic (mg/kg)	Barium (mg/kg)	Boron (mg/kg)	Manganese (mg/kg)	Radium-228 (pCi/g)
25 Locations	Average	9.0	166.5	13.7	380.4	0.86
	Max	21	583	52	944	3.4
Surface	95% t-UCL	10.1	192.0	15.5	415.1	1.1
	95% BCa-UCL	10.2	199.1	15.8	421.9	1.1
	Estimated EPC	**10.2**	**199.1**	**15.8**[a]	**421.9**	**1.1**

[a] 95% t-UCLs using different substitution methods for non-detects were estimated to be between 15.4 and 15.5 mg/kg, and 95% BCa-UCLs were estimated to be between 15.7 and 15.8 mg/kg. In this case, the method of substituting the RL for non-detects resulted in the largest estimated UCL.

D-3.5.13 **ERA 95% UCLs for Selenium**

As described in Section D-1.2, the recommended EPC is generally the maximum of the 95% *t*-UCL and the BCa-UCL. Additionally, as described in Section D-1.3, different methods of substitution for the 24 non-detects in the DP3 area and the 14 non-detects in the DP5 area are implemented to test the sensitivity on the UCL and a range of 95% UCLs are provided in Table D-2.4. To account for dependence due to repeat samples being drawn from the same sampling location, Table D-3.26 presents the estimated mean and 95% UCL for selenium in the DP3 area and Table D-3.27 presents the estimated mean and 95% UCL in the DP5 area using sampling location as the primary sampling unit as discussed in Section D-2.4.2.

The estimated mean concentration of selenium using half the detection limit for censored observations in the DP3 area is 0.47 mg/kg with an associated two-sided 90% confidence interval from 0.38 to 0.56 mg/kg. The estimated 95% UCL varied between 0.25 and 0.99 mg/kg using different methods to account for censored observation. The recommended 95% UCL for use as the DP3 EPC for selenium is 0.56 mg/kg and was obtained using half the detection limit for censored observations.

The estimated mean concentration of selenium using half the detection limit for censored observations in the DP5 area is 0.51 mg/kg with an associated two-sided 90% confidence interval from 0.28 to 0.74 mg/kg. The estimated 95% UCL varied between 0.45 and 1.19 mg/kg using different methods to account for censored observation. The recommended 95% UCL for use as the DP5 EPC for selenium is 0.74 mg/kg and was obtained using half the detection limit for censored observations.

Table D-3.26. Estimated EPCs for selenium (mg/kg) for the ERA for the DP3 area for surface soil (samples from 0-6'' and 12-24''). The DP3 area had 16 locations; each location had a sample collected from 0-6" and from 12-24". There were 24 censored observations (non-detects) out of 32 total observations in the surface soil of the DP3 area, with RLs between 0.5 and 3.0 mg/kg.

Analyte	Average [1]	Max	Exposure Point Concentration [2]		
			95% UCL [3]	Min [4]	Max [5]
Selenium	0.47	1.5 [6]	0.56	0.25	0.99

[1] The estimated mean is calculated using substitution at half the detection limit for non-detects.

[2] Estimate based on fewer than 10 uncensored observations (detects) and should be used with caution. Estimates were obtained by using substitution for censored observations and averaging by location prior to calculations.

[3] The estimated 95% UCL is the 95% t-UCL calculated using substitution at half the detection limit for non-detects.

[4] The minimum 95% UCL is the 95% t-UCL calculated using substitution at a value of 0 for non-detects.

[5] The maximum 95% UCL is the 95% BCa-UCL calculated using substitution at the detection limit for non-detects.

[6] The maximum concentration for the DP3 area is a censored observation and is provided here at half the RL of 3.0 mg/kg to be consistent with the other estimates provided in the table.

Table D-3.27. Estimated EPCs for selenium (mg/kg) for the ERA for the DP-5 area for surface soil (samples from 0-6'' and 12-24''). The DP-5 area had 9 locations; each location had a sample collected from 0-6" and from 12-24". There were 14 censored observations (non-detects) out of 18 total observations in the surface soil of the DP5 area, with RLs between 0.5 and 2.0 mg/kg.

Analyte	Average [1]	Max	Exposure Point Concentration [2]		
			95% UCL [3]	Min [4]	Max [5]
Selenium	0.51	2.2	0.74	0.45	1.19

[1] The estimated mean is calculated using substitution at half the detection limit for non-detects.

[2] Estimate based on fewer than 5 uncensored observations (detects) and should be used with extreme caution. Estimates were obtained by using substitution for censored observations and averaging by location prior to calculations.

[3] The estimated 95% UCL is the 95% BCa-UCL calculated using substitution at half the detection limit for non-detects.

[4] The minimum 95% UCL is the 95% t-UCL calculated using substitution at a value of 0 for non-detects.

[5] The maximum 95% UCL is the 95% BCa-UCL calculated using substitution at the detection limit for non-detects.

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Figures

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Figures D-2: Surface Water

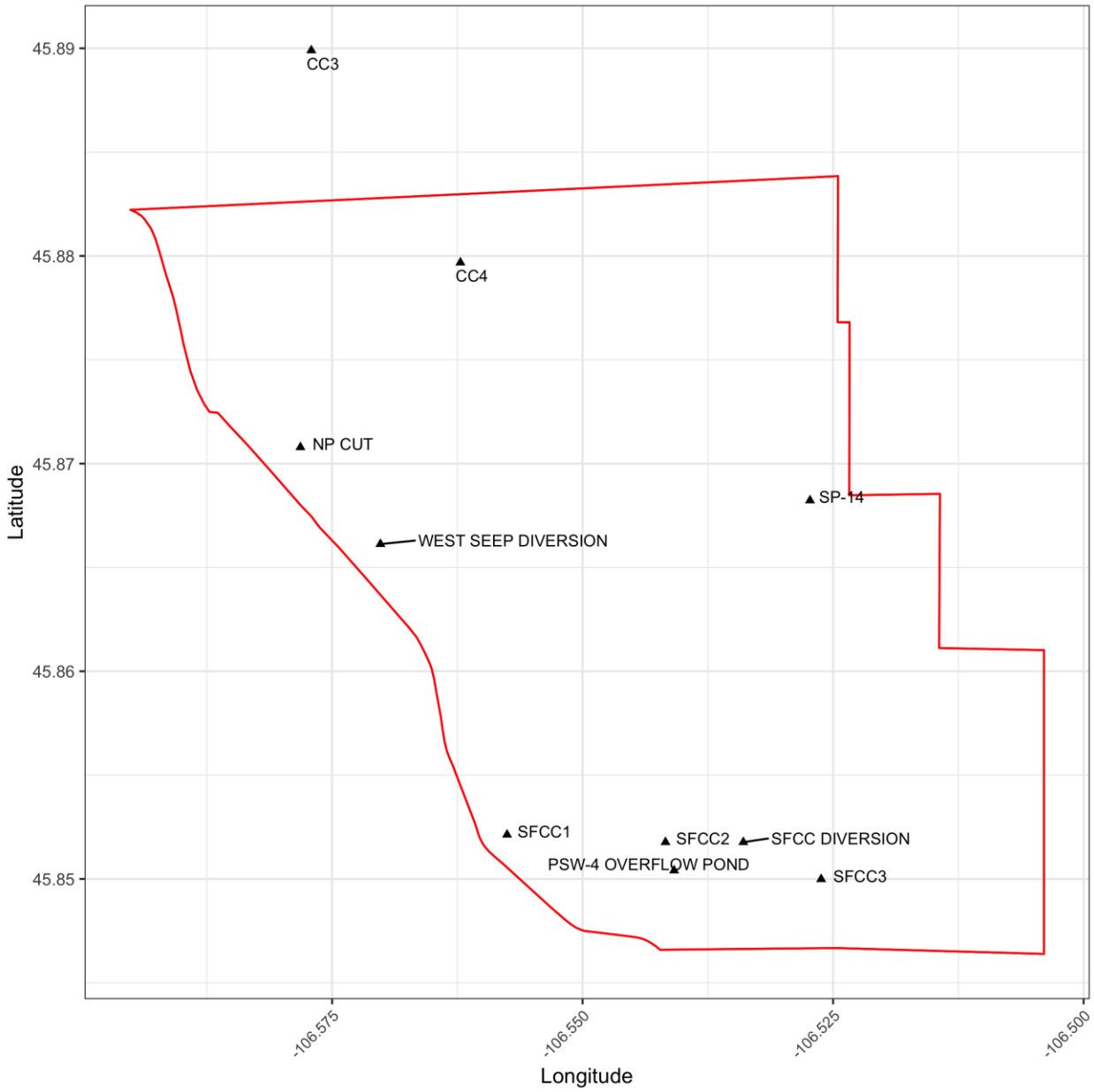


Figure D-2.1. Surface water sampling locations in the Units 3 & 4 EHP AOC Area.

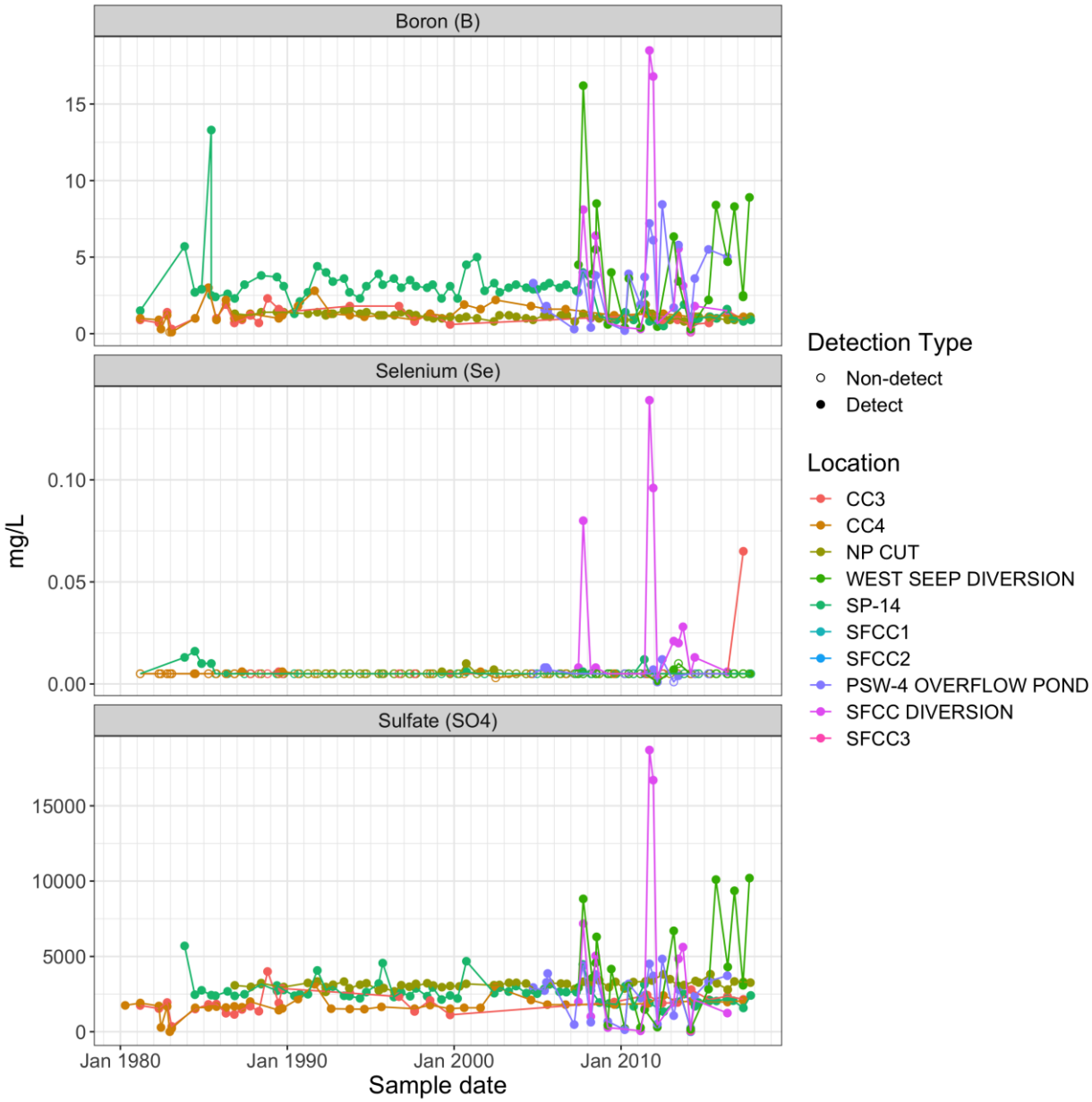


Figure D-2.2. Surface water dissolved concentrations (mg/L) over time for all data available for the preliminary COPCs of boron, selenium, and sulfate from ten locations within the boundary of the Units 3 & 4 EHP AOC Area. Only 2014, 2015, 2016, and 2017 data are used in estimation of EPCs. Boron is the only COPC for human health. Boron, selenium, and sulfate are all COPCs for the ERA.

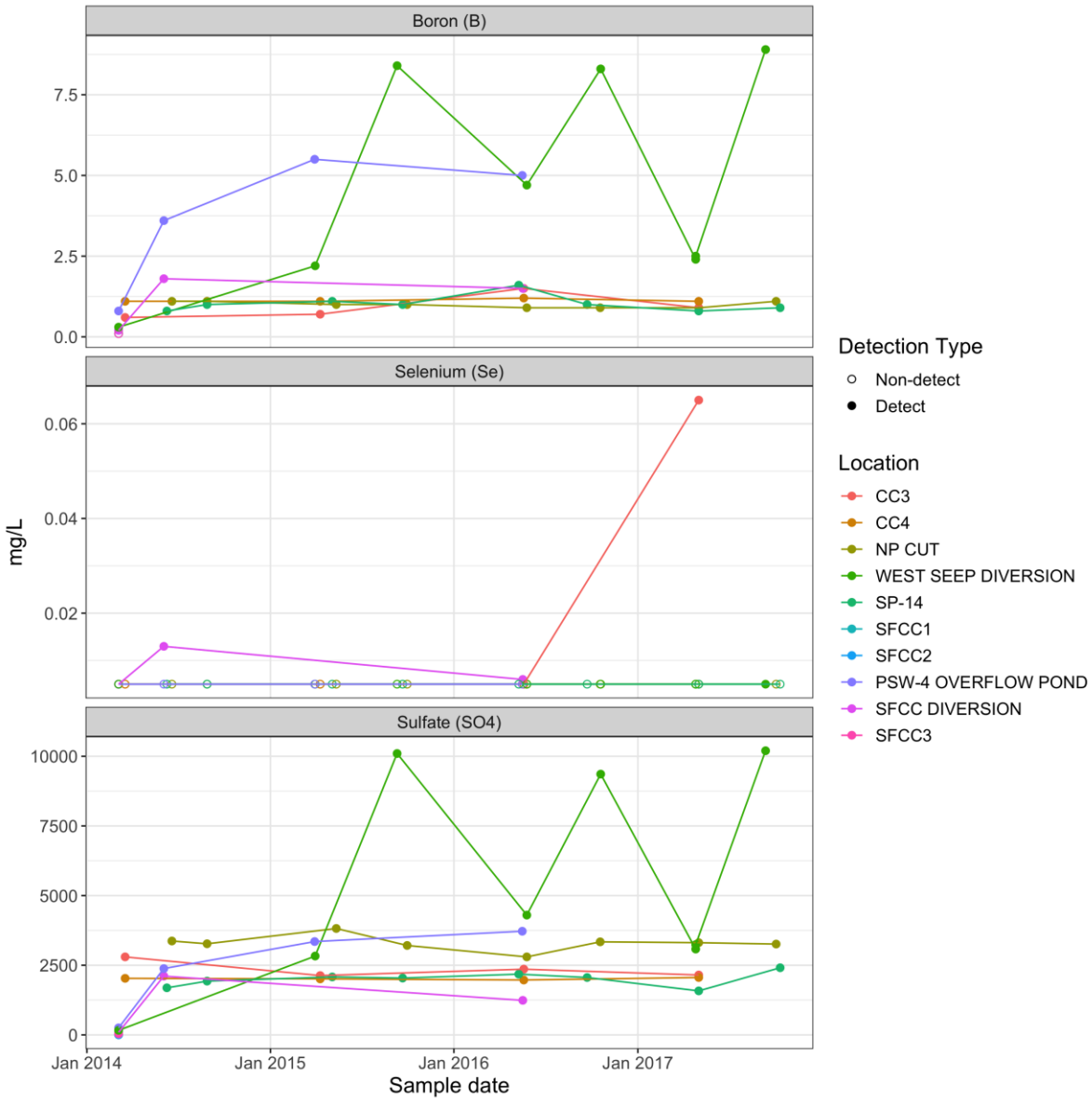


Figure D-2.3. Surface water (mg/L) dissolved concentrations from 2014, 2015, 2016, or 2017 for all data available for boron, selenium, and sulfate from ten locations within the boundary of the Units 3 & 4 EHP AOC Area.

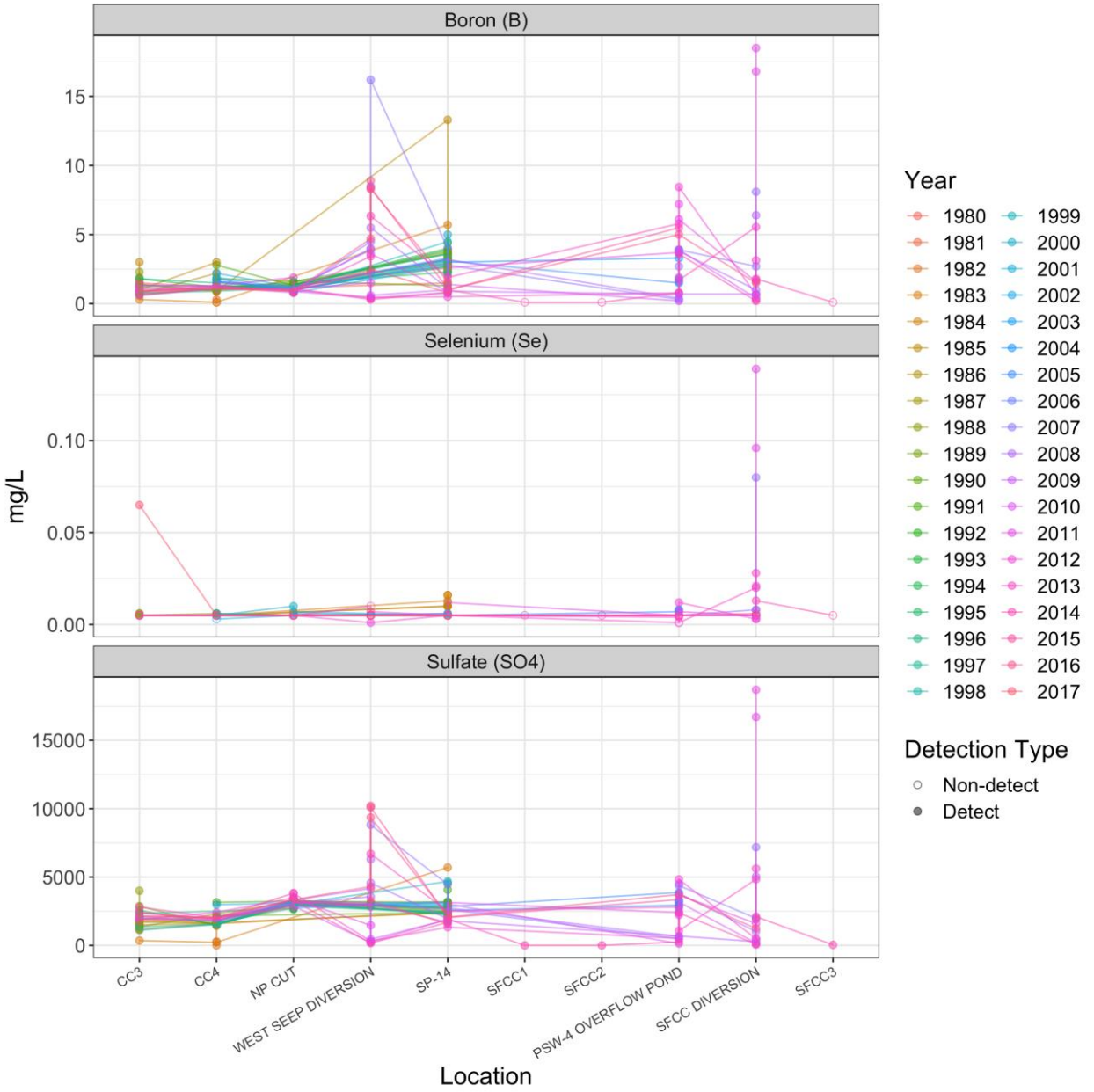


Figure D-2.4. Surface water dissolved concentrations (mg/L) from each sampling location for all data available for the preliminary COPCs of boron, selenium, and sulfate. Only 2014, 2015, 2016, and 2017 data are used in estimation of EPCs. Boron is the only COPC for human health. Boron, selenium, and sulfate are all COPCs for the ERA.

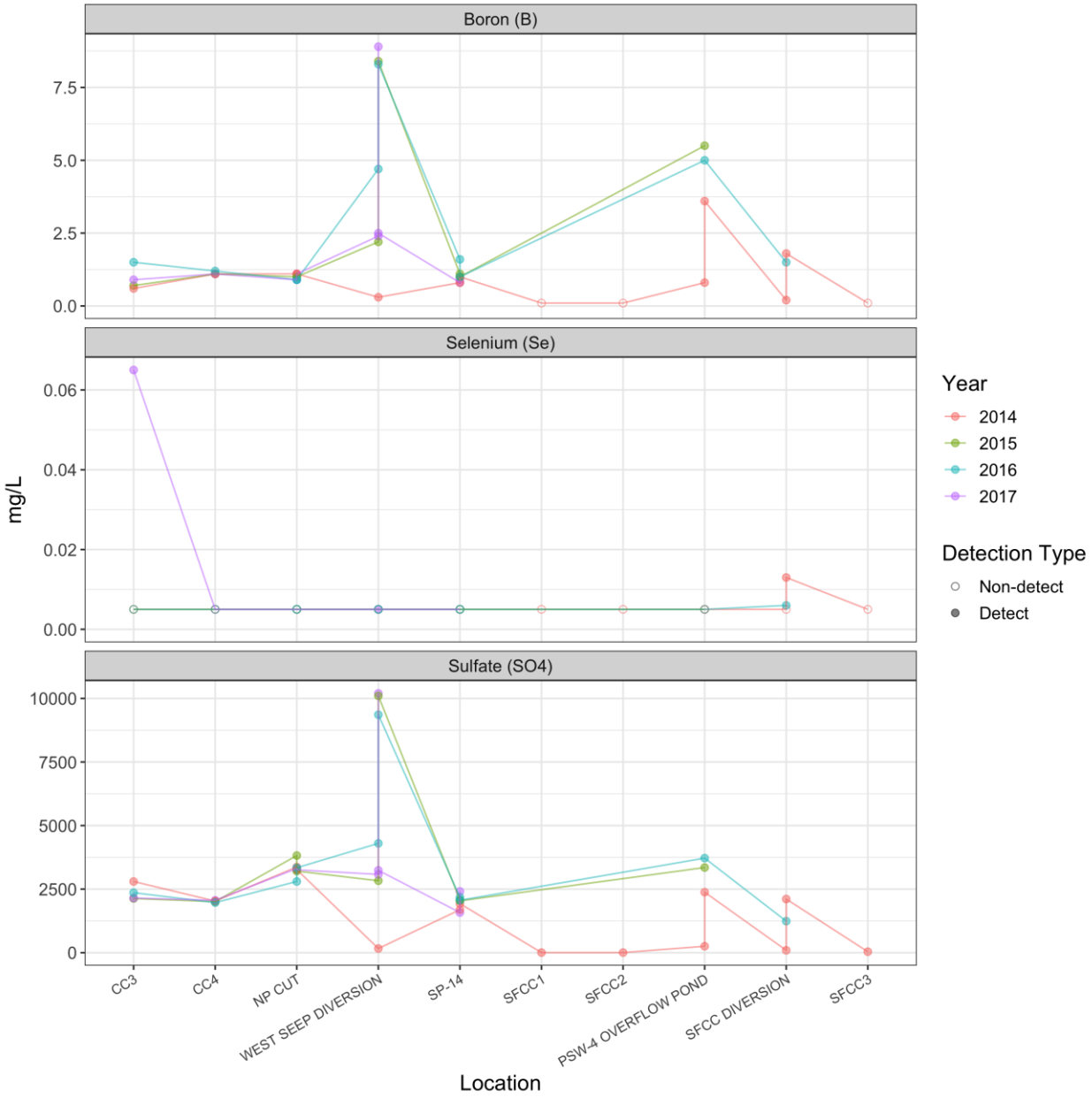


Figure D-2.5. Surface water dissolved concentrations (mg/L) from 2014, 2015, 2016, and 2017 for each sampling location for all data available for boron, selenium, and sulfate. Boron is the only COPC for human health. Boron, selenium, and sulfate are all COPCs for the ERA.

Figures D-3: Soil

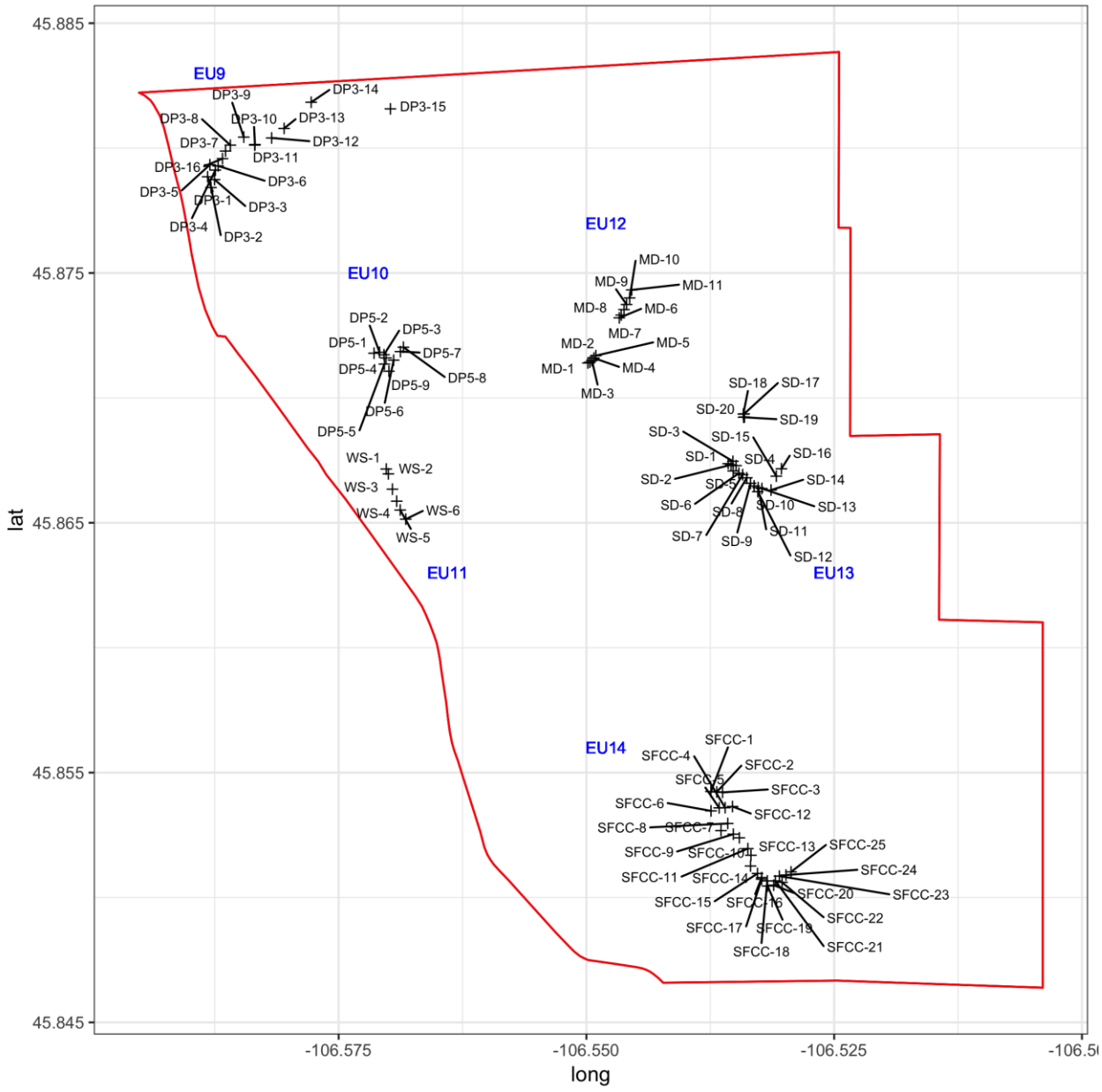


Figure D-3.1. Soil sampling locations in August of 2018 within the Units 3 & 4 EHP AOC Area.

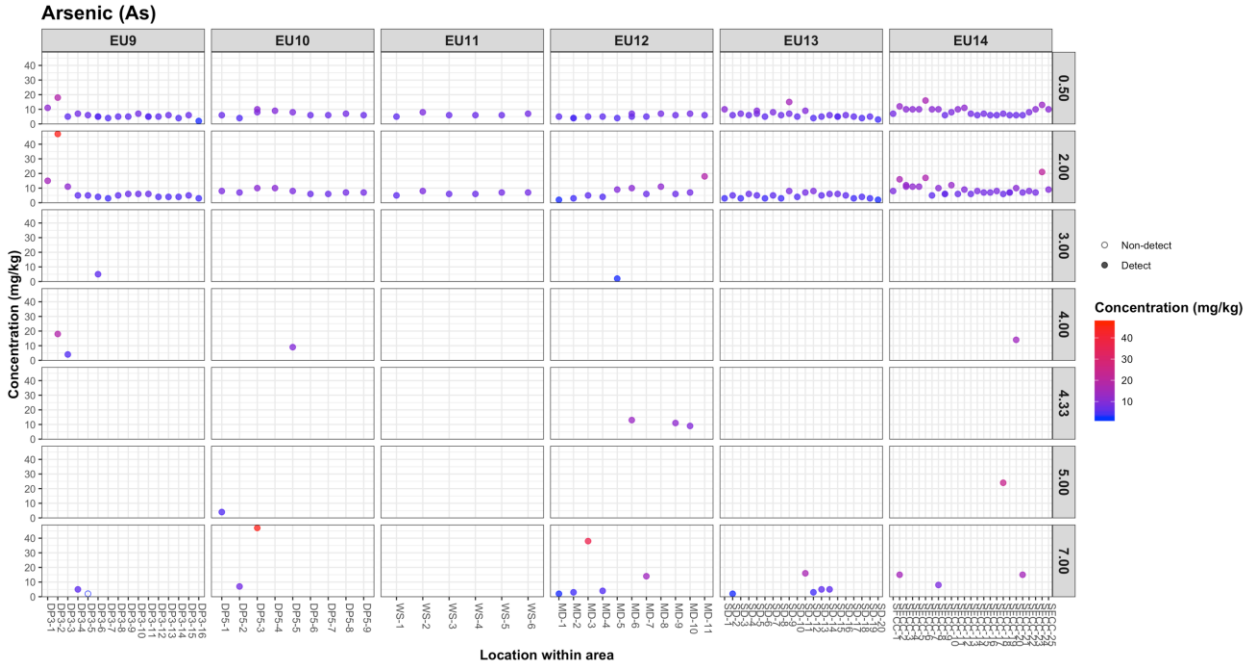


Figure D-3.2. Concentrations of arsenic (mg/kg) displayed by location within area and end depth of the sample, and also colored by where the color blue represents a relatively-low concentration and the color red represents a relatively-high concentration. Observations labeled as "non-detect" in the database are displayed at the RL using an open circle. Both results from field duplicate pairs are included on the plot as separate points. The end depth refers to the maximum depth (in feet) below the surface associated with the sample.

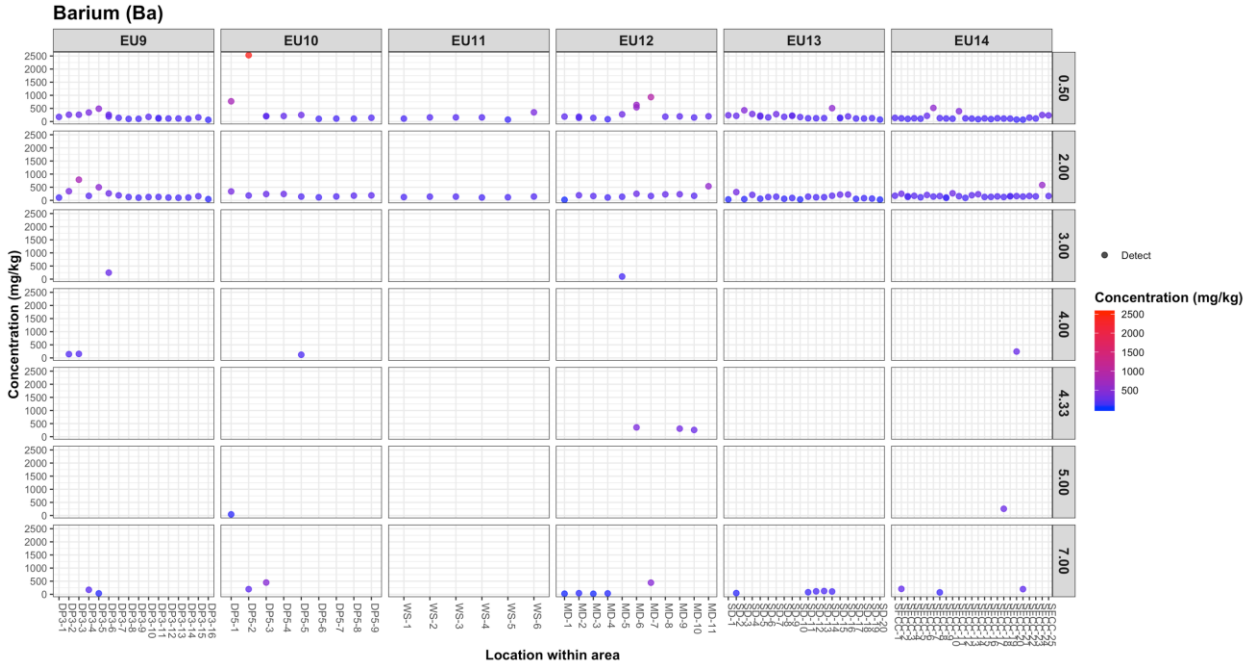


Figure D-3.3. Concentrations of barium (mg/kg) displayed by location within area and end depth of the sample, and also colored by where the color blue represents a relatively-low concentrations and the color red represents a relatively high concentration. Observations labeled as a "non-detect" in the database are displayed at the RL using an open circle. Both results from field duplicate pairs are included on the plot as separate points. The end depth refers to the maximum depth (in feet) below the surface associated with the sample.



Figure D-3.4. Concentrations of cobalt (mg/kg) displayed by location within area and end depth of the sample, and also colored by where the color blue represents a relatively-low concentrations and the color red represents a relatively high concentration. Observations labeled as a "non-detect" in the database are displayed at the RL using an open circle. Both results from field duplicate pairs are included on the plot as separate points. The end depth refers to the maximum depth (in feet) below the surface associated with the sample.

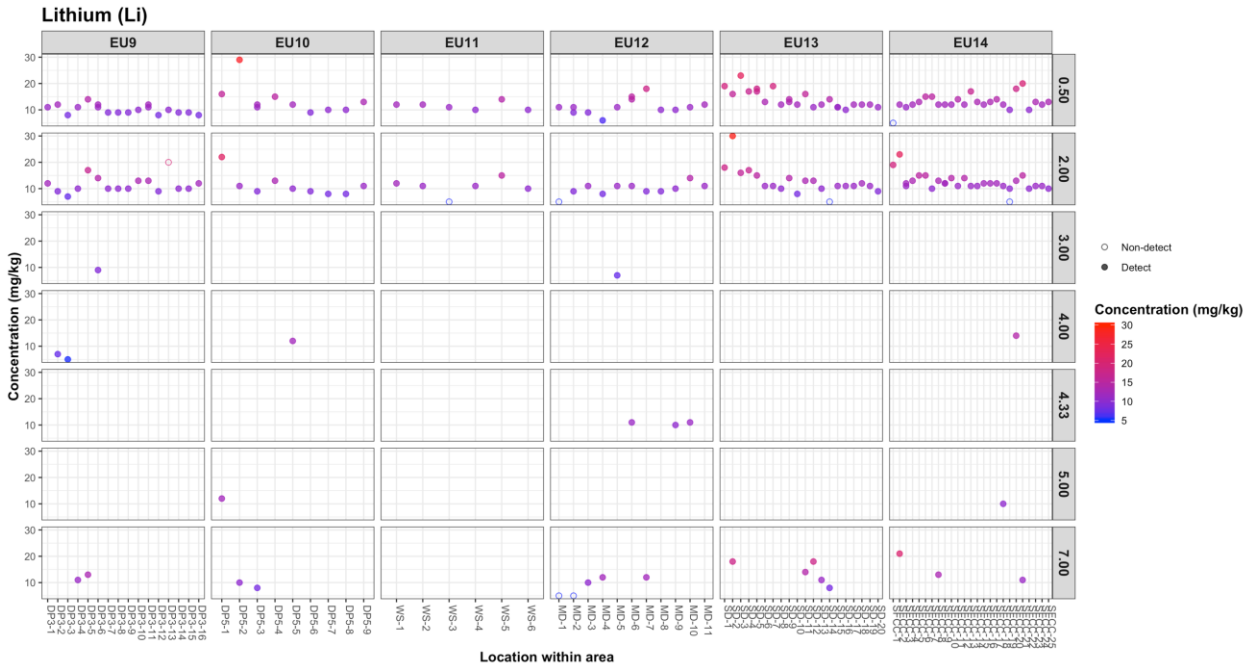


Figure D-3.5. Concentrations of lithium (mg/kg) displayed by location within area and end depth of the sample, and also colored by where the color blue represents a relatively-low concentrations and the color red represents a relatively high concentration. Observations labeled as a "non-detect" in the database are displayed at the RL using an open circle. Both results from field duplicate pairs are included on the plot as separate points. The end depth refers to the maximum depth (in feet) below the surface associated with the sample.

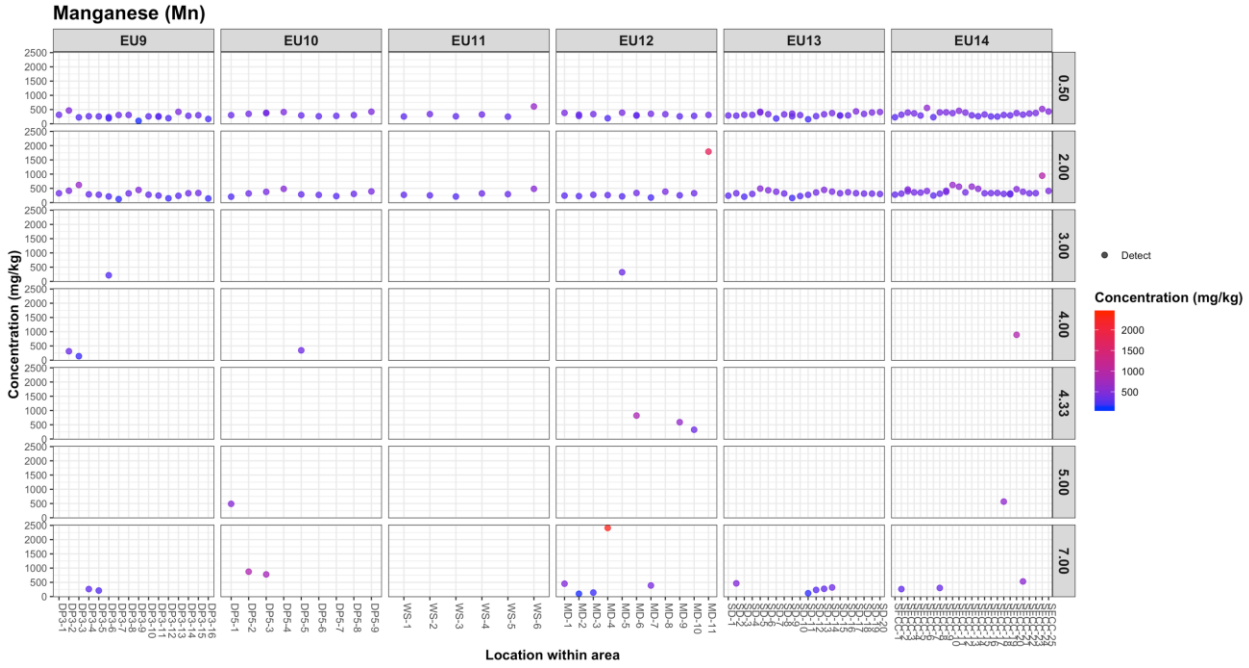


Figure D-3.6. Concentrations of manganese (mg/kg) displayed by location within area and end depth of the sample, and also colored by where the color blue represents a relatively-low concentrations and the color red represents a relatively high concentration. Observations labeled as a "non-detect" in the database are displayed at the RL using an open circle. Both results from field duplicate pairs are included on the plot as separate points. The end depth refers to the maximum depth (in feet) below the surface associated with the sample.



Figure D-3.7. Concentrations of radium-226 (pCi/g) displayed by location within area and end depth of the sample, and also colored by where the color blue represents a relatively-low concentrations and the color red represents a relatively high concentration. Observations labeled as a "non-detect" in the database are displayed at the RL using an open circle. Both results from field duplicate pairs are included on the plot as separate points. The end depth refers to the maximum depth (in feet) below the surface associated with the sample.

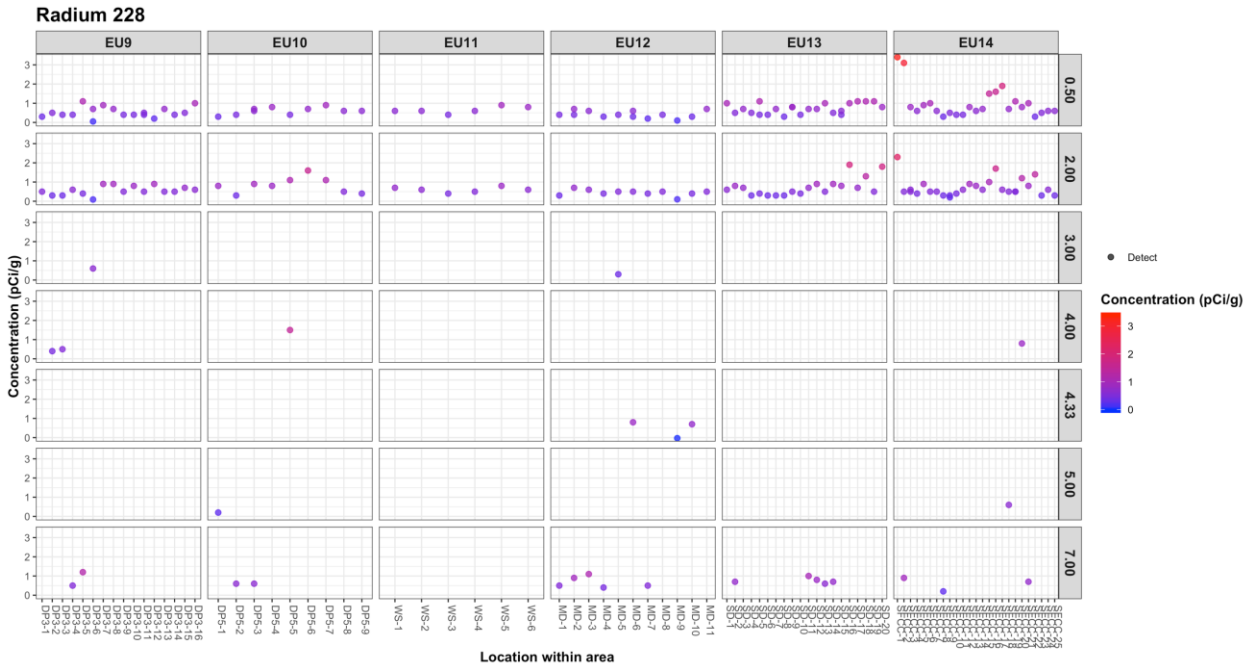


Figure D-3.8. Concentrations of radium-228 (pCi/g) displayed by location within area and end depth of the sample, and also colored by where the color blue represents a relatively-low concentrations and the color red represents a relatively high concentration. Observations labeled as a "non-detect" in the database are displayed at the RL using an open circle. Both results from field duplicate pairs are included on the plot as separate points. The end depth refers to the maximum depth (in feet) below the surface associated with the sample.

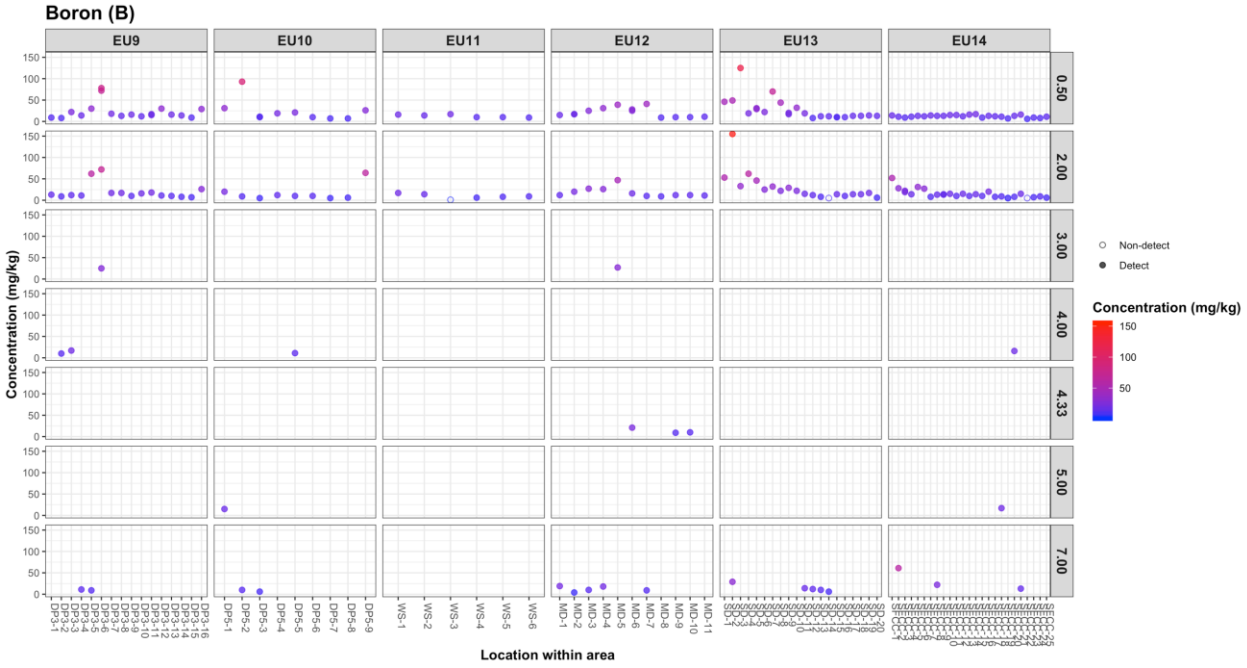


Figure D-3.9. Concentrations of boron (mg/kg) displayed by location within area and end depth of the sample, and also colored by where the color blue represents a relatively-low concentrations and the color red represents a relatively high concentration. Observations labeled as a "non-detect" in the database are displayed at the RL using an open circle. Both results from field duplicate pairs are included on the plot as separate points. The end depth refers to the maximum depth (in feet) below the surface associated with the sample.

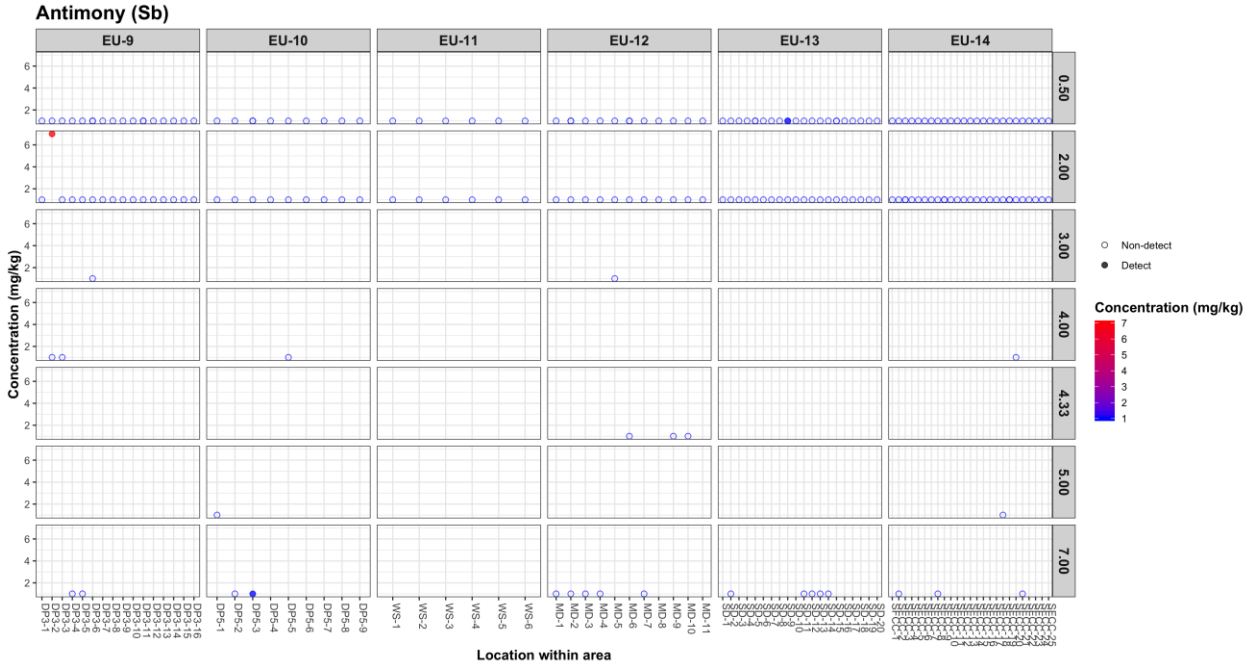


Figure D-3.10. Concentrations of antimony (mg/kg) displayed by location within area and end depth of the sample, and also colored by where the color blue represents a relatively-low concentrations and the color red represents a relatively high concentration. Observations labeled as a "non-detect" in the database are displayed at the RL using an open circle. Both results from field duplicate pairs are included on the plot as separate points. The end depth refers to the maximum depth (in feet) below the surface associated with the sample.

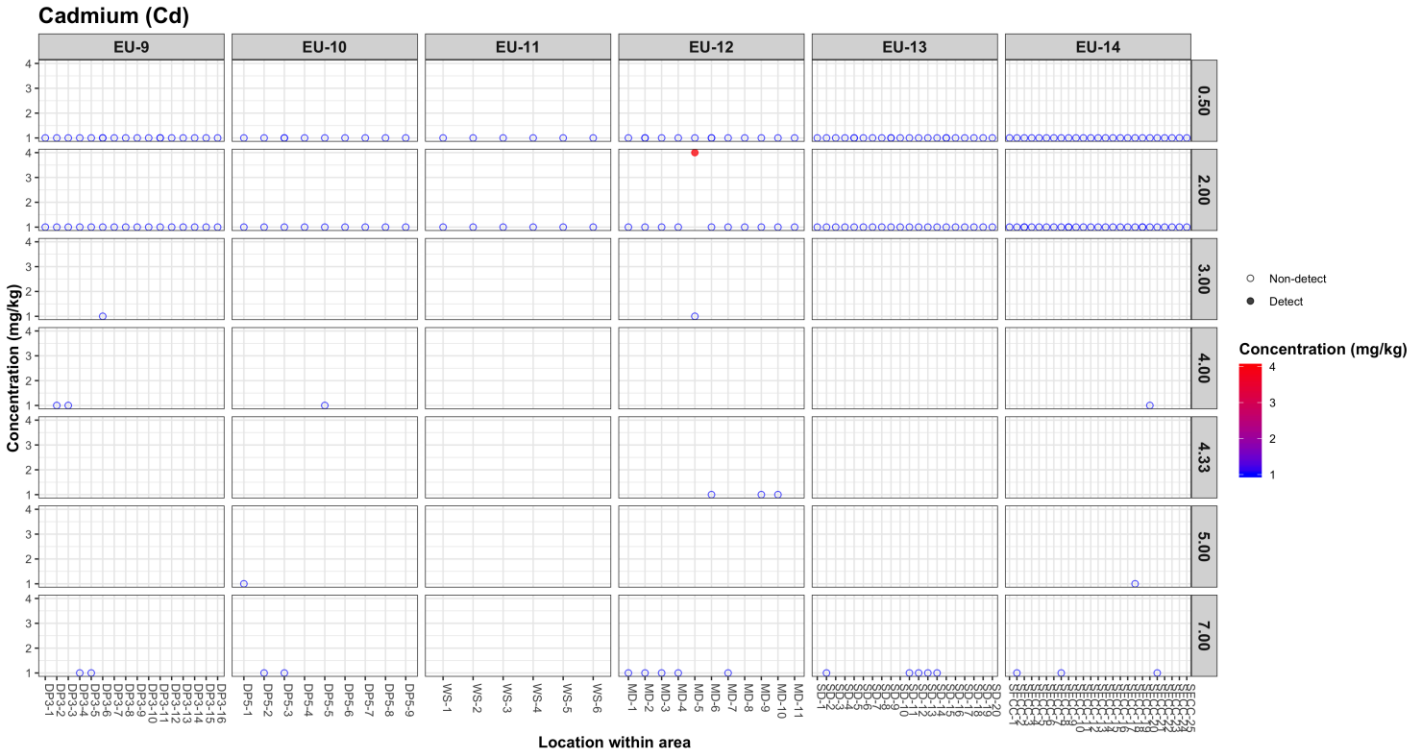


Figure D-3.11. Concentrations of cadmium (mg/kg) displayed by location within area and end depth of the sample, and also colored by where the color blue represents a relatively-low concentrations and the color red represents a relatively high concentration. Observations labeled as a "non-detect" in the database are displayed at the RL using an open circle. Both results from field duplicate pairs are included on the plot as separate points. The end depth refers to the maximum depth (in feet) below the surface associated with the sample.

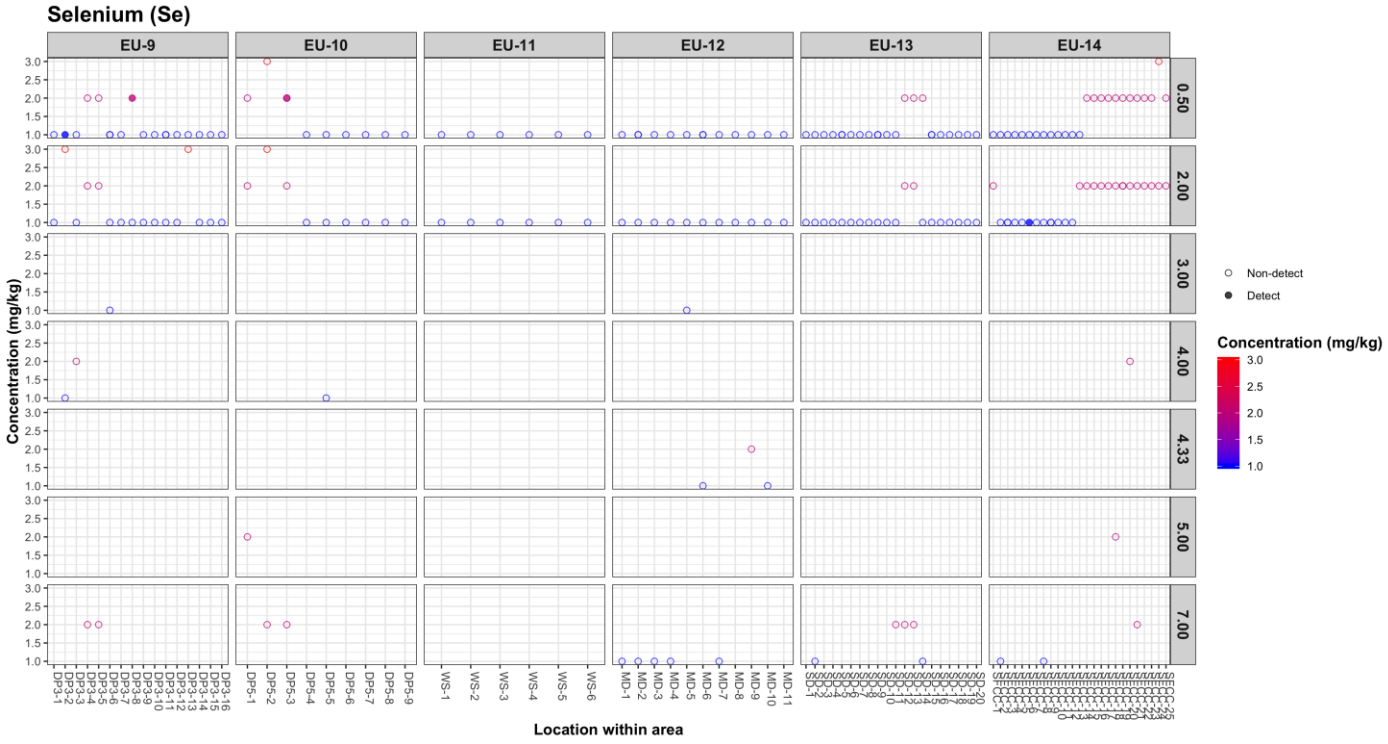


Figure D-3.12. Concentrations of selenium (mg/kg) displayed by location within area and end depth of the sample, and also colored by where the color blue represents a relatively-low concentrations and the color red represents a relatively high concentration. Observations labeled as a "non-detect" in the database are displayed at the RL using an open circle. Both results from field duplicate pairs are included on the plot as separate points. The end depth refers to the maximum depth (in feet) below the surface associated with the sample.

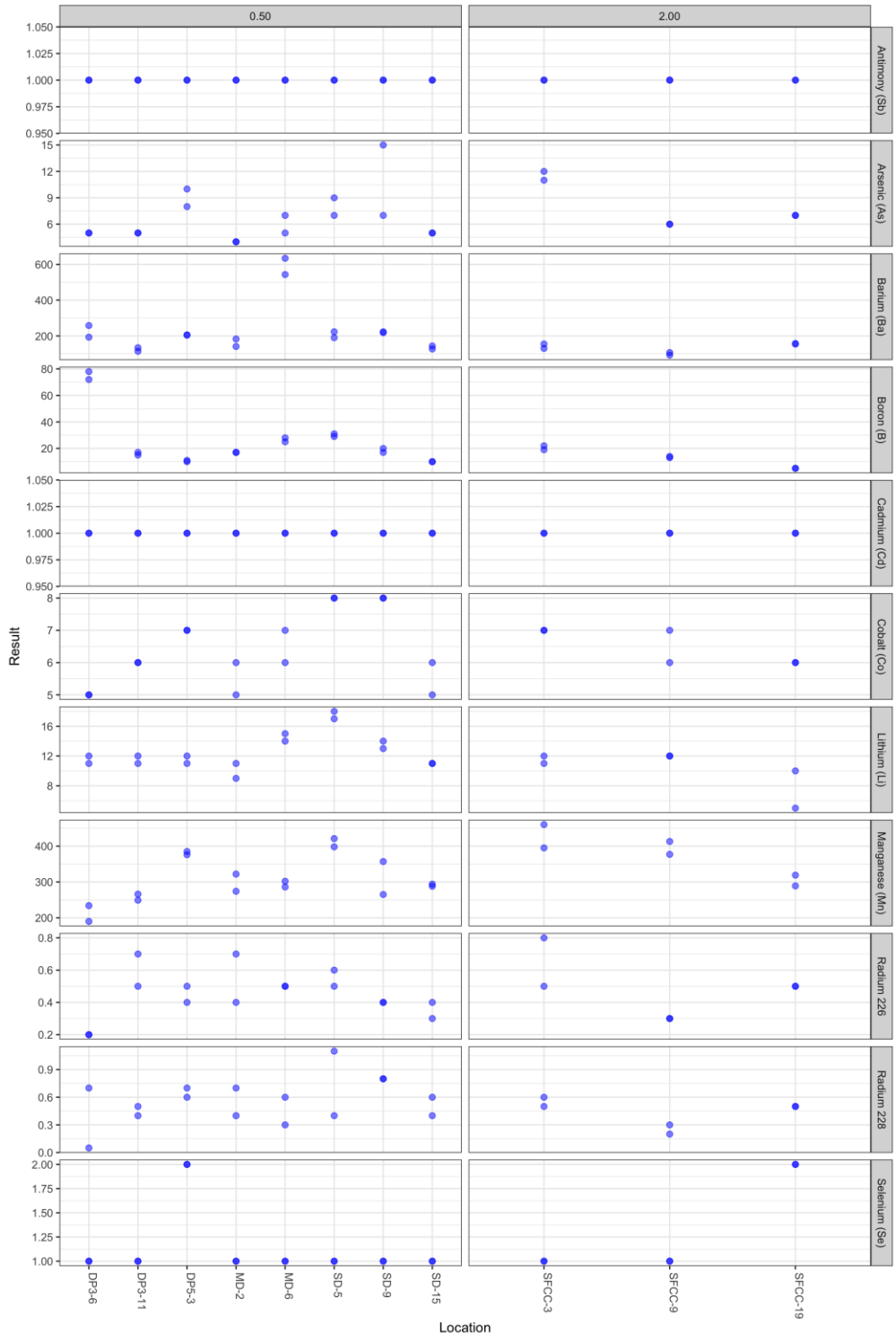


Figure D-3.13. Concentrations of field duplicate pairs for each analyte by end depth and sampling location in soil for the Units 3 & 4 EHP AOC Area. Concentrations of radium-226 and radium-228 are in pCi/g; all other concentrations are in mg/kg. One darker blue circle represents two nearly equal concentrations.

APPENDIX E

Data Used in the Risk Assessment

Table E-1
Colstrip 3&4 EHP AOC Area
Surface Water Data Used in the HHRA
2014 through 2017

Sample Location	Date	B (DIS) mg/L	B (TOT) mg/L	Hg (DIS) mg/L	Hg (TOT) mg/L	Se (DIS) mg/L	Se (TOT) mg/L	Ca (DIS) mg/L	Mg (DIS) mg/L	Cl mg/L	Sulfate mg/L	pH (Field) std units	TDS mg/L
CC3	3/18/2014	0.6	0.6	<0.001	<0.0001	<0.005	<0.005	385	437	26	2800	7.78	4340
CC3	4/10/2015	0.7	NA	NA	NA	<0.005	NA	378	312	21	2130	NA	3330
CC3	5/19/2016	1.5	NA	NA	NA	<0.005	NA	467	310	6	2360	NA	3740
CC3	5/2/2017	0.9	NA	NA	NA	0.065	NA	432	326	11	2150	NA	3340
CC4	3/18/2014	1.1	1.1	<0.001	<0.0001	<0.005	<0.005	355	286	20	2030	7.62	3160
CC4	4/10/2015	1.1	NA	NA	NA	<0.005	NA	349	292	20	2010	NA	3170
CC4	5/19/2016	1.2	NA	NA	NA	<0.005	NA	324	274	14	1970	NA	3070
CC4	5/2/2017	1.1	NA	NA	NA	<0.005	NA	342	278	15	2060	NA	2800
NP CUT	6/19/2014	1.1	NA	NA	NA	<0.005	NA	467	577	57	3370	NA	4920
NP CUT	8/28/2014	1.1	NA	NA	NA	<0.005	NA	492	606	66	3270	NA	5240
NP CUT	5/12/2015	1	NA	NA	NA	<0.005	NA	533	668	68	3820	NA	5250
NP CUT	9/30/2015	1.0	NA	NA	NA	<0.005	NA	493	638	66	3210	NA	5160
NP CUT	5/25/2016	0.9	NA	NA	NA	<0.005	NA	399	518	49	2800	NA	4620
NP CUT	10/18/2016	0.9	NA	NA	NA	<0.005	NA	421	602	61	3340	NA	4910
NP CUT	5/2/2017	0.9	NA	NA	NA	<0.005	NA	480	592	57	3310	NA	5110
NP CUT	10/3/2017	1.1	NA	NA	NA	<0.005	NA	409	544	66	3260	NA	4790
PSW-4 OVERFLOW POND	3/5/2014	0.8	NA	NA	NA	<0.005	NA	78	39	30	253	7.66	706
PSW-4 OVERFLOW POND	6/3/2014	3.6	NA	NA	NA	<0.005	NA	418	393	41	2380	7.99	3760
PSW-4 OVERFLOW POND	3/30/2015	5.5	NA	NA	NA	<0.005	NA	434	568	81	3350	NA	5300
PSW-4 OVERFLOW POND	5/16/2016	5.0	NA	NA	NA	<0.005	NA	491	636	58	3720	NA	5870
SFCC DIVERSION	3/5/2014	0.2	NA	NA	NA	<0.005	NA	20	14	3	93	7.65	186
SFCC DIVERSION	6/3/2014	1.8	NA	NA	NA	0.013	NA	173	327	32	2110	8.4	2880
SFCC DIVERSION	5/17/2016	1.5	NA	NA	NA	0.006	NA	298	98	10	1240	NA	1830
SFCC1	3/5/2014	<0.1	<0.1	NA	< 0.0001	<0.005	<0.005	6	3	2	4	NA	81
SFCC2	3/5/2014	<0.1	<0.1	NA	< 0.0001	<0.005	<0.005	5	2	1	4	NA	68
SFCC3	3/5/2014	<0.1	<0.1	NA	< 0.0001	<0.005	<0.005	15	6	2	39	NA	125
SP-14	6/9/2014	0.8	NA	NA	NA	<0.005	NA	153	139	9	1690	NA	2690
SP-14	8/28/2014	1.0	NA	NA	NA	<0.005	NA	174	142	15	1930	NA	3230
SP-14	5/4/2015	1.1	NA	NA	NA	<0.005	NA	200	173	23	2080	NA	3380
SP-14	9/21/2015	1.0	NA	NA	NA	<0.005	NA	115	170	31	2040	NA	3330
SP-14	5/9/2016	1.6	NA	NA	NA	<0.005	NA	245	201	6	2180	NA	3610
SP-14	9/22/2016	1.0	NA	NA	NA	<0.005	NA	146	172	22	2060	NA	3420
SP-14	5/2/2017	0.8	NA	NA	NA	<0.005	NA	125	125	8	1580	NA	2590
SP-14	10/11/2017	0.9	NA	NA	NA	<0.005	NA	190	180	19	2410	NA	3690
WEST SEEP DIVERSION	3/5/2014	0.3	NA	NA	NA	<0.005	NA	65	19	4	164	8.1	375
WEST SEEP DIVERSION	3/31/2015	2.2	NA	NA	NA	<0.005	NA	323	470	39	2830	NA	4230
WEST SEEP DIVERSION	9/10/2015	8.4	NA	NA	NA	<0.005	NA	260	2000	168	10100	8.6	11100
WEST SEEP DIVERSION	5/25/2016	4.7	NA	NA	NA	<0.005	NA	462	761	66	4300	7.8	6500
WEST SEEP DIVERSION	10/19/2016	8.3	NA	NA	NA	<0.005	NA	106	2040	182	9360	NA	11300
WEST SEEP DIVERSION	4/26/2017	2.5	NA	NA	NA	<0.005	NA	493	493	35	3240	NA	4390
WEST SEEP DIVERSION	4/26/2017	2.4	NA	NA	NA	<0.005	NA	481	477	34	3080	NA	4620
WEST SEEP DIVERSION	9/12/2017	8.9	NA	NA	NA	0.005	NA	152	2060	215	10200	NA	11500

Notes:

DIS	
mg/L	milligrams per liter
NA	Not Analyzed/Not Available
TDS	Total Dissolved Solids
TOT	Total Recoverable concentration

Table E-2
Colstrip 3&4 EHP AOC Area
Private Stock Well Data Used in the HHRA (Total Metals)
2014 through 2017

Sample Location	Date	B mg/L	Hg mg/L	Se mg/L	Ca (DIS) mg/L	Mg (DIS) mg/L	Cl mg/L	Sulfate mg/L	pH (Field) std units	TDS mg/L
PSW-1	6/19/2014	0.7	NA	<0.005	46	28	13	1020	NA	1770
PSW-1	5/12/2015	0.5	NA	<0.005	44	27	12	1020	NA	1760
PSW-1	4/25/2017	0.6	NA	<0.005	43	26	12	968	NA	1720
PSW-2	3/31/2015	1.6	NA	<0.005	388	501	66	2700	NA	4290
PSW-2	10/13/2017	1.4	NA	<0.005	327	420	62	2620	NA	3870
PSW-2	5/2/2017	1.3	NA	<0.005	345	455	69	2780	NA	4020
PSW-3	5/29/2014	0.6	NA	<0.005	88	55	10	1180	NA	2160
PSW-3	5/8/2015	0.4	NA	<0.005	94	57	11	1220	NA	2170
PSW-3	4/25/2017	0.4	NA	<0.005	92	54	8	1250	NA	2140
PSW-4A	10/2/2015	1.9	NA	<0.005	472	319	36	2230	NA	3550
PSW-4A	3/27/2015	2.1	NA	<0.005	442	308	34	2260	NA	3630
PSW-4A	10/12/2016	1.8	NA	0.009	447	304	33	2330	NA	3640
PSW-4A	5/16/2016	1.7	NA	<0.005	442	304	29	2290	NA	3460
PSW-4A	10/27/2017	1.7	NA	0.089	462	309	39	2440	NA	3580
PSW-4A	5/2/2017	1.7	NA	<0.005	469	323	37	2480	NA	3730
PSW-4A	6/3/2014	2	NA	<0.005	465	331	29	2360	7.3	3560
PSW-4A	7/30/2014	2.03	NA	0.0014	490	332	28.4	2440	7.09	3580
PSW-4A	7/30/2014	2.04	NA	0.0011	500	339	28.7	2420	NA	3670
PSW-4A	12/3/2014	1.95	NA	0.0006	458	308	29	2380	NA	3500
PSW-6	5/13/2015	0.5	NA	<0.005	57	35	18	1310	NA	2130
PSW-6	5/16/2016	0.5	NA	<0.005	54	32	7	1290	NA	2230
PSW-6	5/2/2017	0.5	NA	<0.005	55	33	7	1390	NA	2190
PSW-7	6/12/2014	0.3	NA	0.007	13	5	10	732	NA	1560
PSW-7	5/12/2015	0.3	NA	<0.005	15	5	9	721	NA	1550
PSW-7	5/2/2017	0.3	NA	<0.005	15	5	10	747	NA	1530
PSW-9	5/6/2015	0.7	NA	<0.005	52	46	12	992	NA	1690
PSW-9	5/2/2017	0.3	NA	<0.005	18	8	15	865	NA	1600
PSW-11	9/9/2014	0.24	< 0.0001	<0.0007	12	3.5	19.3	997	8.1	1830

Notes:

DIS	Dissolved concentration
mg/L	milligrams per liter
NA	Not Analyzed/Not Available
TDS	Total Dissolved Solids

Table E-3
Colstrip Units 3&4 EHP AOC Area, EU9
Drain Pit 3 - Soil Sampling Results Data Used in the HHRA
2018

Sample Location	Sample Depth	Date	Sb mg/kg	As mg/kg	Ba mg/kg	Be mg/kg	B mg/kg	Cd mg/kg	Cr mg/kg	Co mg/kg	Pb mg/kg	Li mg/kg	Mn mg/kg	Hg mg/kg	Mo mg/kg	Se mg/kg	Tl mg/kg	Ra 226 pCi/g	Ra 228 pCi/g	pH std units	Ca meq/L sat paste	Mg meq/L sat paste	Cl mg/L sat paste	Sulfate mg/L sat paste	F mg/L sat paste
DP3-1	0-6 in	5/7/2018	< 1	11 D	175	< 1	9	< 1	15	7	11	11 D	315	< 1	1	0.6 D	< 1	0.5	0.3 U	7.2	5.76	3.91	55	96	< 1 D
DP3-1	12-24 in	5/7/2018	< 1	15 D	103	< 1	13	< 1	15	7	12	12 D	328	< 1	2	0.6 D	< 1	0.7	0.5	7.4	29.7	26.1	568	2,290 D	< 5 D
DP3-2	0-6 in	5/7/2018	< 1	18 D	259	< 1	8	< 1	15	6	9	12 D	467	< 1	1	1.1 D	< 1	0.5	0.5	7.6	2.56	2.13	14	37	< 0.5 D
DP3-2	12-24 in	5/7/2018	7	47 D	347	< 1	9	< 1	20	7	13	9 D	416	< 1	2	0.5 D	< 1	0.4	0.3	7.5	3.56	3.36	20	132	< 1 D
DP3-2	36-48 in	5/7/2018	< 1	18 D	143	< 1	10	< 1	11	6	7	7 D	313	< 1	6	< 0.5 D	< 1	0.6	0.4	7.4	18	38.6	246	2,910 D	< 5 D
DP3-3	0-6 in	5/7/2018	< 1	5 D	259	< 1	22	< 1	9	4	8	8 D	226	< 1	2	0.6 D	< 1	0.5	0.4	7.5	11.7	23.2	47	1,830 D	< 2 D
DP3-3	12-24 in	5/7/2018	< 1	11 D	787	< 1	12	< 1	14	6	10	7 D	619	< 1	3	< 0.5 D	< 1	0.5	0.3	7.5	21.6	68.6	315 D	4,850 D	< 10 D
DP3-3	36-48 in	5/7/2018	< 1	4	153	< 1	17	< 1	6	3	6	5.0 D	141	< 1	5	< 2 D	< 1	0.7	0.5	7.4	16.4	59.5	133	4,340 D	< 5 D
DP3-4	0-6 in	5/7/2018	< 1	7 D	345	< 1	14	< 1	12	6	12	11 D	264	< 1	1	< 2 D	< 1	0.6	0.4	7.7	2.98	1.62	5	41	0.6 D
DP3-4	12-24 in	5/7/2018	< 1	5 D	170	< 1	11	< 1	12	5	9	10 D	290	< 1	1	< 0.5 D	< 1	0.4	0.6	7.3	2.18	2.44	3	63	1.6 D
DP3-4	72-84 in	5/7/2018	< 1	5	171	< 1	11	< 1	14	6	10	11 D	263	< 1	< 1	< 0.5 D	< 1	0.5	0.5	7.8	2.43	3.49	3	214	0.7 D
DP3-5	0-6 in	5/7/2018	< 1	6	489	< 1	30	< 1	13	6	11	14 D	259	< 1	1	<0.5 D	< 1	0.4	1.1	7.6	27.1	16.3	6	2,270 D	< 5 D
DP3-5	12-24 in	5/7/2018	< 1	5 D	498	< 1	62	< 1	13	5	10	17 D	276	< 1	2	< 2 D	< 1	0.1	0.4	7.7	24.5	44.8	18	3,910 D	< 5 D
DP3-5	72-84 in	5/7/2018	< 1	< 2 D	35	< 1	9	< 1	14	9	17	13 D	211	< 1	< 1	< 2 D	< 1	0.7	1.2	7.8	23.6	57	103	4,280 D	< 5 D
DP3-6	0-6 in	5/7/2018	< 1	5	258	< 1	78	< 1	13	5	9	12 D	234	< 1	1	0.6 D	< 1	0.2	0.05 U	8	22.2	81.5	29 D	5,960 D	< 10 D
DP3-6	12-24 in	5/7/2018	< 1	4	265	< 1	72	< 1	11	4	8	14 D	216	< 1	2	0.7 D	< 1	0.2	0.09 U	7.6	20.9	68.2	109 D	5,470 D	< 10 D
DP3-6	30-36 in	5/8/2018	< 1	5	246	< 1	25	< 1	12	4	8	9 D	215	< 1	1	< 0.5 D	< 1	0.4	0.6	7.5	22.4	56.2	125 D	4,450 D	< 10 D
DP3-6	0-6 in	5/7/2018	< 1	5	193	< 1	72	< 1	13	5	9	11 D	190	< 1	1	0.5 D	< 1	0.2	0.7	8	22.3	83	27 D	5,740 D	< 10 D
DP3-7	0-6 in	5/8/2018	< 1	4	140	< 1	18	< 1	14	6	9	9 D	307	< 1	< 1	< 0.5 D	< 1	0.6	0.9	7.9	16	53.7	154	3,800 D	< 5 D
DP3-7	12-24 in	5/8/2018	< 1	3	189	< 1	17	< 1	13	4	8	10 D	122	< 1	1	< 0.5 D	< 1	0.5	0.9	8	19.9	50.1	128 D	4,490 D	< 10 D
DP3-8	0-6 in	5/8/2018	< 1	5	101	< 1	13	< 1	13	7	11	9 D	311	< 1	< 1	< 1	< 1	0.5	0.7	7.7	19.8	23.1	64	2,900 D	< 5 D
DP3-8	12-24 in	5/8/2018	< 1	5	125	< 1	17	< 1	14	6	11	10 D	323	< 1	< 1	< 1	< 1	0.5	0.9	7.9	23.6	49.5	81	3,940 D	< 5 D
DP3-9	0-6 in	5/8/2018	< 1	5	104	< 1	16	< 1	12	4	8	9 D	102	< 1	< 1	< 1	< 1	0.5	0.4 U	7.5	19	41.3	131	2,840 D	< 5 D
DP3-9	12-24 in	5/8/2018	< 1	6	101	< 1	10	< 1	16	7	10	10 D	443	< 1	< 1	< 0.5 D	< 1	0.5	0.5	7.7	17	34	109	2,520 D	< 5 D
DP3-10	0-6 in	5/8/2018	< 1	7	177	< 1	12	< 1	14	5	10	10 D	260	< 1	< 1	< 0.5 D	< 1	0.5	0.4 U	7.6	17.9	26.3	64	2,180 D	< 5 D
DP3-10	12-24 in	5/8/2018	< 1	6	125	< 1	16	< 1	19	7	14	13 D	277	< 1	1	< 0.5 D	< 1	0.7	0.8	7.6	22.1	55.4	121	4,330 D	< 5 D
DP3-11	0-6 in	5/8/2018	< 1	5	134	< 1	17	< 1	17	6	12	12 D	249	< 1	< 1	< 1	< 1	0.5	0.4	7.3	24	41.2	105	3,220 D	< 5 D
DP3-11	0-6 in	5/8/2018	< 1	5	114	< 1	15	< 1	15	6	10	11 D	266	< 1	< 1	< 1	< 1	0.7	0.5	7.3	25.7	44.9	109	3,290 D	< 5 D
DP3-11	12-24 in	5/8/2018	< 1	6	128	< 1	18	< 1	21	7	16	13 D	247	< 1	1	< 0.5 D	< 1	0.8	0.5	7.6	22.1	60.3	122 D	4,730 D	< 10 D
DP3-12	0-6 in	5/8/2018	< 1	5	115	< 1	30	< 1	10	4	8	8 D	197	< 1	< 1	< 0.5 D	< 1	0.3	0.2 U	7.6	24.4	73.9	155 D	5,230 D	< 10 D
DP3-12	12-24 in	5/8/2018	< 1	4	105	< 1	11	< 1	14	5	8	9 D	149	< 1	< 1	< 0.5 D	< 1	0.4	0.9	7.5	20.9	51	114 D	4,580 D	< 10 D
DP3-13	0-6 in	5/8/2018	< 1	6	116	< 1	16	< 1	14	6	11	10 D	419	< 1	< 1	< 0.5 D	< 1	0.4	0.7	7.6	26.2	33.6	127	3,130 D	< 5 D
DP3-13	12-24 in	5/8/2018	< 1	4 D	98	< 1	10 D	< 1	12	5	7	< 20 D	239	< 1	< 1	< 3 D	< 1	0.4	0.5	7.8	26.7	68.1	154 D	4,530 D	< 10 D
DP3-14	0-6 in	5/8/2018	< 1	4	105	< 1	14	< 1	13	5	10	9 D	281	< 1	< 1	< 0.5 D	< 1	0.4	0.4 U	7.5	16.4	30.5	122	2,900 D	< 5 D
DP3-14	12-24 in	5/8/2018	< 1	4	106	< 1	8	< 1	15	6	9	10 D	328	< 1	< 1	< 0.5 D	< 1	0.4	0.5	7.8	14.4	30.1	113	2,690 D	< 5 D
DP3-15	0-6 in	5/8/2018	< 1	6	158	< 1	9	< 1	14	6	12	9 D	302	< 1	< 1	< 0.5 D	< 1	0.4	0.5	7.6	3.23	1.32	8	44	< 1 D
DP3-15	12-24 in	5/8/2018	< 1	5	156	< 1	7	< 1	16	7	12	10 D	337	< 1	< 1	< 0.5 D	< 1	0.6	0.7	7.6	2.48	1.17	4	50	< 0.5 D
DP3-16	0-6 in	5/8/2018	< 1	2	65	< 1	29	< 1	15	5	9	8 D	169	< 1	< 1	< 0.5 D	< 1	0.4	1	8.4	22.6 D	324	568 D	20,400 D	< 20 D
DP3-16	12-24 in	5/8/2018	< 1	3	46	< 1	26	< 1	17	7	12	12 D	143	< 1	< 1	< 0.5 D	< 1	0.4	0.6	8.4	22.7 D	349	764 D	21,700 D	< 20 D

Notes:

mg/kg	milligram per kilogram
meq/L	milliequivalent per liter
pCi/g	picoCurie per gram
sat paste	saturated paste
NA	Not Analyzed/Not Available
D	Laboratory Reporting Limit Increased Due to Sample Matrix
U	Not Detected At Minimum Detected Concentration

Table E-4
Colstrip Units 3&4 EHP AOC Area, EU10
Drain Pit 5 - Soil Sampling Results Data Used in the HHRA
2018

Sample Location	Sample Depth	Date	Sb mg/kg	As mg/kg	Ba mg/kg	Be mg/kg	B mg/kg	Cd mg/kg	Cr mg/kg	Co mg/kg	Pb mg/kg	Li mg/kg	Mn mg/kg	Hg mg/kg	Mo mg/kg	Se mg/kg	Tl mg/kg	Ra 226 pCi/g	Ra 228 pCi/g	pH std units	Ca meq/L sat paste	Mg meq/L sat paste	Cl mg/L sat paste	Sulfate mg/L sat paste	F mg/L sat paste
DP5-1	0-6 in	5/7/2018	< 1	6 D	772	< 1	31	< 1	11	6	10	16 D	304	< 1	1	< 2 D	< 1	0.5	0.3	7.7	3.55	1.4	7	130	0.6 D
DP5-1	12-24 in	5/7/2018	< 1	8 D	340	< 1	20	< 1	14	7	13	22 D	206	< 1	1	< 2 D	< 1	0.6	0.8	7.4	26.4	7.74	4	1,750 D	< 2 D
DP5-1	48-60 in	5/7/2018	< 1	4 D	43	< 1	15	< 1	13	10	13	12 D	489	< 1	1	< 2 D	< 1	0.4	0.2 U	7.6	27	20.7	12	2,550 D	< 5 D
DP5-2	0-6 in	5/7/2018	< 1	4 D	2,530	< 1	93	< 1	11	5	9	29 D	349	< 1	1	< 0.5 D	< 1	0.4	0.4	7.9	4.58	3.13	6	321	< 1 D
DP5-2	12-24 in	5/7/2018	< 1	7 D	183	< 1	9	< 1	12	7	10	11 D	321	< 1	< 1	0.6 D	< 1	0.5	0.3 U	7.8	12.6	20.3	41	1,960 D	< 5 D
DP5-2	72-84 in	5/7/2018	< 1	7 D	196	< 1	10	< 1	12	7	10	10 D	874	< 1	< 1	< 0.5 D	< 1	0.5	0.6	8.2	21.7	77.6	198 D	8,680 D	< 10 D
DP5-3	0-6 in	5/7/2018	< 1	8 D	206	< 1	10	< 1	13	7	13	11 D	376	< 1	< 1	0.5 D	< 1	0.4	0.7	7.4	4.28	2.31	5	124	< 0.5 D
DP5-3	12-24 in	5/7/2018	< 1	10 D	239	< 1	5	< 1	12	7	12	9 D	377	< 1	< 1	< 0.5 D	< 1	0.4	0.9	7.6	2.49	2.08	4	72	< 0.5 D
DP5-3	72-84 in	5/7/2018	1	47 D	449	< 1	6	< 1	14	15	25	8 D	778	< 1	4	1.3 D	< 1	0.4	0.6	7.9	1.67	2.76	4	116	0.7 D
DP5-3	0-6 in	5/7/2018	< 1	10	204	< 1	11	< 1	15	7	14	12 D	385	< 1	1	2.2 D	< 1	0.5	0.6	7.1	4.44	2.25	5	102	< 0.5 D
DP5-4	0-6 in	5/7/2018	< 1	9	210	< 1	19	< 1	18	7	15	15 D	412	< 1	1	0.8 D	< 1	0.6	0.8	7.4	3.1	1.73	5	54	1.2 D
DP5-4	12-24 in	5/7/2018	< 1	10	241	< 1	12	< 1	18	8	15	13 D	482	< 1	< 1	0.5 D	< 1	0.6	0.8	7.4	3.12	1.13	6	92	0.6 D
DP5-5	0-6 in	5/7/2018	< 1	8	249	< 1	21	< 1	12	6	10	12 D	295	< 1	< 1	< 0.5 D	< 1	0.4	0.4	7.6	26.7	24.6	32	2,690 D	< 5 D
DP5-5	12-24 in	5/7/2018	< 1	8	142	< 1	10	< 1	12	6	11	10 D	287	< 1	< 1	< 0.5 D	< 1	0.5	1.1	7.5	26.5	36.1	84	3,250 D	< 5 D
DP5-5	36-48 in	5/7/2018	< 1	9	121	< 1	11	< 1	16	8	14	12 D	346	< 1	< 1	< 0.5 D	< 1	0.3	1.5	7.6	23.5	54.9	72	4,280 D	< 5 D
DP5-6	0-6 in	5/7/2018	< 1	6	103	< 1	10	< 1	12	5	10	9 D	265	< 1	< 1	< 0.5 D	< 1	0.4	0.7	7.6	26.5	24.3	14	2,610 D	< 5 D
DP5-6	12-24 in	5/7/2018	< 1	6	114	< 1	10	< 1	11	6	9	9 D	270	< 1	< 1	< 0.5 D	< 1	0.5	1.6	7.8	25.7	38.9	37	3,400 D	< 5 D
DP5-7	0-6 in	5/7/2018	< 1	6	112	< 1	7	< 1	12	6	10	10 D	278	< 1	< 1	< 0.5 D	< 1	0.4	0.9	7.7	11.4	16.5	27	1,700 D	< 2 D
DP5-7	12-24 in	5/7/2018	< 1	6	146	< 1	5	< 1	10	5	9	8 D	227	< 1	< 1	< 0.5 D	< 1	0.3	1.1	7.7	19.9	27	37	2,520 D	< 5 D
DP5-8	0-6 in	5/7/2018	< 1	7	110	< 1	7	< 1	13	6	11	10 D	305	< 1	< 1	< 0.5 D	< 1	0.5	0.6	7.7	28.1	21.5	20	2,430 D	< 5 D
DP5-8	12-24 in	5/7/2018	< 1	7	177	< 1	6	< 1	11	6	9	8 D	305	< 1	< 1	< 0.5 D	< 1	0.6	0.5	7.8	26.3	31.9	47	3,080 D	< 5 D
DP5-9	0-6 in	5/7/2018	< 1	6	143	< 1	26	< 1	17	7	11	13 D	424	< 1	2	< 0.5 D	< 1	0.6	0.6	7.8	6.56	7.02	9	607	5 D
DP5-9	12-24 in	5/7/2018	< 1	7	188	< 1	64	< 1	14	7	11	11 D	393	< 1	1	< 0.5 D	< 1	0.5	0.4	7.9	21.7	74.2	56 D	5,310 D	< 10 D

Notes:

mg/kg	milligram per kilogram
meq/L	milliequivalent per liter
pCi/g	picoCurie per gram
sat paste	saturated paste
NA	Not Analyzed/Not Available
D	Laboratory Reporting Limit Increased Due to Sample Matrix
U	Not Detected At Minimum Detected Concentration

Table E-5
Colstrip Units 3&4 EHP AOC Area, EU11
West Seep - Soil Sampling Results Data Used in the HHRA
2018

Sample Location	Sample Depth	Date	Sb mg/kg	As mg/kg	Ba mg/kg	Be mg/kg	B mg/kg	Cd mg/kg	Cr mg/kg	Co mg/kg	Pb mg/kg	Li mg/kg	Mn mg/kg	Hg mg/kg	Mo mg/kg	Se mg/kg	Tl mg/kg	Ra 226 pCi/g	Ra 228 pCi/g	pH std units	Ca meq/L sat paste	Mg meq/L sat paste	Cl mg/L sat paste	Sulfate mg/L sat paste	F mg/L sat paste
WS-1	0-6 in	5/8/2018	< 1	5	111	< 1	16	< 1	14 D	< 1	< 1	12 D	256	< 1	< 1	< 1	< 1	0.4	0.6	7.7	15.4	11.7	8	1,480 D	< 2 D
WS-1	12-24 in	5/8/2018	< 1	5	123	< 1	17	< 1	14	6	10	12	272	< 1		< 1	< 1	0.5	0.7	7.8	20.7	22.2	12	2,700 D	< 5
WS-2	0-6 in	5/8/2018	< 1	8	157	< 1	14	< 1	17 D	8	12	12 D	341	< 1	< 1	< 1	< 1	0.4	0.6	7.9	3.14	3.45	6	76 D	0.5 D
WS-2	12-24 in	5/8/2018	< 1	8	140	< 1	14	< 1	15 D	7	12	11 D	253	< 1	< 1	< 1	< 1	0.4	0.6	7.8	25.4	38.4	23	3,250 D	< 5 D
WS-3	0-6 in	5/8/2018	< 1	6	157	< 1	17	< 1	14 D	6	11	11 D	263	< 1	< 1	< 1	< 1	0.5	0.4 U	7.7	5.41	1.68	6	122	< 0.5 D
WS-3	12-24 in	5/8/2018	< 1	6	140	< 1	< 1	< 1	13 D	6	11	< 5 D	213	< 1	< 1	< 1	< 1	0.4	0.4 U	7.7	15.8	21.6	24	2,330 D	< 5 D
WS-4	0-6 in	5/8/2018	< 1	6	157	< 1	10	< 1	17 D	7	12	10 D	326	< 1	< 1	< 1	< 1	0.5	0.6	7.6	3.88	1.64	4	32	< 0.5 D
WS-4	12-24 in	5/8/2018	< 1	6	108	< 1	6	< 1	15 D	7	11	11 D	321	< 1	< 1	< 1	< 1	0.4	0.5	7.7	2.25	2.2	5	73	< 0.5 D
WS-5	0-6 in	5/8/2018	< 1	6	73	< 1	10	< 1	20 D	9	16	14 D	249	< 1	1	< 1	< 1	0.6	0.9	7.7	2.98	2.32	6	83	< 0.5 D
WS-5	12-24 in	5/8/2018	< 1	7	116	< 1	8	< 1	21	9	15	15 D	296	< 1	1	< 1	< 1	0.7	0.8	7.6	25.1	25.6	19	2,740 D	< 5 D
WS-6	0-6 in	5/8/2018	< 1	7	352	< 1	9	< 1	16 D	10	13	10 D	608	< 1	< 1	< 1	< 1	0.6	0.8	7.8	2.4	0.79	4	24	< 0.5 D
WS-6	12-24 in	5/8/2018	< 1	7	144	< 1	9	< 1	17	7	15	10 D	483	< 1	< 1	< 1	< 1	0.4	0.6	7.5	3.03	1.22	6	13	< 0.5 D

Notes:

mg/kg	milligram per kilogram
meq/L	milliequivalent per liter
pCi/g	picoCurie per gram
sat paste	saturated paste
NA	Not Analyzed/Not Available
D	Laboratory Reporting Limit Increased Due to Sample Matrix
U	Not Detected At Minimum Detected Concentration

Table E-6
Colstrip Units 3&4 EHP AOC Area, EU12
Main Dam - Soil Sampling Results Data Used in the HHRA
2018

Sample Location	Sample Depth	Date	Sb mg/kg	As mg/kg	Ba mg/kg	Be mg/kg	B mg/kg	Cd mg/kg	Cr mg/kg	Co mg/kg	Pb mg/kg	Li mg/kg	Mn mg/kg	Hg mg/kg	Mo mg/kg	Se mg/kg	Tl mg/kg	Ra 226 pCi/g	Ra 228 pCi/g	pH std units	Ca meq/L sat paste	Mg meq/L sat paste	Cl mg/L sat paste	Sulfate mg/L sat paste	F mg/L sat paste
MD-1	0-6 in	5/9/2018	< 1	5	188	< 1	15	< 1	15	6	9	11 D	383	< 1	< 1	< 1	< 1	0.4	0.4	7.4	3.82	2.33	10	60	< 1 D
MD-1	12-24 in	5/9/2018	< 1	2	20	< 1	12	< 1	15	6	6	< 5 D	244	< 1	< 1	< 1	< 1	0.4	0.3 U	7.6	23.1	21	8	2,560 D	< 5 D
MD-1	72-84 in	5/9/2018	< 1	2	23	< 1	19	< 1	18	7	9	4.9 D	452	< 1	< 1	< 1	< 1	0.5	0.5	7.7	17.4	77.1	165 D	6,010 D	< 10 D
MD-2	0-6 in	5/9/2018	< 1	4	141	< 1	17	< 1	13	5	9	11 D	274	< 1	< 1	< 1	< 1	0.4	0.7	7.7	22.4	17.4	36	2,420 D	< 5 D
MD-2	0-6 in	5/9/2018	< 1	4	183	< 1	17	< 1	15	6	9	9 D	322	< 1	< 1	< 1	< 1	0.7	0.4	7.7	25.9	19.7	34	2,400 D	< 5 D
MD-2	12-24 in	5/9/2018	< 1	3	193	< 1	20	< 1	14	6	8	9 D	228	< 1	< 1	< 1	< 1	0.4	0.7	7.9	23.1	43.2	49	3,760 D	< 5 D
MD-2	72-84 in	5/9/2018	< 1	3	43	< 1	4	< 1	15	5	6	< 5 D	98	< 1	< 1	< 1	< 1	0.3	0.9	8.2	1.29	6.12	9	391	3 D
MD-3	0-6 in	5/9/2018	< 1	5 D	138	< 1	25	< 1	13	6	9	9 D	340	< 1	< 1	< 1	< 1	0.5	0.6	7.9	23.1	24.3	12	2,780 D	< 5 D
MD-3	12-24 in	5/9/2018	< 1	5	163	< 1	27	< 1	15	6	11	11 D	274	< 1	< 1	< 1	< 1	0.4	0.6	7.9	21.2	55	26	4,640 D	< 5 D
MD-3	72-84 in	5/9/2018	< 1	38	20	< 1	10	< 1	15	6	10	10 D	139	< 1	< 1	< 1	< 1	0.4	1.1	7.9	20.2	37.1	46	3,600 D	< 5 D
MD-4	0-6 in	5/9/2018	< 1	5	88	< 1	31	< 1	11	6	6	6 D	195	< 1	< 1	< 1	< 1	0.3	0.3 U	8.3	20.7	172	411 D	11,700 D	< 10 D
MD-4	12-24 in	5/9/2018	< 1	4	108	< 1	26	< 1	14	5	7	8 D	263	< 1	< 1	< 1	< 1	0.4	0.4	8	19.5	112	248 D	8,440 D	< 10 D
MD-4	72-84 in	5/9/2018	< 1	4	34	< 1	18	< 1	13	6	7	12 D	2,410	< 1	2	< 1	< 1	0.7	0.4	7.9	17.6	82.5	204 D	6,240 D	< 10 D
MD-5	0-6 in	5/9/2018	< 1	4	275	< 1	39	< 1	12	7	9	11 D	390	< 1	< 1	< 1	< 1	0.4	0.4 U	7.8	19.6	75.5	58 D	5,850 D	< 10 D
MD-5	12-24 in	5/9/2018	< 1	9	136	< 1	47	4	14	6	13	11 D	219	< 1	< 1	< 1	< 1	0.4	0.5	8.1	18.8	225	537 D	14,700 D	< 10 D
MD-5	30-36 in	5/9/2018	< 1	2	99	< 1	27	< 1	17	5	6	7 D	321	< 1	< 1	< 1	< 1	0.4	0.3 U	8.1	18.7	141	329 D	10,100 D	< 10 D
MD-6	0-6 in	5/9/2018	< 1	7	634	< 1	25	< 1	14	7	11	15 D	302	< 1	1	< 1	< 1	0.5	0.6	7.9	4.5	8.65	17	699 D	< 2 D
MD-6	0-6 in	5/9/2018	< 1	5	543	< 1	28	< 1	13	6	9	14 D	286	< 1	< 1	< 1	< 1	0.5	0.3 U	7.6	4.35	9.18	14	706 D	< 2 D
MD-6	12-24 in	5/9/2018	< 1	10	250	< 1	16	< 1	14	7	11	11 D	338	< 1	< 1	< 1	< 1	0.5	0.5	7.5	6.16	12.2	29	1,090 D	< 2 D
MD-6	40-52 in	5/9/2018	< 1	13	355	< 1	21	< 1	14	6	10	11 D	822	< 1	1	< 1	< 1	0.5	0.8	7.5	14.7	38.3	93	3,490 D	< 5 D
MD-7	0-6 in	5/9/2018	< 1	5 D	931	< 1	41	< 1	13	5	8	18 D	350	< 1	1	< 1	< 1	0.3	0.2 U	7.6	11.5	32.6	78	2,810 D	< 5 D
MD-7	12-24 in	5/9/2018	< 1	6 D	165	< 1	10	< 1	12	7	9	9 D	176	< 1	< 1	< 1	< 1	0.5	0.4	7.6	11	21.9	54	2,130 D	< 5 D
MD-7	72-84 in	5/9/2018	< 1	14 D	443	< 1	9	< 1	16	11	17	12 D	389	< 1	1	< 1	< 1	0.4	0.5	7.5	10.1	10.5	34	1,320 D	< 2 D
MD-8	0-6 in	5/9/2018	< 1	7 D	185	< 1	9	< 1	13	7	10	10 D	337	< 1	< 1	< 1	< 1	0.4	0.4	7.6	4.38	5.87	12	488	< 1 D
MD-8	12-24 in	5/9/2018	< 1	11	227	< 1	9	< 1	13	7	11	9 D	384	< 1	< 1	< 1	< 1	0.5	0.5	7.6	5.02	7.33	20	659	< 1 D
MD-9	0-6 in	5/9/2018	< 1	6 D	196	< 1	10	< 1	13	6	10	10 D	262	< 1	< 1	< 1	< 1	0.2	0.1 U	7.7	3.72	4.99	10	411	< 1 D
MD-9	12-24 in	5/9/2018	< 1	6 D	231	< 1	12	< 1	13	6	10	10 D	256	< 1	< 1	< 1	< 1	0.4	0.1 U	7.4	4.11	6.04	17	508	< 1 D
MD-9	40-52 in	5/9/2018	< 1	11 D	307	< 1	9	< 1	14	10	11	10 D	590	< 1	< 1	< 1	< 1	0.5	-0.03 U	7.5	3.89	5.18	14	484	< 1 D
MD-10	0-6 in	5/9/2018	< 1	7 D	153	< 1	10	< 1	16	7	11	11 D	277	< 1	< 1	< 1	< 1	0.4	0.3 U	7.5	2.97	4.28	8	348	< 1 D
MD-10	12-24 in	5/9/2018	< 1	7	171	< 1	12	< 1	16	7	12	14 D	330	< 1	< 1	< 1	< 1	0.5	0.4	7.5	3.06	4.88	10	374	< 1 D
MD-10	40-52 in	5/9/2018	< 1	9	258	< 1	10	< 1	13	7	11	11 D	325	< 1	< 1	< 1	< 1	0.6	0.7	7.4	3.32	5.37	15	447	1 D
MD-11	0-6 in	5/9/2018	< 1	6	200	< 1	11	< 1	14	7	11	12 D	311	< 1	< 1	< 1	< 1	0.5	0.7	7.5	3.14	3.86	5	212	< 1 D
MD-11	12-24 in	5/9/2018	< 1	18	537	1	11	< 1	20	10	13	11 D	1,790	< 1	5	< 1	< 1	0.6	0.5	7.5	2.78	3.4	8	258	< 1 D

Notes:

mg/kg	milligram per kilogram
meq/L	milliequivalent per liter
pCi/g	picoCurie per gram
sat paste	saturated paste
NA	Not Analyzed/Not Available
D	Laboratory Reporting Limit Increased Due to Sample Matrix
U	Not Detected At Minimum Detected Concentration

Table E-7
Colstrip Units 3&4 EHP AOC Area, EU13
Saddle Dam - Soil Sampling Results Data Used in the HHRA
2018

Sample Location	Sample Depth	Date	Sb mg/kg	As mg/kg	Ba mg/kg	Be mg/kg	B mg/kg	Cd mg/kg	Cr mg/kg	Co mg/kg	Pb mg/kg	Li mg/kg	Mn mg/kg	Hg mg/kg	Mo mg/kg	Se mg/kg	Tl mg/kg	Ra 226 pCi/g	Ra 228 pCi/g	pH std units	Ca meq/L sat paste	Mg meq/L sat paste	Cl mg/L sat paste	Sulfate mg/L sat paste	F mg/L sat paste
SD-1	0-6 in	5/9/2018	< 1	10	239	< 1	46	< 1	14	6	13	19 D	292	< 1	3	< 1	< 1	0.5	1	7.6	26.3	16.7	7	2,410 D	< 5 D
SD-1	12-24 in	5/9/2018	< 1	3	35	< 1	53	< 1	13	8	14	18 D	242	< 1	2	< 1	< 1	0.7	0.6	7.8	21.7	68.1	32 D	5,500 D	< 10 D
SD-2	0-6 in	5/9/2018	< 1	6	217	< 1	49	< 1	16	6	12	16 D	284	< 1	1	< 1	< 1	0.5	0.5	7.7	29	10.9	9	1,980 D	< 2 D
SD-2	12-24 in	5/9/2018	< 1	5	314	< 1	155	< 1	18	6	12	30 D	327	< 1	1	< 1	< 1	0.5	0.8	8.1	16	89.6	40 D	6,970 D	< 10 D
SD-2	72-84 in	5/9/2018	< 1	2	46	< 1	29	< 1	15	7	15	18 D	464	< 1	3	< 1	< 1	0.8	0.7	8	20.9	86	169 D	6,570 D	< 10 D
SD-3	0-6 in	5/9/2018	< 1	7	429	< 1	125	< 1	14	6	12	23 D	315	< 1	2	< 1	< 1	0.2	0.7	8.1	21.8	53	40	4,470 D	< 5 D
SD-3	12-24 in	5/9/2018	< 1	3	46	< 1	33	< 1	13	5	10	16 D	206	< 1	1	< 1	< 1	0.4	0.7	8.3	20.1	204	412 D	13,200 D	< 10 D
SD-4	0-6 in	5/9/2018	< 1	6	287	< 1	19	< 1	16	6	12	17 D	313	< 1	< 1	< 1	< 1	0.4	0.5	7.5	3.36	2.88	18	88	< 1 D
SD-4	12-24 in	5/9/2018	< 1	6	208	< 1	62	< 1	15	6	11	17 D	305	< 1	< 1	< 1	< 1	0.3	0.3	7.9	22.6	50.8	11	4,290 D	< 5 D
SD-5	0-6 in	5/9/2018	< 1	9	190	< 1	29	< 1	14	8	13	17 D	398	< 1	2	< 1	< 1	0.5	1.1	7.8	3.58	2.78	8	120	< 1 D
SD-5	0-6 in	5/9/2018	< 1	7	223	< 1	31	< 1	15	8	12	18 D	421	< 1	2	< 1	< 1	0.6	0.4	7.7	3.64	2.88	8	119	< 1 D
SD-5	12-24 in	5/9/2018	< 1	5	60	< 1	46	< 1	8	8	10	15 D	491	< 1	3	< 1	< 1	0.3	0.4	7.8	23	42.4	14	3,840 D	6 D
SD-6	0-6 in	5/9/2018	< 1	5	158	< 1	22	< 1	12	6	10	13 D	337	< 1	< 1	< 1	< 1	0.5	0.4	7.7	5.9	4.89	29	343	< 1 D
SD-6	12-24 in	5/9/2018	< 1	3	125	< 1	25	< 1	11	7	10	11 D	434	< 1	< 1	< 1	< 1	0.5	0.3	7.8	23.5	46.6	14	4,040 D	< 5 D
SD-7	0-6 in	5/9/2018	< 1	8	281	< 1	70	< 1	14	6	13	19 D	186	< 1	1	< 1	< 1	0.2	0.7	8.1	20.6	179	308 D	11,900 D	< 10 D
SD-7	12-24 in	5/9/2018	< 1	5 D	137	< 1	32	< 1	11	7	10	11 D	381	< 1	2	< 1	< 1	0.2	0.3	8.2	20.5	200	484 D	12,800 D	< 10 D
SD-8	0-6 in	5/9/2018	< 1	6 D	178	< 1	44	< 1	11	6	10	12 D	331	< 1	2	< 1	< 1	0.3	0.3	7.9	21.3	142	311 D	9,390 D	< 10 D
SD-8	12-24 in	5/9/2018	< 1	3 D	58	< 1	22	< 1	12	8	10	10 D	319	< 1	1	< 1	< 1	0.2	0.3 U	7.9	23.1 D	160	393 D	11,300 D	< 10 D
SD-9	0-6 in	5/9/2018	< 1	7 D	218	< 1	17	< 1	13	8	11	14 D	357	< 1	2	< 1	< 1	0.4	0.8	7.4	7.52	13.1	32	1,110 D	< 2 D
SD-9	0-6 in	5/9/2018	1	15 D	223	< 1	20	< 1	14	8	14	13 D	265	< 1	2	< 1	< 1	0.4	0.8	7.3	6.59	11.5	28	967 D	< 2 D
SD-9	12-24 in	5/9/2018	< 1	8 D	91	< 1	29	< 1	12	6	9	14 D	162	< 1	1	< 1	< 1	0.2	0.5	7.4	12.4	11.3	34	2,770 D	< 5 D
SD-10	0-6 in	5/9/2018	< 1	5 D	169	< 1	32	< 1	13	7	10	12 D	305	< 1	1	< 1	< 1	0.5	0.4	7.4	22.5	22.7	12	2,890 D	< 5 D
SD-10	12-24 in	5/9/2018	< 1	4	34	< 1	22	< 1	8	4	7	8 D	229	< 1	2	< 1	< 1	0.5	0.4 U	7.7	22.5	80.3	54 D	6,550 D	< 10 D
SD-11	0-6 in	5/10/2018	< 1	9 D	124	< 1	19	< 1	19	8	14	16 D	158	< 1	3	< 1	< 1	0.5	0.7	7.4	22.7	14.7	13	2,460 D	< 5 D
SD-11	12-24 in	5/10/2018	< 1	7 D	139	< 1	15	< 1	13	7	12	13 D	272	< 1	1	< 1	< 1	0.5	0.7	7.3	24	19.1	13	2,590 D	< 5 D
SD-11	72-84 in	5/10/2018	< 1	16 D	79	< 1	14 D	< 1	18	4	27	14 D	117	< 1	< 1	< 2 D	< 1	0.7	1	7.6	25.2	59.7	30	4,650 D	< 5 D
SD-12	0-6 in	5/10/2018	< 1	4 D	125	< 1	8 D	< 1	15	9	11	11 D	268	< 1	< 1	< 2 D	< 1	0.4	0.7	7.4	4.38	4.69	14	530	< 1 D
SD-12	12-24 in	5/10/2018	< 1	8 D	116	< 1	12 D	< 1	13	7	12	13 D	356	< 1	< 1	< 2 D	< 1	0.5	0.9	7.3	27.5	18	10	2,440 D	< 5 D
SD-12	72-84 in	5/10/2018	< 1	3 D	113	< 1	12 D	< 1	14	5	11	18 D	233	< 1	< 1	< 2 D	< 1	0.5	0.8	7.6	4.9	6.04	6	845 D	< 2 D
SD-13	0-6 in	5/10/2018	< 1	5	130	< 1	12 D	< 1	12	5	12	12 D	334	< 1	< 1	< 2 D	< 1	0.5	1	7.2	4.74	2.35	15	36	< 1 D
SD-13	12-24 in	5/10/2018	< 1	5 D	119	< 1	8 D	< 1	12	6	11	10 D	446	< 1	< 1	< 2 D	< 1	0.4	0.5	7.4	2.8	1.35	12	61	< 0.5 D
SD-13	72-84 in	5/10/2018	< 1	5 D	125	< 1	10 D	< 1	11	6	9	11 D	272	< 1	< 1	< 2 D	< 1	0.4	0.6	7.4	15.3	20.5	25	2,780 D	< 5 D
SD-14	0-6 in	5/10/2018	< 1	6	510	< 1	12 D	< 1	14	6	10	14 D	376	< 1	< 1	< 2 D	< 1	0.5	0.5	7.5	2.88	3.22	9	127	0.8 D
SD-14	12-24 in	5/10/2018	< 1	6	174	< 1	< 5 D	< 1	15	6	9	< 5 D	385	< 1	2	< 1	< 1	0.5	0.9	7.4	2.79	2.2	8	172	0.8 D
SD-14	72-84 in	5/10/2018	< 1	5 D	107	< 1	6 D	< 1	14	8	12	8 D	320	< 1	< 1	< 1	< 1	0.4	0.7	7.4	6.02	6	14	935 D	< 2 D
SD-15	0-6 in	5/10/2018	< 1	5 D	144	< 1	10 D	< 1	12	6	9	11 D	294	< 1	< 1	< 1	< 1	0.4	0.6	7.4	2.85	3.29	5	74	0.6 D
SD-15	0-6 in	5/10/2018	< 1	5 D	127	< 1	10 D	< 1	12	5	9	11 D	288	< 1	< 1	< 1	< 1	0.3	0.4 U	7.4	2.81	3.4	6	83	0.7 D
SD-15	12-24 in	5/10/2018	< 1	6 D	217	< 1	14 D	< 1	13	6	10	11 D	327	< 1	< 1	< 1	< 1	0.5	0.8	7.4	7.29	5.99	9	840 D	< 2 D
SD-16	0-6 in	5/10/2018	< 1	6 D	194	< 1	10 D	< 1	11	6	9	10 D	296	< 1	< 1	< 1	< 1	0.5	1	7.2	4.44	2.8	10	33	< 1 D
SD-16	12-24 in	5/10/2018	< 1	5 D	221	< 1	10 D	< 1	13	6	10	11 D	365	< 1	< 1	< 1	< 1	0.4	1.9	7.3	3.58	1.53	7	87	< 0.5 D
SD-17	0-6 in	5/10/2018	< 1	5	114	< 1	13 D	< 1	16	8	13	12 D	436	< 1	< 1	< 1	< 1	0.6	1.1	7.1	5.29	2.21	8	22	< 1 D

Table E-7
Colstrip Units 3&4 EHP AOC Area, EU13
Saddle Dam - Soil Sampling Results Data Used in the HHRA
2018

Sample Location	Sample Depth	Date	Sb mg/kg	As mg/kg	Ba mg/kg	Be mg/kg	B mg/kg	Cd mg/kg	Cr mg/kg	Co mg/kg	Pb mg/kg	Li mg/kg	Mn mg/kg	Hg mg/kg	Mo mg/kg	Se mg/kg	Tl mg/kg	Ra 226 pCi/g	Ra 228 pCi/g	pH std units	Ca meq/L sat paste	Mg meq/L sat paste	Cl mg/L sat paste	Sulfate mg/L sat paste	F mg/L sat paste
SD-17	12-24 in	5/10/2018	< 1	3 D	55	< 1	14 D	< 1	11	5	8	11 D	330	< 1	< 1	< 1	< 1	0.4	0.7	7.1	24.3	5.29	9	1,750 D	< 2 D
SD-18	0-6 in	5/10/2018	< 1	4 D	115	< 1	13 D	< 1	15	7	12	12 D	348	< 1	< 1	< 1	< 1	0.5	1.1	7.2	5.11	2.2	7	49	< 0.5 D
SD-18	12-24 in	5/10/2018	< 1	4	83	< 1	14 D	< 1	13	6	9	12 D	316	< 1	< 1	< 1	< 1	0.4	1.3	7.3	27	10.1	5	1,960 D	< 2 D
SD-19	0-6 in	5/10/2018	< 1	5 D	128	< 1	14 D	< 1	16	7	12	12 D	397	< 1	< 1	< 1	< 1	0.5	1.1	7.4	4.64	1.58	8	31	< 0.5 D
SD-19	12-24 in	5/10/2018	< 1	3 D	66	< 1	17 D	< 1	12	5	8	11 D	315	< 1	< 1	< 1	< 1	0.5	0.5	7.4	20.7	23.8	7	2,980 D	< 5 D
SD-20	0-6 in	5/10/2018	< 1	3	74	< 1	13 D	< 1	13	7	11	11 D	413	< 1	1	< 1	< 1	0.5	0.8	7.5	3.96	1.2	5	35	< 0.5 D
SD-20	12-24 in	5/10/2018	< 1	2	28	< 1	6 D	< 1	8	4	5	9 D	302	< 1	< 1	< 1	< 1	0.4	1.8	7.3	19.1	1.76	8	1,650 D	< 2 D

Notes:

mg/kg	milligram per kilogram
meq/L	milliequivalent per liter
pCi/g	picoCurie per gram
sat paste	saturated paste
NA	Not Analyzed/Not Available
D	Laboratory Reporting Limit Increased Due to Sample Matrix
U	Not Detected At Minimum Detected Concentration

Table E-8
Colstrip Units 3&4 EHP AOC Area, EU14
South Fork Cow Creek - Soil Sampling Results Data Used in the HHRA
2018

Sample Location	Sample Depth	Date	Sb mg/kg	As mg/kg	Ba mg/kg	Be mg/kg	B mg/kg	Cd mg/kg	Cr mg/kg	Co mg/kg	Pb mg/kg	Li mg/kg	Mn mg/kg	Hg mg/kg	Mo mg/kg	Se mg/kg	Tl mg/kg	Ra 226 pCi/g	Ra 228 pCi/g	pH std units	Ca meq/L sat paste	Mg meq/L sat paste	Cl mg/L sat paste	Sulfate mg/L sat paste	F mg/L sat paste
SFCC-1	0-6 in	5/10/2018	< 1	7 D	139	< 1	14 D	< 1	17	6	13	< 5 D	230	< 1	1	< 1	< 1	0.6	3.4	6.6	2.18	1.84	13	53	< 0.5 D
SFCC-1	12-24 in	5/10/2018	< 1	8	174	< 1	52 D	< 1	16	6	12	19 D	279	< 1	2	< 2 D	< 1	0.6	2.3	7.6	9.17	9.46	11	1,190 D	< 2 D
SFCC-2	0-6 in	5/10/2018	< 1	12 D	122	< 1	11 D	< 1	16	7	13	12 D	319	< 1	< 1	< 1	< 1	0.6	3.1	7	2.5	2.5	24	48	< 0.5 D
SFCC-2	12-24 in	5/10/2018	< 1	16 D	249	< 1	28 D	< 1	13	7	12	23 D	315	< 1	2	< 1	< 1	0.6	0.5	7.5	3.91	5.86	33	266	1 D
SFCC-2	72-84 in	5/10/2018	< 1	15 D	206	< 1	61 D	< 1	15	7	15	21 D	263	< 1	2	< 1	< 1	0.3	0.9	8	22.1 D	197	298 D	12,600 D	< 10 D
SFCC-3	0-6 in	5/10/2018	< 1	10 D	101	< 1	9 D	< 1	16	7	13	11 D	394	< 1	< 1	< 1	< 1	0.7	0.8	6.8	2.98	2.37	11	42	< 0.5 D
SFCC-3	12-24 in	5/10/2018	< 1	11 D	130	< 1	22 D	< 1	14	7	13	11 D	460	< 1	1	< 1	< 1	0.5	0.5	7.5	16.4	18.8	15	2,140 D	< 5 D
SFCC-3	12-24 in	5/10/2018	< 1	12 D	155	< 1	19 D	< 1	15	7	13	12 D	395	< 1	1	< 1	< 1	0.8	0.6	7.4	14.6	17.4	37	2,240 D	< 5 D
SFCC-4	0-6 in	5/10/2018	< 1	10 D	123	< 1	11 D	< 1	14	7	13	12 D	367	< 1	< 1	< 1	< 1	0.6	0.6	7.4	4.68	1.41	5	16	< 0.5 D
SFCC-4	12-24 in	5/10/2018	< 1	11 D	171	< 1	14 D	< 1	16	7	12	13 D	359	< 1	1	< 1	< 1	0.5	0.4	7.6	2.3	2.31	11	45	< 0.5 D
SFCC-5	0-6 in	5/10/2018	< 1	10 D	107	< 1	13 D	< 1	16	8	13	13 D	290	< 1	2	< 1	< 1	0.5	0.9	7	3.55	1.83	20	36	0.7 D
SFCC-5	12-24 in	5/10/2018	< 1	11 D	116	< 1	31 D	< 1	16	7	13	15 D	350	< 1	2	< 1	< 1	0.6	0.9	7.6	23.2	14.8	9	2,230 D	< 5 D
SFCC-6	0-6 in	5/10/2018	< 1	16 D	217	< 1	12 D	< 1	19	8	15	15 D	558	< 1	< 1	< 1	< 1	0.6	1	6.5	1.91	2.1	8	32	< 0.5 D
SFCC-6	12-24 in	5/10/2018	< 1	17 D	204	< 1	27 D	< 1	15	7	13	15 D	406	< 1	2	1	< 1	0.6	0.5	7.3	26.2	27.9	7	2,730 D	< 5 D
SFCC-7	0-6 in	5/10/2018	< 1	10 D	519	< 1	14 D	< 1	15	7	14	15 D	232	< 1	3	< 1	< 1	0.4	0.6	6.4	3.09	2.13	24	40	< 0.5 D
SFCC-7	12-24 in	5/10/2018	< 1	5 D	143	< 1	8 D	< 1	10	5	7	10 D	247	< 1	1	< 1	< 1	0.4	0.5	7.3	2.31	2.87	14	78	< 0.5 D
SFCC-8	0-6 in	5/10/2018	< 1	10 D	130	< 1	13 D	< 1	16	7	13	12 D	400	< 1	< 1	< 1	< 1	0.6	0.3 U	6.9	4.34	1.66	16	18	< 0.5 D
SFCC-8	12-24 in	5/10/2018	< 1	10 D	162	< 1	13 D	< 1	14	6	11	13 D	312	< 1	< 1	< 1	< 1	0.5	0.3 U	7.1	3.04	1.72	7	73	< 0.5 D
SFCC-8	72-84 in	5/10/2018	< 1	8 D	73	< 1	22 D	< 1	13	6	11	13 D	303	< 1	< 1	< 1	< 1	0.4	0.2 U	7.6	22.1	93.6	105 D	7,540 D	< 10 D
SFCC-9	0-6 in	5/10/2018	< 1	6 D	115	< 1	13 D	< 1	13	7	11	12 D	402	< 1	1	< 1	< 1	0.6	0.5	7.3	3.07	2.52	6	60	< 0.5 D
SFCC-9	12-24 in	5/10/2018	< 1	6 D	107	< 1	14 D	< 1	14	7	11	12 D	413	< 1	< 1	< 1	< 1	0.3	0.3 U	7.5	21.9	99.9	129 D	8,070 D	< 10 D
SFCC-9	12-24 in	5/10/2018	< 1	6 D	93	< 1	13 D	< 1	13	6	11	12 D	377	< 1	< 1	< 1	< 1	0.3	0.2 U	7.6	22.7	78	96 D	6,420 D	< 10 D
SFCC-10	0-6 in	5/10/2018	< 1	8 D	107	< 1	15 D	< 1	13	7	12	12 D	375	< 1	< 1	< 1	< 1	0.4	0.4	7.5	4	2.63	7	133	0.5 D
SFCC-10	12-24 in	5/10/2018	< 1	12 D	268	< 1	15 D	< 1	15	9	17	14 D	619	< 1	2	< 1	< 1	0.6	0.4	7.2	28	13.9	6	1,990 D	< 5 D
SFCC-11	0-6 in	5/10/2018	< 1	10 D	394	< 1	15 D	< 1	15	9	16	14 D	455	< 1	1	< 1	< 1	0.7	0.4	7.5	10.8	9.85	10	1,090 D	< 2 D
SFCC-11	12-24 in	5/10/2018	< 1	6 D	158	< 1	10 D	< 1	12	6	12	11 D	559	< 1	< 1	< 1	< 1	0.5	0.6	7.5	12.1	10.6	11	1,210 D	< 2 D
SFCC-12	0-6 in	5/10/2018	< 1	11 D	121	< 1	12 D	< 1	16	7	12	12 D	393	< 1	1	< 1	< 1	0.5	0.8	7.2	3.76	1.87	6	16	< 0.5 D
SFCC-12	12-24 in	5/10/2018	< 1	9 D	94	< 1	15 D	< 1	15	7	12	14 D	359	< 1	1	< 1	< 1	0.6	0.9	7.5	26.4	22.3	5	2,270 D	< 5 D
SFCC-13	0-6 in	5/10/2018	< 1	7 D	111	< 1	16 D	< 1	17	9	17	17 D	299	< 1	< 1	< 1	< 1	0.7	0.6	7.2	13.9	11.8	17	1,150 D	< 2 D
SFCC-13	12-24 in	5/10/2018	< 1	6 D	194	< 1	10 D	< 1	11	6	11	11 D	561	< 1	1	< 2 D	< 1	0.6	0.8	7.3	18.3	16	22	1,720 D	< 2 D
SFCC-14	0-6 in	5/10/2018	< 1	6 D	89	< 1	17 D	< 1	14	7	14	13 D	265	< 1	< 1	< 2 D	< 1	0.5	0.7	7.4	14.6	8.5	11	1,020 D	< 2 D
SFCC-14	12-24 in	5/10/2018	< 1	8	231	< 1	14 D	< 1	12	9	15	11 D	484	< 1	1	< 2 D	< 1	0.9	0.6	7.3	28.7	24.1	20	2,570 D	< 5 D
SFCC-15	0-6 in	5/10/2018	< 1	7 D	118	< 1	9 D	< 1	13	7	12	12 D	327	< 1	< 1	< 2 D	< 1	0.5	1.5	7.2	4.42	3.47	21	56	< 1 D
SFCC-15	12-24 in	5/10/2018	< 1	7 D	128	< 1	10 D	< 1	13	7	15	12 D	328	< 1	< 1	< 2 D	< 1	0.7	1	7.3	2.86	3.84	16	67	< 0.5 D
SFCC-16	0-6 in	5/10/2018	< 1	6 D	93	< 1	13 D	< 1	13	6	13	13 D	258	< 1	< 1	< 2 D	< 1	0.6	1.6	7.5	2.14	3.27	6	26	< 0.5 D
SFCC-16	12-24 in	5/10/2018	< 1	7 D	131	< 1	20 D	< 1	14	7	12	12 D	332	< 1	< 1	< 2 D	< 1	0.6	1.7	7.5	25.9	37.3	8	2,890 D	< 5 D
SFCC-17	0-6 in	5/10/2018	< 1	6	124	< 1	12 D	< 1	14	7	14	14 D	253	< 1	< 1	< 2 D	< 1	0.5	1.9	7.4	2.08	1.8	3	22	< 0.5 D
SFCC-17	12-24 in	5/10/2018	< 1	8 D	149	< 1	8 D	< 1	13	8	12	12 D	339	< 1	< 1	< 2 D	< 1	0.5	0.6	7.3	2.2	2.22	3	40	< 0.5 D
SFCC-18	0-6 in	5/10/2018	< 1	7 D	112	< 1	11 D	< 1	14	7	13	12 D	310	< 1	< 1	< 2 D	< 1	0.5	0.7	7.2	3.48	4.13	24	35	< 1 D
SFCC-18	12-24 in	5/10/2018	< 1	6 D	126	< 1	9 D	< 1	12	6	11	11 D	306	< 1	< 1	< 2 D	< 1	0.8	0.5	7.4	2.66	3.7	10	71	< 0.5 D
SFCC-18	48-60 in	5/10/2018	< 1	24	256	< 1	17 D	< 1	14	13	21	10 D	568	< 1	2	< 2 D	< 1	0.7	0.6	7.6	24.4	68.6	26 D	4,980 D	< 10 D
SFCC-19	0-6 in	5/10/2018	< 1	6 D	110	< 1	7 D	< 1	13	6	11	10 D	296	< 1	< 1	< 2 D	< 1	0.5	1.1	7.3	3.54	1.3	3	18	< 0.5 D
SFCC-19	12-24 in	5/10/2018	< 1	7 D	158	< 1	5 D	< 1	12	6	10	10 D	289	< 1	< 1	< 2 D	< 1	0.5	0.5	7.4	3.63	2.12	3	88	< 0.5 D
SFCC-19	12-24 in	5/10/2018	< 1	7 D	154	< 1	< 5 D	< 1	13	6	11	< 5 D	319	< 1	< 1	< 2 D	< 1	0.5	0.5	7.5	4.4	2.36	3	118	0.5 D
SFCC-20	0-6 in	5/10/2018	< 1	6	74	< 1	13 D	< 1	21	8	17	18 D	375	< 1	1	< 2 D	< 1	0.7	0.8	7.3	2.11	2	4	21	< 0.5 D
SFCC-20	12-24 in	5/10/2018	< 1	10 D	161	< 1	8 D	< 1	17	8	13	13 D	471	< 1	1	< 2 D	< 1	0.6	1.2	7.4	1.77	2.45	4	31	< 0.5 D
SFCC-20	36-48 in	5/10/2018	< 1	14	243	< 1	16 D	< 1	22	10	17	14 D	890	< 1	2	< 2 D	< 1	0.6	0.8	7.5	1.79	2.73	7	73	0.7 D
SFCC-21	0-6 in	5/10/2018	< 1	6 D	70	< 1	16 D	< 1	21	8	18	20 D	322	< 1	< 1	< 2 D	< 1	0.6	1	7.4	2.06	2.47	4	35	< 0.5 D

Table E-8
Colstrip Units 3&4 EHP AOC Area, EU14
South Fork Cow Creek - Soil Sampling Results Data Used in the HHRA
2018

Sample Location	Sample Depth	Date	Sb mg/kg	As mg/kg	Ba mg/kg	Be mg/kg	B mg/kg	Cd mg/kg	Cr mg/kg	Co mg/kg	Pb mg/kg	Li mg/kg	Mn mg/kg	Hg mg/kg	Mo mg/kg	Se mg/kg	Tl mg/kg	Ra 226 pCi/g	Ra 228 pCi/g	pH std units	Ca meq/L sat paste	Mg meq/L sat paste	Cl mg/L sat paste	Sulfate mg/L sat paste	F mg/L sat paste
SFCC-21	12-24 in	5/10/2018	< 1	7	143	< 1	15 D	< 1	18	8	15	15 D	379	< 1	< 1	< 2 D	< 1	0.6	0.8	7.4	21.2	28	11	2,680 D	< 5 D
SFCC-21	72-84 in	5/10/2018	< 1	15	197	< 1	13 D	< 1	17	7	11	11 D	531	< 1	2	< 2 D	< 1	0.7	0.7	7.6	24.6	33.4	73	3,250 D	< 5 D
SFCC-22	0-6 in	5/10/2018	< 1	8	146	< 1	6 D	< 1	15	6	10	10 D	360	< 1	< 1	< 2 D	< 1	0.3	0.3 U	7.4	3.18	1.82	5	13	< 0.5 D
SFCC-22	12-24 in	5/10/2018	< 1	8	165	< 1	< 5 D	< 1	12	6	10	10 D	326	< 1	< 1	< 2 D	< 1	0.5	1.4	7.7	1.71	1.91	2	14	< 0.5 D
SFCC-23	0-6 in	5/10/2018	< 1	10 D	115	< 1	9 D	< 1	17	8	15	13 D	380	< 1	1	< 2 D	< 1	0.6	0.5	7.4	2.72	2.26	6	24	< 0.5 D
SFCC-23	12-24 in	5/10/2018	< 1	7 D	150	< 1	7 D	< 1	14	6	11	11 D	332	< 1	< 1	< 2 D	< 1	0.5	0.3 U	7.6	1.55	2.16	3	30	0.5 D
SFCC-24	0-6 in	5/10/2018	< 1	13 D	248	< 1	8 D	< 1	15	8	16	12 D	519	< 1	1	< 3 D	< 1	0.6	0.6	7.5	2.21	1.76	3	16	< 0.5 D
SFCC-24	12-24 in	5/10/2018	< 1	21	583	< 1	9 D	< 1	19	10	19	11 D	944	< 1	2	< 2 D	< 1	0.5	0.6	7.5	1.79	1.97	4	22	< 0.5 D
SFCC-25	0-6 in	5/10/2018	< 1	10	235	< 1	11 D	< 1	17	7	16	13 D	432	< 1	< 1	< 2 D	< 1	0.6	0.6	7.5	2.33	2.81	10	42	< 0.5 D
SFCC-25	12-24 in	5/10/2018	< 1	9 D	164	< 1	6 D	< 1	12	7	11	10 D	410	< 1	1	< 2 D	< 1	0.5	0.3 U	7.6	1.61	3.27	7	52	0.7 D

Notes:

mg/kg	milligram per kilogram
meq/L	milliequivalent per liter
pCi/g	picoCurie per gram
sat paste	saturated paste
NA	Not Analyzed/Not Available
D	Laboratory Reporting Limit Increased Due to Sample Matrix
U	Not Detected At Minimum Detected Concentration

APPENDIX F

Federal CCR Rule Baseline Monitoring Data

**** DRAFT ****

2/20/2019

Appendix F

Colstrip SES Federal CCR Rule Groundwater Draft Baseline Monitoring Data - 2016 Through August 2017

Comparison to USEPA MCLs (If No MCL Listed Then EPA RSL For Tapwater - Ingestion For Child, RSL Limit Was Used)

***Metals analyzed as Total Recoverable (TRC) unless turbidity >10, then metals ran both as Total Recoverable (TRC) and Dissolved (DIS).**

Highlighted Values Exceed MCL or EPA Tapwater RSL

Highlighted Values Are Detection Limits Higher than the MCL or EPA Tapwater RSL

			ANTIMONY	ARSENIC	BARIUM	BERYLLIUM	BORON	CADMIUM	CALCIUM	CHROMIUM	COBALT	FLUORIDE	IRON	LEAD	LITHIUM	MANGANESE	MERCURY	MOLYBDENUM	pH	RADIUM 226/228	SELENIUM	SULFATE	THALLIUM	TDS
Site Code	Sample Code	Date	7440-36-0 mg/L	7440-38-2 mg/L	7440-39-3 mg/L	7440-41-7 mg/L	7440-42-8 mg/L	7440-43-9 mg/L	7440-70-2 mg/L	7440-47-3 mg/L	7440-48-4 mg/L	16984-48-8 mg/L	7439-89-6 mg/L	7439-92-1 mg/L	7439-93-2 mg/L	7439-96-5 mg/L	7439-97-6 mg/L	7439-98-7 mg/L	NA standard units	7440-14-4 pCi/L	7782-49-2 mg/L	14808-79-8 mg/L	7440-28-0 mg/L	NA mg/L
			MCL - 0.006	MCL - 0.01	MCL - 2.0	MCL - 0.004	RSL - 4.0	MCL - 0.005	No MCL/ RSL	MCL - 0.1	RSL - 0.006	MCL - 4.0	RSL - 14.0	MCL - 0.015	RSL - 0.04	RSL - 0.43	MCL - 0.002	RSL - 0.1	No MCL/ RSL	MCL - 5.0	MCL - 0.05	No MCL/ RSL	MCL - 0.002	No MCL/ RSL
Units 3&4 EHP																								
1000M	TLN-1602-322-CCR	2/12/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.76	< 0.001	539	< 0.005	< 0.005	0.2	4.9	< 0.001	0.2	0.286	< 0.0001	< 0.001	7	-0.1	< 0.002	3,710	< 0.0005	5,650
1000M	CTLN-1605-202	5/11/2016	< 0.001	0.001	< 0.05	< 0.001	0.64	< 0.001	517	< 0.005	0.005	0.2	7.51	< 0.001	0.2	0.317	< 0.0001	< 0.001	7.1	3.5	< 0.002	3,700	< 0.0005	5,810
1000M	CTLN-1606-425	6/14/2016	< 0.001	< 0.001	< 0.05	0.001	0.67	< 0.001	502	< 0.005	< 0.005	0.1	6.55	< 0.001	0.2	0.267	< 0.0001	< 0.001	7.1	1.6	< 0.001	3,690	< 0.0005	5,710
1000M	CTLN-1608-904	8/17/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.67	< 0.001	513	< 0.005	< 0.005	0.2	6.15	< 0.001	0.2	0.276	< 0.0001	< 0.001	7	1.2	< 0.002	3,730	< 0.0005	5,550
1000M	CTLN-1610-379	10/12/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.76	< 0.001	470	< 0.005	< 0.005	0.1	5.63	< 0.001	0.2	0.258	< 0.0001	< 0.001	7.1	3.7	< 0.002	3,280	< 0.0005	5,710
1000M	CTLN-1611-229	11/29/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.65	< 0.001	551	< 0.005	< 0.005	0.2	6.21	< 0.001	0.2	0.29	< 0.0001	< 0.001	7	1.1	< 0.002	3,870	< 0.0005	5,700
1000M	CTLN-1701-135	1/25/2017	< 0.001	< 0.002	< 0.05	< 0.001	0.67	< 0.001	527	< 0.005	< 0.005	0.2	6.08	< 0.001	0.2	0.276	< 0.0001	< 0.001	7.1	1.1	< 0.004	3,570	0.0027	5,640
1000M	CTLN-1702-725	2/27/2017	< 0.001	< 0.002	< 0.05	< 0.001	0.69	< 0.001	511	< 0.005	< 0.005	0.2	6.17	< 0.001	0.2	0.286	< 0.0001	< 0.001	7	2	< 0.004	3,520	< 0.0005	5,660
1000M	CTLN-1704-903	4/10/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.64	< 0.001	497	< 0.005	< 0.005	0.2	5.85	< 0.001	0.2	0.276	< 0.0001	< 0.001	7.2	0.7	< 0.002	3690	< 0.0005	5430
1000M	CTLN-1705-411	5/18/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.63	< 0.001	479	< 0.005	0.006	0.2	5.8	< 0.001	0.1	0.242	< 0.0001	< 0.001	7.2	4.1	< 0.002	3770	< 0.0005	5780
1000M	CTLN-1706-407	6/15/2017	0.001	< 0.001	< 0.05	< 0.001	0.54	< 0.001	509	< 0.005	< 0.005	0.1	6.36	0.002	0.2	0.28	< 0.0001	0.001	7.1	4.5	< 0.002	3720	< 0.0005	5320
1000M	CTLN-1707-407	7/26/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.64	< 0.001	493	< 0.005	< 0.005	0.2	5.94	< 0.001	0.1	0.296	< 0.0001	< 0.001	7.2	2.1	< 0.001	3780	< 0.0005	5440
1000M	CTLN-1708-463	8/29/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.64	< 0.001	555	< 0.005	< 0.005	0.1	5.87	< 0.001	< 0.1	0.265	< 0.0001	< 0.001	7.1	3.6	< 0.001	3650	< 0.0005	5390
1004M	TLN-1602-317-CCR	2/11/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.23	< 0.001	495	< 0.005	< 0.005	0.2	0.22	< 0.001	0.2	0.188	< 0.0001	< 0.001	6.9	-0.3	< 0.002	4,540	< 0.0005	6,910
1004M	CTLN-1604-220	4/27/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.27	< 0.001	560	< 0.005	< 0.005	0.2	0.02	< 0.001	0.2	0.174	< 0.0001	< 0.001	7.1	1.7	< 0.004	4,630	< 0.0005	7,050
1004M	CTLN-1606-417	6/1/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.42	< 0.001	516	< 0.005	< 0.005	0.2	< 0.05	< 0.001	0.2	0.173	< 0.0001	< 0.001	7.1	2	< 0.002	4,680	< 0.0005	6,610
1004M	CTLN-1607-518	7/11/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.34	< 0.001	452	< 0.005	0.026	0.2	0.1	< 0.001	0.2	0.178	< 0.0001	0.001	7.1	5.2	< 0.002	4,740	< 0.0005	6,960
1004M	CTLN-1608-919	8/24/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.39	< 0.001	497	< 0.005	< 0.005	0.1	< 0.09	< 0.001	0.2	0.176	< 0.0001	< 0.001	7.1	1.6	< 0.002	4,610	< 0.0005	7,060
1004M	CTLN-1611-235	11/30/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.32	< 0.001	514	< 0.005	< 0.005	0.2	0.14	< 0.001	0.2	0.19	< 0.0001	< 0.001	7.1	0.9	< 0.002	4,880	< 0.0005	6,980
1004M	CTLN-1701-122	1/23/2017	< 0.001	< 0.002	< 0.05	< 0.001	1.28	< 0.001	497	< 0.005	< 0.005	0.2	0.07	< 0.001	0.2	0.186	< 0.0001	0.001	7	2.4	< 0.004	4,130	0.0022	6,880
1004M	CTLN-1702-724	2/27/2017	< 0.001	< 0.002	< 0.05	< 0.001	1.34	< 0.001	470	< 0.005	< 0.005	0.2	0.08	< 0.001	0.2	0.196	< 0.0001	< 0.001	7	1.6	< 0.004	4,710	< 0.0005	6,910
1004M	CTLN-1704-909	4/12/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.36	< 0.001	471	< 0.005	< 0.005	0.2	0.03	< 0.001	0.1	0.205	< 0.0001	< 0.001	7.2	0.6	< 0.002	4580	< 0.0005	6260
1004M	CTLN-1705-407	5/18/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.34	< 0.001	476	< 0.005	< 0.005	0.2	0.09	< 0.001	0.2	0.191	< 0.0001	0.002	7.2	0.5	< 0.002	4730	< 0.0005	7070
1004M	CTLN-1706-415	6/23/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.34	< 0.001	464	< 0.005	< 0.005	0.2	0.06	< 0.001	0.1	0.386	< 0.0001	< 0.001	7.1	1.7	< 0.002	4630	< 0.0005	6540
1004M	CTLN-1707-404	7/25/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.26	< 0.001	479	< 0.005	< 0.005	0.2	0.07	< 0.001	0.1	0.209	< 0.0001	< 0.001	7	1.1	< 0.001	4670	< 0.0005	6750
1004M	CTLN-1708-474	8/31/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.25	< 0.001	477	< 0.005	< 0.005	0.2	0.07	< 0.001	0.1	0.198	< 0.0001	< 0.001	7	2.9	< 0.001	4650	< 0.0005	6880
1006M	TLN-1602-331-CCR	2/18/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.11	< 0.001	335	< 0.005	< 0.005	0.4	0.15	< 0.001	0.2	0.109	< 0.0001	0.002	7.2	3	< 0.001	1,330	< 0.0005	2,240
1006M	CTLN-1604-218	4/27/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.32	< 0.001	354	< 0.005	< 0.005	0.4	0.35	< 0.001	0.2	0.103	< 0.0001	0.002	7.2	2	< 0.002	1,330	< 0.0005	2,220
1006M	CTLN-1605-411	5/30/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.35	< 0.001	339	< 0.005	< 0.005	0.3	0.2	< 0.001	0.3	0.106	< 0.0001	0.003	7.2	4.2	< 0.001	1,350	< 0.0005	2,180
1006M	CTLN-1607-505	7/6/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.29	< 0.001	342	< 0.005	< 0.005	0.3	0.19	< 0.001	0.2	0.118	< 0.0001	0.002	7.2	1.8	< 0.001	1,250	< 0.0005	2,180
1006M	CTLN-1608-925	8/25/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.38	< 0.001	346	< 0.005	< 0.005	0.3	0.22	< 0.001	0.2	0.114	< 0.0001	0.003	7.3	1.9	< 0.001	1,370	< 0.0005	2,220
1006M	CTLN-1611-237	11/30/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.35	< 0.001	360	< 0.005	< 0.005	0.3	0.38	< 0.001	0.2	0.119	< 0.0001	0.002	7.2	0.9	< 0.001	1,350	< 0.0005	2,240
1006M	CTLN-1701-129	1/24/2017	< 0.001 TRC < 0.001 DIS	< 0.001 TRC < 0.001 DIS	< 0.05 TRC < 0.05 DIS	< 0.001 TRC < 0.001 DIS	1.32 TRC 1.33 DIS	< 0.001 TRC < 0.001 DIS	354 TRC 334 DIS	< 0.005 TRC < 0.005 DIS	< 0.005 TRC < 0.005 DIS	0.4	0.60 TRC 0.05 DIS	< 0.001 TRC < 0.001 DIS	0.2 **TRC** 0.2 **DIS**	0.114 TRC 0.110 DIS	< 0.0001 TRC < 0.0001 DIS	0.002 TRC 0.002 DIS	7.2	3	< 0.002 TRC < 0.002 DIS	1,390	< 0.0005 TRC < 0.0005 DIS	2,160
1006M	CTLN-1702-723	2/27/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.34	< 0.001	337	< 0.005	< 0.005	0.4	0.3	< 0.001	0.2	0.128	< 0.0001	0.003	7.1	1.7	< 0.002	1,320	< 0.0005	2,230
1006M	CTLN-1704-922	4/18/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.29	< 0.001	336	< 0.005	< 0.005	0.4	0.31	< 0.001	0.2	0.123	< 0.0001	0.002	7.2	2.3	< 0.002	1,380	0.0007	2,080
1006M	CTLN-1705-400	5/16/2017	< 0.001	0.001	< 0.05	< 0.001	1.27	< 0.001	326	< 0.005	< 0.005	0.4	0.16	< 0.001	0.2	0.112	< 0.0001	0.003	7.2	1.9	< 0.001	1,400	< 0.0005	2,220
1006M	CTLN-1706-417	6/26/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.34	< 0.001	345	< 0.005	< 0.005	0.3	0.12	< 0.001	0.2	0.107	< 0.0001	0.002	7.2	1.7	< 0.001	1,420	< 0.0005	2,170
1006M	CTLN-1707-406	7/25/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.27	< 0.001	327	< 0.005	< 0.005	0.3	0.14	< 0.001	0.2	0.111	< 0.0001	0.002	7.2	3.1	< 0.001	1,410	< 0.0005	2,190
1006M	CTLN-1708-469	8/30/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.27	< 0.001	328	< 0.005	< 0.005	0.4	0.15	< 0.001	0.2	0.103	< 0.0001	0.002	7.2	0.5	< 0.001	1,400	< 0.0005	2,160
1008D	TLN-1602-320-CCR	2/11/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.64	< 0.001	522	< 0.005	< 0.005	0.2	4.61	< 0.001	0.1	0.096	< 0.0001	< 0.001	6.8	3.2	< 0.002	3,370	< 0.0005	5,200
1008D	CTLN-1604-219	4/27/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.58	< 0.001	561	< 0.005	< 0.005	0.2	4.58	< 0.001	0.2	0.085	< 0.0001	< 0.001	7.1	4.2	< 0.004	3,380	< 0.0005	5,250
1008D	CTLN-1605-415	5/31/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.58	< 0.001	523	< 0.005	< 0.005	0.2	4.54	< 0.001	0.2	0.089	< 0.0001	< 0.001	7.0	4.9	< 0.002	3,420	< 0.0005	5,090
1008D	CTLN-1607-513	7/7/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.56	< 0.001	539	< 0.005	< 0.005	0.2	4.37	< 0.001	0.1	0.088	< 0.0001	< 0.001	7.0	3.5	< 0.001	3,430	< 0.0005	5,060
1008D	CTLN-1608-918	8/24/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.6	< 0.001	527	< 0.005	< 0.005	0.2	4.57	< 0.001	0.2	0.082	< 0.0001	< 0.001	7.0	7	< 0.002	3,340	< 0.0005	5,170
1008D	CTLN-1611-233	11/30/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.58	< 0.001	582	< 0.005	< 0.005	0.2	4.67	< 0.001	0.2	0.088	< 0.0001	< 0.001	7.0	2.4	< 0.002	3,580	< 0.0005	5,190
1008D	CTLN-1701-119	1/12/2017	< 0.001	< 0.002	< 0.05	< 0.001	0.55	< 0.001	517	< 0.005	< 0.005	0.2	4.47	< 0.001	0.1	0.091	< 0.0001	< 0.001	7.0	9.4	< 0.002	3,440	< 0.0005	5,080
1008D	CTLN-1702-705	2/15/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.57	< 0.001	490	< 0.005	< 0.005	0.2	4.28	< 0.001	0.1	0.084	< 0.0001	< 0.001	7.0	4.8	< 0.002	3,470	< 0.0005	5,100
1008D	CTLN-1704-910	4/12/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.57	< 0.001	516	< 0.005	< 0.005	0.2	4.55	< 0.001	0.1	0.094	< 0.0001	< 0.001	7.1	5.4	< 0.002	3,420	< 0.0005	4,950
1008D	CTLN-1705-408	5/18/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.55	< 0.001	483	< 0.005	< 0.005	0.2	4.24	< 0.001	0.1	0.08	< 0.0001	0.002	7.1	2.5	< 0.001	3,540	< 0.0005	5,150
1008D (Dup)	CTLN-1705-409	5/18/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.55	< 0.001	488	< 0.005	< 0.005	0.2	4.28	< 0.001	< 0.1	0.072	< 0.0001	0.001	7	2.9	< 0.002	3,590	< 0.0005	5,010
1008D	CTLN-1706-416	6/23/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.64	< 0.001	535	< 0.005	< 0.005	0.2	4.39	< 0.001	0.1	0.102	< 0.0001	< 0.001	7	3.7	< 0.002	3,300	< 0.0005	5,190
1008D	CTLN-1707-405	7/25/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.64	< 0.001	550	< 0.005	< 0.005	0.2	4.85	< 0.001	< 0.1	0.096	< 0.0001	< 0.001	7	5.1	< 0.001	3,440	< 0.0005	5,130
1008D	CTLN-1708-470	8/30/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.58	< 0.001	526	< 0.005	< 0.005	0.2	4.37	< 0.001	< 0.1	0.089	< 0.0001	< 0.001	6.9	3.6	< 0.001	3,410	< 0.0005	4,940
1009D	TLN-1602-330-CCR	2/17/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.35	< 0.001	89	< 0.005	< 0.005	0.9	< 0.02	< 0.001	< 0.1	0.072	< 0.0001	< 0.001	7.7	2.3	< 0.001	1,690	< 0.0005	2,860
1009D	CTLN-1605-201	5/10/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.34	< 0.001	87	< 0.005	< 0.005	1	< 0.02	< 0.001	< 0.1	0.064	< 0.0001	< 0.001	7.7	2.1	< 0.001	1,660	< 0.0005	2,820
1009D	CTLN-1606-424	6/14/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.35	< 0.001	82	< 0.005	< 0.005	0.9	< 0.03	< 0.001	< 0.1	0.061	< 0.0001	< 0.001	7.8	4.2	< 0.001	1,690	< 0.0005	2,750
1009D	CTLN-1608-903	8/17/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.36	< 0.001	81	< 0.005	< 0.005	1	< 0.02	< 0.001	< 0.1	0.064	< 0.0001	< 0.001	7.8	1.5	< 0.001	1,700	< 0.0005	2,700
1009D	CTLN-1610-380	10/12/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.37	< 0.001	79	< 0.005	< 0.005	1.2	< 0.05	< 0.001	< 0.1	0.061	< 0.0001	< 0.001	7.7	4.1	< 0.001	1,770	< 0.0005	2,770
1009D	CTLN-1612-238	12/1/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.37	< 0.001	93	< 0.005	< 0.005	0.9	< 0.02	< 0.001	< 0.1	0.063	< 0.0001	< 0.001	7.7	-0.6	< 0.001	1,740	< 0.0005	2,740

**** DRAFT ****

2/20/2019

Appendix F

Colstrip SES Federal CCR Rule Groundwater Draft Baseline Monitoring Data - 2016 Through August 2017

Comparison to USEPA MCLs (If No MCL Listed Then EPA RSL For Tapwater - Ingestion For Child, RSL Limit Was Used)

***Metals analyzed as Total Recoverable (TRC) unless turbidity >10, then metals ran both as Total Recoverable (TRC) and Dissolved (DIS).**

Highlighted Values Exceed MCL or EPA Tapwater RSL

Highlighted Values Are Detection Limits Higher than the MCL or EPA Tapwater RSL

Site Code	Sample Code	Date	ANTIMONY 7440-36-0 mg/L	ARSENIC 7440-38-2 mg/L	BARIUM 7440-39-3 mg/L	BERYLLIUM 7440-41-7 mg/L	BORON 7440-42-8 mg/L	CADMIUM 7440-43-9 mg/L	CALCIUM 7440-70-2 mg/L	CHROMIUM 7440-47-3 mg/L	COBALT 7440-48-4 mg/L	FLUORIDE 16984-48-8 mg/L	IRON 7439-89-6 mg/L	LEAD 7439-92-1 mg/L	LITHIUM 7439-93-2 mg/L	MANGANESE 7439-96-5 mg/L	MERCURY 7439-97-6 mg/L	MOLYBDENUM 7439-98-7 mg/L	pH NA standard units	RADIUM 226/228 7440-14-4 pCi/L	SELENIUM 7782-49-2 mg/L	SULFATE 14808-79-8 mg/L	THALLIUM 7440-28-0 mg/L	TDS NA mg/L
			MCL - 0.006	MCL - 0.01	MCL - 2.0	MCL - 0.004	RSL - 4.0	MCL - 0.005	No MCL/ RSL	MCL - 0.1	RSL - 0.006	MCL - 4.0	RSL - 14.0	MCL - 0.015	RSL - 0.04	RSL - 0.43	MCL - 0.002	RSL - 0.1	No MCL/ RSL	MCL - 5.0	MCL - 0.05	No MCL/ RSL	MCL - 0.002	No MCL/ RSL
1009D	CTLN-1701-117	1/11/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.33	< 0.001	79	< 0.005	< 0.005	1.1	< 0.02	< 0.001	< 0.1	0.062	< 0.0001	< 0.001	7.8	4.1	< 0.002	1,760	< 0.0005	2,680
1009D	CTLN-1702-729	2/28/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.35	< 0.001	81	< 0.005	< 0.005	1	< 0.02	< 0.001	< 0.1	0.07	< 0.0001	< 0.001	7.7	2.6	< 0.002	1,680	< 0.0005	2,710
1009D	CTLN-1704-901	4/11/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.34	< 0.001	81	< 0.005	< 0.005	1	< 0.02	< 0.001	< 0.1	0.053	< 0.0001	< 0.001	7.9	1	< 0.001	1,710	< 0.0005	2,550
1009D	CTLN-1705-406	5/17/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.32	< 0.001	74	< 0.005	< 0.005	1	< 0.02	< 0.001	< 0.1	0.051	< 0.0001	0.001	7.8	1.4	< 0.001	1,810	< 0.0005	2,870
1009D	CTLN-1706-404	6/15/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.3	< 0.001	86	< 0.005	< 0.005	0.9	< 0.02	< 0.001	< 0.1	0.054	< 0.0001	< 0.001	7.9	0.7	< 0.001	1,750	< 0.0005	2,660
1009D	CTLN-1707-403	7/25/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.32	< 0.001	78	< 0.005	< 0.005	0.9	< 0.02	< 0.001	< 0.1	0.056	< 0.0001	< 0.001	7.8	1.2	< 0.001	1,760	< 0.0005	2,700
1009D	CTLN-1708-462	8/28/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.33	< 0.001	88	< 0.005	< 0.005	1.1	< 0.02	< 0.001	< 0.1	0.056	< 0.0001	< 0.001	7.9	-0.6	< 0.001	1,840	< 0.0005	2,680
1082D	TLN-1602-328-CCR	2/17/2016	< 0.001	< 0.001	< 0.05	< 0.001	15.2	< 0.001	502	< 0.005	0.008	0.2	< 0.02	< 0.001	0.4	0.01	< 0.0001	< 0.001	6.9	9.3	0.01	9,660	< 0.0005	15,100
1082D	CTLN-1604-206	4/20/2016	< 0.001	0.001	< 0.05	< 0.001	15.1	< 0.001	486	< 0.005	0.006	0.2	0.3	< 0.001	0.4	0.007	< 0.0001	< 0.001	7.0	9.7	0.016	9,410	< 0.0005	15,100
1082D	CTLN-1605-401	5/25/2016	< 0.001	< 0.001	< 0.05	< 0.001	15.2	< 0.001	477	< 0.005	0.007	0.2	< 0.1	< 0.001	0.4	0.015	< 0.0001	< 0.001	6.9	9.5	0.012	9,520	< 0.0005	14,000
1082D	CTLN-1607-502	7/5/2016	< 0.001	< 0.001	< 0.05	< 0.001	14.1	< 0.001	469	< 0.005	< 0.005	0.2	< 0.02	< 0.001	0.3	0.005	< 0.0001	< 0.001	7.0	7.4	0.011	9,980	< 0.0005	15,200
1082D	CTLN-1608-911	8/22/2016	< 0.001	< 0.001	< 0.05	< 0.001	13.8	< 0.001	442	< 0.005	0.006	0.2	< 0.2	0.001	0.3	< 0.001	< 0.0001	< 0.001	6.9	8.5	0.013	10,100	< 0.0005	14,200
1082D	CTLN-1611-207	11/16/2016	< 0.001	< 0.001	< 0.05	< 0.001	14.3	< 0.001	470	< 0.005	0.007	0.2	< 0.2	0.002	0.4	0.004	< 0.0001	< 0.001	7.0	9.1	< 0.008	10,500	< 0.001	14,600
1082D	CTLN-1612-102	12/28/2016	< 0.001	0.001	< 0.05	< 0.001	13.8	< 0.001	470	< 0.005	0.006	0.2	< 0.02	< 0.001	0.3	0.01	< 0.0001	< 0.001	6.9	5.6	< 0.008	9,850	< 0.0005	14,400
1082D	CTLN-1702-727	2/28/2017	< 0.001	< 0.003	< 0.05	< 0.002	13.6	< 0.001	448	< 0.005	0.008	0.2	< 0.07	< 0.001	0.3	0.012	< 0.0001	< 0.001	6.9	7.2	0.008	10,000	< 0.0005	14,600
1082D	CTLN-1704-908	4/10/2017	< 0.001	< 0.001	< 0.05	< 0.003	14.1	< 0.001	440	< 0.005	0.007	0.2	0.02	0.001	0.2	0.007	< 0.0001	0.002	7	5.5	0.011	9,930	< 0.0008	13,600
1082D	CTLN1705-306B	5/16/2017	< 0.001	< 0.002	< 0.05	< 0.001	13.9	< 0.001	451	< 0.005	0.008	0.2	0.06	< 0.001	0.2	< 0.001	< 0.0001	0.012	7	8.2	0.013	10,200	< 0.0005	14,700
1082D	CTLN-1706-305	6/14/2017	< 0.001	< 0.003	< 0.05	< 0.002	14.5	< 0.001	468	< 0.005	0.007	0.2	0.02	< 0.001	0.4	0.007	< 0.0001	< 0.001	7	6.1	< 0.007	10,100	< 0.0005	13,800
1082D	CTLN-1707-320	7/26/2017	< 0.001	< 0.001	< 0.05	< 0.001	13.2	< 0.001	444	< 0.005	0.006	0.2	0.03	< 0.001	0.2	0.009	< 0.0001	< 0.001	7	13.8	0.009	10,100	< 0.0005	14,600
1082D	CTLN-1708-313	8/29/2017	< 0.001	< 0.001	< 0.05	< 0.001	12.3	< 0.001	462	< 0.005	0.005	0.2	< 0.02	< 0.001	0.3	0.007	< 0.0001	< 0.001	7	5.5	0.01	7,940	< 0.0005	14,700
1116D	TLN-1602-300-CCR	2/4/2016	< 0.001	< 0.001	< 0.05	< 0.001	74.8	0.001	524	0.006	0.034	0.3	0.12	0.001	0.9	0.775	< 0.0001	< 0.001	7.0	7.3	0.007	13,700	< 0.0005	18,300
1116D	CTLN-1604-204	4/20/2016	< 0.001	< 0.001	< 0.05	< 0.001	78.9	< 0.001	552	< 0.005	0.029	0.3	0.03	< 0.001	1	0.667	< 0.0001	< 0.001	7.1	7.3	0.08	13,200	< 0.0005	20,400
1116D (Dup)	CTLN-1604-205	4/20/2016	< 0.001	< 0.001	< 0.05	< 0.001	76.8	< 0.001	531	< 0.005	0.026	0.3	< 0.03	< 0.001	1	0.665	< 0.0001	< 0.001	7.1	6.6	0.08	13,200	< 0.0005	20,500
1116D	CTLN-1605-400	5/25/2016	< 0.001	0.001	< 0.05	< 0.001	78.6	< 0.001	539	< 0.005	0.031	0.3	< 0.1	< 0.001	1.1	0.612	< 0.0001	< 0.001	7.1	6.1	0.007	13,200	< 0.0005	19,600
1116D	CTLN-1607-503	7/5/2016	< 0.001	< 0.001	< 0.05	< 0.001	77.2	< 0.001	554	< 0.005	0.016	0.2	< 0.02	0.001	1	0.262	< 0.0001	< 0.001	7.0	11.9	0.005	12,500	< 0.0005	19,700
1116D	CTLN-1608-909	8/22/2016	< 0.001	0.001	< 0.05	< 0.001	71.6	< 0.001	502	< 0.005	0.03	0.3	< 0.2	0.001	0.9	0.473	< 0.0001	< 0.001	7.1	7	0.005	14,100	< 0.0005	19,700
1116D	CTLN-1611-208	11/16/2016	< 0.001	< 0.001	< 0.05	< 0.001	83.8	< 0.001	589	< 0.005	0.027	0.3	0.03	0.002	1.2	0.376	< 0.0001	< 0.001	7.1	9.6	< 0.008	13,400	< 0.001	20,000
1116D	CTLN-1612-101	12/28/2016	< 0.001	< 0.001	< 0.05	< 0.001	80.3	0.002	565	< 0.005	0.027	0.3	< 0.02	< 0.001	1	0.398	< 0.0001	< 0.001	7.1	5.2	< 0.008	13,600	< 0.0005	19,800
1116D	CTLN-1702-706	2/16/2017	< 0.001	< 0.002	< 0.05	< 0.001	71.5	< 0.001	453	< 0.005	0.027	0.3	< 0.02	0.001	0.9	0.327	< 0.0001	< 0.001	7.1	8	0.004	14,000	< 0.0005	20,200
1116D	CTLN-1704-911	4/12/2017	< 0.001	< 0.001	< 0.05	< 0.003	81.5	< 0.001	528	< 0.005	0.027	0.3	< 0.02	0.001	0.9	0.39	< 0.0001	< 0.001	7.2	5.6	0.006	14,000	< 0.0008	18,000
1116D	CTLN1705-305B	5/16/2017	< 0.001	< 0.001	< 0.05	< 0.001	81.4	< 0.001	552	< 0.005	0.029	0.3	< 0.02	0.001	1	0.411	< 0.0001	0.004	7.2	7.5	0.007	14,300	< 0.0005	18,400
1116D	CTLN-1706-304	6/14/2017	< 0.001	< 0.003	< 0.05	< 0.002	81.1	0.001	588	< 0.005	0.026	0.3	0.03	0.001	1.1	0.346	0.0001	< 0.001	7.2	6.3	< 0.007	13,700	< 0.0005	19,900
1116D	CTLN-1707-318	7/25/2017	< 0.001	0.001	< 0.05	< 0.001	76.6	0.003	542	< 0.005	0.028	0.3	0.05	0.003	0.9	0.37	0.0001	< 0.001	7.1	7.7	0.005	13,900	< 0.0005	18,800
1116D	CTLN-1708-305	8/23/2017	< 0.001	0.001	< 0.05	< 0.001	88.4	0.001	614	< 0.005	0.03	0.3	< 0.02	0.001	0.8	0.458	< 0.0001	< 0.001	7.1	13.7	0.005	14,200	< 0.0005	18,800
1116D (Dup)	CTLN-1708-306	8/23/2017	< 0.001	0.001	< 0.05	< 0.001	84.9	0.001	579	< 0.005	0.03	0.3	< 0.02	0.001	0.7	0.467	< 0.0001	< 0.001	7.1	5.5	0.005	14,100	< 0.0005	19,400
1119D	TLN-1602-327-CCR	2/17/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.46	< 0.001	59	< 0.005	< 0.005	1.2	< 0.02	< 0.001	< 0.1	0.034	< 0.0001	< 0.001	7.7	2.1	< 0.002	2,280	< 0.0005	3,950
1119D	CTLN-1604-208	4/21/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.49	< 0.001	58	< 0.005	< 0.005	1.4	0.02	< 0.001	0.1	0.003	< 0.0001	< 0.001	7.8	3	< 0.001	2,290	< 0.0005	3,880
1119D	CTLN-1606-422	6/13/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.4	< 0.001	54	< 0.005	< 0.005	1.4	0.02	< 0.001	< 0.1	0.002	< 0.0001	0.002	7.7	2.1	0.001	2,280	< 0.0005	3,780
1119D	CTLN-1607-522	7/12/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.4	< 0.001	51	< 0.005	< 0.005	1.2	< 0.09	< 0.001	< 0.1	< 0.001	< 0.0001	0.002	7.8	1	< 0.002	2,350	< 0.0005	3,770
1119D	CTLN-1608-910	8/22/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.4	< 0.001	55	< 0.005	< 0.005	1.2	< 0.09	< 0.001	< 0.1	< 0.001	< 0.0001	0.001	7.8	5.1	< 0.002	2,360	< 0.0005	3,870
1119D	CTLN-1611-231	11/29/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.4	< 0.001	66	< 0.005	< 0.005	1.2	< 0.02	< 0.001	0.1	0.001	< 0.0001	0.001	7.8	-1	< 0.002	2,420	< 0.0005	3,930
1119D	CTLN-1701-106	1/9/2017	< 0.001	< 0.002	< 0.05	< 0.001	0.35	< 0.001	56	< 0.005	< 0.005	1.2	< 0.04	< 0.001	< 0.1	0.002	< 0.0001	0.001	7.8	2.8	< 0.004	2,390	< 0.0005	3,820
1119D	CTLN-1702-708	2/21/2017	< 0.001	< 0.002	< 0.05	< 0.001	0.36	< 0.001	54	< 0.005	< 0.005	1.5	0.06	< 0.001	0.1	0.007	< 0.0001	0.072	7.8	2.8	< 0.004	2,330	0.0006	3,850
1119D	CTLN-1704-912	4/12/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.45	< 0.001	54	< 0.005	< 0.005	1.2	< 0.02	< 0.001	< 0.1	0.006	< 0.0001	0.002	7.9	1.4	< 0.002	2,380	< 0.0005	3,690
1119D	CTLN1705-307B	5/16/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.4	< 0.001	54	< 0.005	< 0.005	1.3	< 0.02	< 0.001	< 0.1	0.004	< 0.0001	0.003	7.9	2.3	< 0.002	2,360	< 0.0005	3,600
1119D	CTLN-1706-306	6/14/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.36	< 0.001	52	< 0.005	< 0.005	1.2	< 0.02	< 0.001	0.1	0.01	< 0.0001	0.001	7.8	3.3	< 0.002	2,380	< 0.0005	3,750
1119D	CTLN-1707-321	7/26/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.35	< 0.001	52	< 0.005	< 0.005	1.2	< 0.02	< 0.001	< 0.1	0.007	< 0.0001	0.001	8	2.3	< 0.001	2,360	< 0.0005	3,790
1119D	CTLN-1708-466	8/29/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.32	< 0.001	54	< 0.005	< 0.005	1.3	< 0.02	< 0.001	< 0.1	0.047	< 0.0001	0.001	7.8	0.9	< 0.001	2,330	< 0.0005	3,760
1174D-CCR	CTLN-1604-226	4/29/2016	0.001 TRC 0.002 DIS	0.004 TRC 0.003 DIS	0.11 TRC < 0.05 DIS	< 0.001 TRC < 0.001 DIS	1.28 TRC 1.26 DIS	< 0.001 TRC < 0.001 DIS	47 TRC 40 DIS	< 0.005 TRC < 0.005 DIS	< 0.005 TRC < 0.005 DIS	1.2	3.74 TRC 0.12 DIS	0.005 TRC < 0.001 DIS	0.1 **TRC** < 0.1 DIS	0.121 TRC 0.079 DIS	< 0.0001 TRC < 0.0001 DIS	0.007 TRC 0.007 DIS	8.0	3.5	< 0.001 TRC < 0.001 DIS	1,700	< 0.0005 TRC < 0.0005 DIS	2,960
1174D-CCR	CTLN-1606-427	6/14/2016	< 0.001	0.003	< 0.05	0.001	1.1	< 0.001	36	< 0.005	< 0.005	1.2	0.47	< 0.001	< 0.1	0.141	< 0.0001	0.006	7.8	1.5	< 0.001	1,660	< 0.0005	2,810
1174D-CCR	CTLN-1608-902	8/12/2016	< 0.001	0.004	< 0.05	< 0.001	1.04	< 0.001	39	< 0.005	< 0.005	1.2	0.35	< 0.001	< 0.1	0.134	< 0.0001	0.002	7.9	0.7	< 0.001	1,640	< 0.0005	2,840
1174D-CCR	CTLN-1610-385	10/17/2016	< 0.001	0.003	< 0.05	< 0.001	1.1	< 0.001	39	< 0.005	< 0.005	1.3	0.18	< 0.001	0.1	0.111	< 0.0001	< 0.001	7.9	0.7	< 0.001	1,600	< 0.0005	2,740
1174D-CCR	CTLN-1611-234	11/30/2016	< 0.001 TRC < 0.001 DIS	0.003 TRC 0.001 DIS	< 0.05 TRC < 0.05 DIS	< 0.001 TRC < 0.001 DIS	0.85 TRC 0.83 DIS	< 0.001 TRC < 0.001 DIS	39 TRC 32 DIS	< 0.005 TRC < 0.005 DIS	< 0.005 TRC < 0.005 DIS	1.5	0.47 TRC 0.04 DIS	< 0.001 TRC < 0.001 DIS	< 0.1 TRC < 0.1 DIS	0.118 TRC 0.100 DIS	< 0.0001 TRC < 0.0001 DIS	0.001 TRC < 0.001 DIS	7.9	-0.3	< 0.001 TRC < 0.001 DIS	1,620	< 0.0005 TRC < 0.0005 DIS	2,760
1174D-CCR	CTLN-1701-126	1/24/2017	< 0.001	0.001	< 0.05	< 0.001	0.79	< 0.001	33	< 0.005	< 0.005	1.4	0.09	< 0.001	< 0.1	0.108	< 0.0001	< 0.001	7.8	1	< 0.002	1,590	0.0007	2,630
1174D-CCR	CTLN-1702-728	2/28/2017	< 0.001	0.003	< 0.05	< 0.001	0.76	< 0.001	31	< 0.005	< 0.005	1.4	0.06	< 0.001	< 0.1	0.098	< 0.0001	< 0.001	7.8	1.6	< 0.002	1,560	< 0.0005	2,660
1174D-CCR	CTLN-1704-933	4/20/2017	< 0.001	0.002	< 0.05	< 0.001	0.75	< 0.001	31	< 0.005	< 0.005	1.4	0.06	< 0.001	< 0.1	0.102	< 0.0001	< 0.001	7.8	1.4	< 0.002	1,560	< 0.0005	2,550
1174D-CCR	CTLN1705-314B	5/18/2017	< 0.001	0.002	< 0.05	< 0.001	0.65	< 0.001	29	< 0.005	< 0.005	1.4	0.05	< 0.001	< 0.1	0.097	< 0.0001	< 0.001	7.9	0.4	< 0.001	1,540	< 0.0005	2,680
1174D-CCR	CTLN-1706-423	6/27/2017	< 0.001	0.003	< 0.05	< 0.001	0.65	< 0.001	31	< 0.005	< 0.005	1.3	0.07	< 0.001	< 0.1	0.083	< 0.0001	< 0.001	7.8	6.1	< 0.001	1,710	< 0.0005	2,490
1174D-CCR	CTLN-1708-422	8/2/2017	< 0.001	0.002	< 0.05	< 0.001	0.54	< 0.001	26	< 0.005	< 0.005	1.4	0.05	< 0.001	< 0.1	0.096	< 0.0001	< 0.001	7.8	4	< 0.001	1,610	< 0.0005	2,520
1174D-CCR	CTLN-1708-475	8/31/2017	< 0.001	0.002	< 0.05	< 0.001	0.61	< 0.001	30	< 0.005	< 0.005	1.4	0.05	< 0.001	< 0.1	0.095	< 0.0001	< 0.001	7.8	-0.6	< 0.001	1,690	< 0.0005	2,550

**** DRAFT ****

2/20/2019

Appendix F

Colstrip SES Federal CCR Rule Groundwater Draft Baseline Monitoring Data - 2016 Through August 2017

Comparison to USEPA MCLs (If No MCL Listed Then EPA RSL For Tapwater - Ingestion For Child, RSL Limit Was Used)

***Metals analyzed as Total Recoverable (TRC) unless turbidity >10, then metals ran both as Total Recoverable (TRC) and Dissolved (DIS).**

Highlighted Values Exceed MCL or EPA Tapwater RSL

Highlighted Values Are Detection Limits Higher than the MCL or EPA Tapwater RSL

Site Code	Sample Code	Date	ANTIMONY 7440-36-0 mg/L	ARSENIC 7440-38-2 mg/L	BARIUM 7440-39-3 mg/L	BERYLLIUM 7440-41-7 mg/L	BORON 7440-42-8 mg/L	CADMIUM 7440-43-9 mg/L	CALCIUM 7440-70-2 mg/L	CHROMIUM 7440-47-3 mg/L	COBALT 7440-48-4 mg/L	FLUORIDE 16984-48-8 mg/L	IRON 7439-89-6 mg/L	LEAD 7439-92-1 mg/L	LITHIUM 7439-93-2 mg/L	MANGANESE 7439-96-5 mg/L	MERCURY 7439-97-6 mg/L	MOLYBDENUM 7439-98-7 mg/L	pH NA standard units	RADIUM 226/228 7440-14-4 pCi/L	SELENIUM 7782-49-2 mg/L	SULFATE 14808-79-8 mg/L	THALLIUM 7440-28-0 mg/L	TDS NA mg/L
			MCL - 0.006	MCL - 0.01	MCL - 2.0	MCL - 0.004	RSL - 4.0	MCL - 0.005	No MCL/ RSL	MCL - 0.1	RSL - 0.006	MCL - 4.0	RSL - 14.0	MCL - 0.015	RSL - 0.04	RSL - 0.43	MCL - 0.002	RSL - 0.1	No MCL/ RSL	MCL - 5.0	MCL - 0.05	No MCL/ RSL	MCL - 0.002	No MCL/ RSL
1175D-CCR	CTLN-1604-201	4/19/2016	< 0.001	< 0.001	< 0.05	< 0.001	2.66	< 0.001	282	< 0.005	< 0.005	0.4	0.1	< 0.001	0.2	0.418	< 0.0001	0.003	7.3	4.3	0.002	1,910	< 0.0005	3,240
1175D-CCR	CTLN-1605-406	5/26/2016	< 0.001	< 0.001	< 0.05	< 0.001	2.93	< 0.001	297	< 0.005	0.005	0.4	0.84	0.001	0.2	0.438	< 0.0001	0.002	7.2	3.6	< 0.001	1,880	< 0.0005	3,160
1175D-CCR	CTLN-1607-506	7/6/2016	< 0.001	< 0.001	< 0.05	< 0.001	2.66	< 0.001	277	< 0.005	< 0.005	0.4	2.55	< 0.001	0.2	0.441	< 0.0001	0.001	7.2	3.4	< 0.001	1,810	< 0.0005	3,070
1175D-CCR	CTLN-1608-924	8/25/2016	< 0.001 TRC < 0.001 DIS	0.001 TRC 0.001 DIS	< 0.05 TRC < 0.05 DIS	< 0.001 TRC < 0.001 DIS	2.67 TRC 2.55 DIS	< 0.001 TRC < 0.001 DIS	257 TRC 266 DIS	< 0.005 TRC < 0.005 DIS	< 0.005 TRC < 0.005 DIS	0.4	1.50 TRC 0.45 DIS	< 0.001 TRC < 0.001 DIS	0.1 **TRC** 0.1 **DIS**	0.441 **TRC** 0.427 DIS	< 0.0001 TRC < 0.0001 DIS	< 0.001 TRC < 0.001 DIS	7.6	2.6	< 0.001 TRC < 0.001 DIS	1,900	< 0.0005 TRC < 0.0005 DIS	3,040
1175D-CCR	CTLN-1611-202	11/15/2016	< 0.001	< 0.001	< 0.05	< 0.001	2.61	< 0.001	256	< 0.005	< 0.005	0.5	1.41	< 0.001	0.2	0.381	< 0.0001	< 0.001	7.2	4	< 0.002	1,780	< 0.0005	2,960
1175D-CCR	CTLN-1701-128	1/24/2017	< 0.001	0.001	< 0.05	< 0.001	2.74	< 0.001	262	< 0.005	< 0.005	0.4	2.2	< 0.001	0.1	0.353	< 0.0001	< 0.001	7.2	2.3	< 0.002	1,800	< 0.0005	2,900
1175D-CCR	CTLN-1702-721	2/23/2017	< 0.001	0.001	< 0.05	< 0.001	2.81	< 0.001	261	< 0.005	< 0.005	0.4	1.93	< 0.001	0.2	0.371	< 0.0001	< 0.001	7.2	3.1	< 0.002	1,730	< 0.0005	2,900
1175D-CCR	CTLN-1704-918	4/13/2017	< 0.001	< 0.001	< 0.05	< 0.001	2.78	< 0.001	238	< 0.005	< 0.005	0.4	2.1	< 0.001	0.1	0.339	< 0.0001	< 0.001	7.3	2	< 0.001	1,730	< 0.0005	2,790
1175D-CCR	CTLN-1705-318	5/30/2017	< 0.001	0.001	< 0.05	< 0.001	2.59	< 0.001	233	< 0.005	< 0.005	0.4	3.01	< 0.001	0.1	0.325	< 0.0001	< 0.001	7.3	2.6	< 0.001	1,850	< 0.0005	2,930
1175D-CCR	CTLN-1706-424	6/27/2017	< 0.001	< 0.001	< 0.05	< 0.001	2.9	< 0.001	255	< 0.005	< 0.005	0.4	2.69	< 0.001	0.1	0.292	< 0.0001	< 0.001	7.3	2.2	< 0.001	1,940	< 0.0005	2,770
1175D-CCR	CTLN-1707-411	7/31/2017	< 0.001	< 0.001	< 0.05	< 0.001	2.72	< 0.001	248	< 0.005	< 0.005	0.4	2.55	< 0.001	0.1	0.301	< 0.0001	< 0.001	7.3	5.8	< 0.001	1,830	< 0.0005	2,890
1175D-CCR	CTLN-1708-316	8/30/2017	< 0.001	< 0.001	< 0.05	< 0.001	2.58	< 0.001	241	< 0.005	< 0.005	0.4	2.19	< 0.001	0.1	0.298	< 0.0001	< 0.001	7.2	2.6	< 0.001	1,950	< 0.0005	2,840
1176M-CCR	CTLN-1604-202	4/19/2016	< 0.001	0.002	< 0.05	< 0.001	1.71	< 0.001	645	< 0.005	< 0.005	0.3	5.01	< 0.001	0.2	0.692	< 0.0001	< 0.001	7.2	3.1	0.02	3,690	< 0.0005	6,160
1176M-CCR	CTLN-1605-414	5/31/2016	< 0.001	< 0.001	< 0.05	< 0.001	2.9	< 0.001	628	< 0.005	< 0.005	0.3	2.75	< 0.001	0.2	0.444	< 0.0001	0.002	6.9	3.6	0.016	4,120	< 0.0005	6,450
1176M-CCR	CTLN-1607-515	7/8/2016	< 0.001	< 0.001	< 0.05	< 0.001	3.32	< 0.001	627	< 0.005	< 0.005	0.2	2.55	< 0.001	0.2	0.459	< 0.0001	< 0.001	6.9	2.6	0.013	4,240	< 0.0005	6,470
1176M-CCR	CTLN-1608-916	8/23/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.91	< 0.001	660	< 0.005	< 0.005	0.3	6.62	< 0.001	0.2	0.605	< 0.0001	< 0.001	7.2	7	0.003	3,740	< 0.0005	6,000
1176M-CCR	CTLN-1608-917	8/23/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.87	< 0.001	654	< 0.005	< 0.005	0.3	6.57	< 0.001	0.2	0.6	< 0.0001	< 0.001	7.2	4.8	0.004	3,760	< 0.0005	6,000
1176M-CCR	CTLN-1611-201	11/15/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.73	< 0.001	628	< 0.005	< 0.005	0.3	5.41	< 0.001	0.2	0.607	< 0.0001	< 0.001	6.9	2.6	< 0.004	3,780	0.0005	5,890
1176M-CCR	CTLN-1701-127	1/24/2017	< 0.001 TRC < 0.001 DIS	< 0.002 TRC < 0.002 DIS	< 0.05 TRC < 0.05 DIS	< 0.001 TRC < 0.001 DIS	1.99 TRC 1.84 DIS	< 0.001 TRC < 0.001 DIS	677 TRC 633 DIS	< 0.005 TRC < 0.005 DIS	< 0.005 TRC < 0.005 DIS	0.3	6.32 TRC 4.04 DIS	< 0.001 TRC < 0.001 DIS	0.2 **TRC** 0.2 **DIS**	0.571 **TRC** 0.567 **DIS**	< 0.0001 TRC < 0.0001 DIS	< 0.001 TRC < 0.001 DIS	6.9	1.4	< 0.004 TRC 0.004 DIS	3,940	< 0.0005 TRC 0.0005 DIS	5,920
1176M-CCR	CTLN-1702-722	2/23/2017	< 0.001	< 0.001	< 0.05	< 0.001	4.19	< 0.001	632	< 0.005	< 0.005	0.3	1.93	< 0.001	0.2	0.414	< 0.0001	0.001	7.0	1.8	0.016	4,130	< 0.0005	6,630
1176M-CCR	CTLN-1704-917	4/13/2017	< 0.001	< 0.001	< 0.05	< 0.001	5.77	< 0.001	577	< 0.005	< 0.005	0.2	1.63	< 0.001	0.1	0.3	< 0.0001	0.001	7.2	2.7	0.023	4,560	< 0.0005	6,450
1176M-CCR	CTLN-1705-316	5/30/2017	< 0.001	< 0.001	< 0.05	< 0.001	5.67	< 0.001	576	< 0.005	< 0.005	0.3	1.63	< 0.001	0.1	0.341	< 0.0001	0.001	7	1.1	0.026	4,330	< 0.0007	6,920
1176M-CCR (Dup)	CTLN-1705-317	5/30/2017	< 0.001	< 0.001	< 0.05	< 0.001	5.35	< 0.001	623	< 0.005	< 0.005	0.2	2.31	< 0.001	0.1	0.407	< 0.0001	< 0.001	7	1	0.024	4,220	< 0.0007	6,930
1176M-CCR	CTLN-1706-425	6/27/2017	< 0.001	< 0.001	< 0.05	< 0.001	4.24	< 0.001	610	< 0.005	< 0.005	0.3	1.95	< 0.001	0.2	0.443	< 0.0001	< 0.001	7	5.4	0.012	4,220	< 0.0005	6,240
1176M-CCR	CTLN-1707-412	7/31/2017	< 0.001	< 0.001	< 0.05	< 0.001	3.3	< 0.001	617	< 0.005	< 0.005	0.3	2.27	< 0.001	0.1	0.505	< 0.0001	< 0.001	6.9	2.8	0.009	3,950	< 0.0005	6,300
1176M-CCR	CTLN-1708-315	8/29/2017	< 0.001	< 0.001	< 0.05	< 0.001	2.65	< 0.001	651	< 0.005	< 0.005	0.3	3.69	< 0.001	0.1	0.543	< 0.0001	< 0.001	6.9	2	0.007	3,850	< 0.0005	5,940
1177D-CCR	CTLN-1604-200	4/19/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.01	< 0.001	328	< 0.005	< 0.005	0.4	1.46	< 0.001	0.2	0.189	< 0.0001	< 0.001	7.5	4.9	< 0.001	2,310	< 0.0005	3,820
1177D-CCR	CTLN-1605-412	5/31/2016	< 0.001	0.001	< 0.05	< 0.001	1.39	< 0.001	345	< 0.005	< 0.005	0.5	3.43	< 0.001	0.2	0.143	< 0.0001	< 0.001	7.1	5.2	< 0.001	2,670	< 0.0005	4,300
1177D-CCR	CTLN-1605-413	5/31/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.38	< 0.001	335	< 0.005	< 0.005	0.4	3.37	< 0.001	0.2	0.139	< 0.0001	< 0.001	7.2	4.9	< 0.001	2,730	< 0.0005	4,240
1177D-CCR	CTLN-1607-512	7/7/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.34	< 0.001	350	< 0.005	< 0.005	0.4	3.7	< 0.001	0.2	0.135	< 0.0001	< 0.001	7.2	4.4	< 0.001	2,720	< 0.0005	4,120
1177D-CCR	CTLN-1608-914	8/23/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.39	< 0.001	340	< 0.005	< 0.005	0.5	4.35	< 0.001	0.2	0.13	< 0.0001	< 0.001	7.5	10.1	< 0.001	2,800	< 0.0005	4,250
1177D-CCR	CTLN-1611-217	11/21/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.43	< 0.001	355	< 0.005	< 0.005	0.5	4.34	< 0.001	0.2	0.135	< 0.0001	< 0.001	7.1	4.5	< 0.002	2,800	< 0.0005	4,340
1177D-CCR	CTLN-1702-709	2/21/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.31	< 0.001	366	< 0.005	< 0.005	0.5	4.41	< 0.001	0.2	0.132	< 0.0001	< 0.001	7.2	4.3	< 0.002	2,950	< 0.0005	4,690
1177D-CCR	CTLN-1702-710	2/21/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.43	< 0.001	391	< 0.005	< 0.005	0.5	4.66	< 0.001	0.2	0.144	< 0.0001	< 0.001	7.2	4.8	< 0.002	3,010	< 0.0005	4,710
1177D-CCR	CTLN-1703-400	3/27/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.45	< 0.001	391	< 0.005	< 0.005	0.5	4.56	< 0.001	0.2	0.151	< 0.0001	< 0.001	7.1	3.7	< 0.002	3,030	< 0.0005	4,520
1177D-CCR	CTLN-1704-932	4/20/2017	< 0.001	0.001	< 0.05	< 0.001	1.38	< 0.001	379	< 0.005	< 0.005	0.5	5	< 0.001	0.1	0.153	< 0.0001	< 0.001	7.2	3.6	< 0.002	3,070	< 0.0005	4,530
1177D-CCR	CTLN-1705-401	5/16/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.23	< 0.001	356	< 0.005	< 0.005	0.5	4.14	< 0.001	0.1	0.138	< 0.0001	0.001	7.2	6.4	< 0.001	3,240	< 0.0005	4,590
1177D-CCR	CTLN-1706-409	6/21/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.37	< 0.001	392	< 0.005	< 0.005	0.4	4.23	< 0.001	0.2	0.144	< 0.0001	< 0.001	7.2	6.1	< 0.002	3,130	< 0.0005	4,880
1177D-CCR	CTLN-1707-305	7/18/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.31	< 0.001	407	< 0.005	< 0.005	0.4	5.32	0.002	< 0.1	0.169	< 0.0001	< 0.001	7.1	6.7	< 0.002	3,330	< 0.0007	5,070
1177D-CCR	CTLN-1708-459	8/22/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.46	< 0.001	420	< 0.005	< 0.005	0.4	5.43	< 0.001	0.1	0.176	< 0.0001	< 0.001	7.1	5.2	< 0.001	3,380	< 0.0005	5,070
1178M-CCR	CTLN-1605-245	5/3/2016	< 0.001	< 0.001	< 0.05	< 0.001	3.39	< 0.001	359	< 0.005	< 0.005	0.2	1.71	< 0.001	0.2	0.567	< 0.0001	0.003	7.0	3	< 0.002	1,720	< 0.0005	2,830
1178M-CCR	CTLN-1606-432	6/15/2016	< 0.001	< 0.001	< 0.05	< 0.001	3.74	< 0.001	349	< 0.005	< 0.005	0.2	3.51	< 0.001	0.2	0.28	< 0.0001	0.002	7.0	3.8	< 0.001	1,680	< 0.0005	2,700
1178M-CCR	CTLN-1607-526	7/26/2016	< 0.001	< 0.001	< 0.05	< 0.001	3.7	< 0.001	337	< 0.005	< 0.005	0.2	4.04	< 0.001	0.2	0.255	< 0.0001	0.001	7.0	2	< 0.001	1,680	< 0.0005	2,710
1178M-CCR	CTLN-1608-933	8/30/2016	< 0.001	< 0.001	< 0.05	< 0.001	3.52	< 0.001	344	< 0.005	< 0.005	0.2	3.97	< 0.001	0.2	0.228	< 0.0001	< 0.001	7.0	1.8	< 0.001	1,850	< 0.0005	2,690
1178M-CCR	CTLN-1611-218	11/21/2016	< 0.001	< 0.001	< 0.05	< 0.001	3.7	< 0.001	339	< 0.005	< 0.005	0.2	3.41	< 0.001	0.2	0.23	< 0.0001	< 0.001	7.0	2.3	< 0.002	1,680	< 0.0005	2,660
1178M-CCR	CTLN-1701-116	1/11/2017	< 0.001	< 0.001	< 0.05	< 0.001	3.52	< 0.001	331	< 0.005	< 0.005	0.2	3.5	0.003	0.2	0.226	< 0.0001	< 0.001	7.0	4.6	< 0.002	1,720	< 0.0005	2,620
1178M-CCR	CTLN-1702-703	2/15/2017	< 0.001	< 0.001	< 0.05	< 0.001	3.45	< 0.001	331	< 0.005	< 0.005	0.2	3.38	< 0.001	0.2	0.262	< 0.0001	< 0.001	7.0	4.8	< 0.001	1,700	< 0.0005	2,640
1178M-CCR	CTLN-1704-936	4/21/2017	< 0.001	< 0.001	< 0.05	< 0.001	3.32	< 0.001	316	< 0.005	< 0.005	0.2	1	< 0.001	0.2	0.252	< 0.0001	0.001	7.1	1.5	< 0.002	1,560	< 0.0005	2,530
1178M-CCR	CTLN-1705-402	5/16/2017	< 0.001	< 0.001	< 0.05	< 0.001	3.12	< 0.001	317	< 0.005	< 0.005	0.3	1.04	< 0.001	0.2	0.239	< 0.0001	0.002	7.1	1.6	< 0.001	1,590	< 0.0005	2,490
1178M-CCR	CTLN-1706-413	6/22/2017	< 0.001	< 0.001	< 0.05	< 0.001	3.25	< 0.001	332	< 0.005	< 0.005	0.3	0.95	< 0.001	0.2	0.254	< 0.0001	< 0.001	7.1	5.1	< 0.001	1,640	< 0.0005	2,510
1178M-CCR	CTLN-1707-319	7/26/2017	< 0.001	< 0.001	< 0.05	< 0.001	2.79	< 0.001	303	< 0.005	< 0.005	0.3	1.53	< 0.001	0.1	0.221	< 0.0001	< 0.001	7.1	5	< 0.001	1,630	< 0.0005	2,570
1178M-CCR	CTLN-1708-458	8/22/2017	< 0.001	< 0.001	< 0.05	< 0.001	2.93	< 0.001	331	< 0.005	< 0.005	0.3	2.41	< 0.001	0.2	0.234	< 0.0001	< 0.001	7.1	3.4	< 0.001	1,820	< 0.0005	2,720
1179D-CCR	CTLN-1605-242	5/2/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.55	< 0.001	215	< 0.005	< 0.005	0.2	2.06	< 0.001	0.1	0.089	< 0.0001	< 0.001	7.4	5.1	< 0.002	1,620	< 0.0005	2,750
1179D-CCR	CTLN-1605-410	5/30/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.48	< 0.001	224	< 0.005	< 0.005	0.2	2.36	< 0.001	0.1	0.073	< 0.0001	< 0.001	7.3	3.6	< 0.001	1,590	< 0.0005	2,730
1179D-CCR	CTLN-1607-511	7/7/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.54	< 0.001	236	< 0.005	< 0.005	0.2	2.17	< 0.001	< 0.1	0.072	< 0.0001	< 0.001	7.2	7.6	< 0.001	1,680	< 0.0005	2,730
1179D-CCR	CTLN-1610-377	10/12/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.6	< 0.001	206	< 0.005	< 0.005	0.2	2.22	< 0.001	0.1	0.07	< 0.0001	< 0.001	7.3	4.9	< 0.001	1,690	< 0.0005	2,700
1179D-CCR	CTLN-1611-226	11/28/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.5	< 0.001	210	< 0.005	< 0.005	0.2	2.41	< 0.001	0.1	0.07	< 0.0001	< 0.001	7.3	3.1	< 0.001	1,670	< 0.0005	2,790
1179D-CCR	CTLN-1701-108	1/9/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.51	< 0.001	220	< 0.005	< 0.005	0.2	2.36	< 0.001	< 0.1	0.07	< 0.0001	< 0.001	7.2	2.9	< 0.002	1,700	< 0.0005	2,740
1179D-CCR (Dup)	CTLN-1701-109	1/9/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.5	< 0.001	243	< 0.005	< 0.005	0.2	2.36	< 0.001	< 0.1	0.07	< 0.0001	< 0.001	7.2	4.2	< 0.002	1,670	< 0.0005	2,750
1179D-CCR	CTLN-1702-701	2/14/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.51	< 0.001	212	< 0.005	< 0.005	0.2	2.35	< 0.001	< 0.1	0.064	< 0.0001	< 0.001	7.3	3.2	< 0.001	1,730	< 0.0005	2,780

**** DRAFT ****

2/20/2019

Appendix F

Colstrip SES Federal CCR Rule Groundwater Draft Baseline Monitoring Data - 2016 Through August 2017

Comparison to USEPA MCLs (If No MCL Listed Then EPA RSL For Tapwater - Ingestion For Child, RSL Limit Was Used)

***Metals analyzed as Total Recoverable (TRC) unless turbidity >10, then metals ran both as Total Recoverable (TRC) and Dissolved (DIS).**

Highlighted Values Exceed MCL or EPA Tapwater RSL

Highlighted Values Are Detection Limits Higher than the MCL or EPA Tapwater RSL

Site Code	Sample Code	Date	ANTIMONY 7440-36-0 mg/L	ARSENIC 7440-38-2 mg/L	BARIUM 7440-39-3 mg/L	BERYLLIUM 7440-41-7 mg/L	BORON 7440-42-8 mg/L	CADMIUM 7440-43-9 mg/L	CALCIUM 7440-70-2 mg/L	CHROMIUM 7440-47-3 mg/L	COBALT 7440-48-4 mg/L	FLUORIDE 16984-48-8 mg/L	IRON 7439-89-6 mg/L	LEAD 7439-92-1 mg/L	LITHIUM 7439-93-2 mg/L	MANGANESE 7439-96-5 mg/L	MERCURY 7439-97-6 mg/L	MOLYBDENUM 7439-98-7 mg/L	pH NA standard units	RADIUM 226/228 7440-14-4 pCi/L	SELENIUM 7782-49-2 mg/L	SULFATE 14808-79-8 mg/L	THALLIUM 7440-28-0 mg/L	TDS NA mg/L
			MCL - 0.006	MCL - 0.01	MCL - 2.0	MCL - 0.004	RSL - 4.0	MCL - 0.005	No MCL/ RSL	MCL - 0.1	RSL - 0.006	MCL - 4.0	RSL - 14.0	MCL - 0.015	RSL - 0.04	RSL - 0.43	MCL - 0.002	RSL - 0.1	No MCL/ RSL	MCL - 5.0	MCL - 0.05	No MCL/ RSL	MCL - 0.002	No MCL/ RSL
1179D-CCR	CTLN-1704-935	4/20/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.54	< 0.001	213	< 0.005	< 0.005	0.2	2.28	< 0.001	< 0.1	0.077	< 0.0001	< 0.001	7.3	3.5	< 0.002	1,670	< 0.0005	2,690
1179D-CCR	CTLN-1705-410	5/18/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.49	< 0.001	200	< 0.005	< 0.005	0.2	2.08	< 0.001	< 0.1	0.059	< 0.0001	< 0.001	7.4	2.4	< 0.001	1,680	< 0.0005	2,800
1179D-CCR	CTLN-1706-403	6/14/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.47	< 0.001	220	< 0.005	< 0.005	0.2	2.38	< 0.001	0.1	0.063	< 0.0001	< 0.001	7.5	3.2	< 0.001	1,720	< 0.0005	2,630
1179D-CCR	CTLN-1707-312	7/20/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.57	< 0.001	241	< 0.005	< 0.005	0.2	2.04	< 0.001	< 0.1	0.064	< 0.0001	< 0.001	7.2	5.1	< 0.001	1,800	< 0.0005	2,730
1179D-CCR	CTLN-1708-308	8/24/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.56	< 0.001	221	< 0.005	< 0.005	0.2	2.21	< 0.001	< 0.1	0.067	< 0.0001	< 0.001	7.3	2.9	< 0.001	1,800	< 0.0005	2,800
1180D-CCR	CTLN-1604-129	4/13/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.56	< 0.001	286	< 0.005	< 0.005	0.3	1.92	< 0.001	0.1	0.125	< 0.0001	< 0.001	7.3	5.6	0.001	1,860	< 0.0005	3,090
1180D-CCR	CTLN-1605-405	5/26/2016	< 0.001	< 0.001	< 0.05	0.001	0.55	< 0.001	296	< 0.005	< 0.005	0.2	3.2	< 0.001	< 0.1	0.064	< 0.0001	< 0.001	7.1	3.9	< 0.001	1,760	< 0.0005	2,970
1180D-CCR	CTLN-1607-504	7/6/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.59	< 0.001	302	< 0.005	< 0.005	0.2	3.07	< 0.001	< 0.1	0.04	< 0.0001	< 0.001	7.1	2.8	< 0.001	1,820	< 0.0005	2,960
1180D-CCR	CTLN-1608-920	8/24/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.56	< 0.001	285	< 0.005	< 0.005	0.2	3.21	< 0.001	< 0.1	0.031	< 0.0001	< 0.001	7.5	3.7	< 0.001	1,830	< 0.0005	2,990
1180D-CCR	CTLN-1611-228	11/28/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.56	< 0.001	283	< 0.005	< 0.005	0.2	3.3	< 0.001	< 0.1	0.033	< 0.0001	< 0.001	7.1	1.3	< 0.001	1,760	< 0.0005	2,940
1180D-CCR	CTLN-1701-120	1/12/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.53	< 0.001	275	< 0.005	< 0.005	0.2	3.27	< 0.001	< 0.1	0.031	< 0.0001	< 0.001	7.1	7.4	< 0.002	1,850	< 0.0005	2,870
1180D-CCR	CTLN-1702-711	2/21/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.53	< 0.001	282	< 0.005	< 0.005	0.2	3.17	< 0.001	< 0.1	0.031	< 0.0001	< 0.001	7.1	3.5	< 0.002	1,800	< 0.0005	2,930
1180D-CCR	CTLN-1704-904	4/10/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.56	< 0.001	275	< 0.005	< 0.005	0.2	3.22	< 0.001	< 0.1	0.029	< 0.0001	< 0.001	7.2	3.3	< 0.001	1,770	< 0.0005	2,740
1180D-CCR	CTLN-1705-325	5/31/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.54	< 0.001	282	< 0.005	< 0.005	0.2	3.12	< 0.001	< 0.1	0.024	< 0.0001	< 0.001	7.2	2.5	0.002	1,980	< 0.0005	2,980
1180D-CCR	CTLN-1706-405	6/15/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.48	< 0.001	277	< 0.005	< 0.005	0.2	3.21	< 0.001	< 0.1	0.026	< 0.0001	< 0.001	7.3	4.6	< 0.001	1,850	< 0.0005	2,800
1180D-CCR (Dup)	CTLN-1706-406	6/15/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.45	< 0.001	271	< 0.005	< 0.005	0.2	3.22	< 0.001	< 0.1	0.026	< 0.0001	< 0.001	7.3	3	< 0.001	1,800	< 0.0005	2,820
1180D-CCR	CTLN-1707-402	7/24/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.55	< 0.001	282	< 0.005	< 0.005	0.2	3.18	< 0.001	< 0.1	0.029	< 0.0001	< 0.001	7.1	2.2	< 0.002	1,850	< 0.0005	2,930
1180D-CCR	CTLN-1708-090	8/24/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.58	< 0.001	268	< 0.005	< 0.005	0.2	2.97	< 0.001	< 0.1	0.029	< 0.0001	< 0.001	7.2	6.2	< 0.001	2,070	< 0.0005	2,840
1181M-CCR	CTLN-1604-125	4/12/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.92	< 0.001	487	< 0.005	< 0.005	0.2	1.28	< 0.001	0.3	1.2	< 0.0001	< 0.003	7.2	4.6	< 0.001	3,570	< 0.0005	5,480
1181M-CCR	CTLN-1606-458	6/22/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.62	< 0.001	469	< 0.005	< 0.005	0.2	6.84	< 0.001	0.3	0.698	< 0.0001	< 0.001	7.0	4.4	< 0.001	3,640	< 0.0005	5,600
1181M-CCR	CTLN-1607-533	7/27/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.67	< 0.001	464	< 0.005	< 0.005	0.2	7	< 0.001	0.2	0.766	< 0.0001	< 0.001	7.0	3.7	0.003	3,740	< 0.0005	5,540
1181M-CCR	CTLN-1610-386	10/17/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.82	< 0.001	538	< 0.005	< 0.005	0.2	6.44	< 0.001	0.3	0.672	< 0.0001	< 0.001	7.1	3.2	0.001	3,570	< 0.0005	5,510
1181M-CCR	CTLN-1611-232	11/29/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.71	< 0.001	508	< 0.005	< 0.005	0.2	6.44	< 0.001	0.3	0.73	< 0.0001	< 0.001	7.1	1.6	< 0.002	4,010	< 0.0005	5,620
1181M-CCR	CTLN-1701-121	1/12/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.63	< 0.001	469	< 0.005	< 0.005	0.2	6.38	< 0.001	0.2	0.719	< 0.0001	< 0.001	7.1	4.6	< 0.004	3,810	< 0.0005	5,530
1181M-CCR	CTLN-1702-713	2/22/2017	< 0.001	< 0.002	< 0.05	< 0.001	0.66	< 0.001	489	< 0.005	< 0.005	0.2	6.51	< 0.001	0.3	0.712	< 0.0001	< 0.001	7.0	2.4	< 0.004	3,640	< 0.0005	5,530
1181M-CCR	CTLN-1704-905	4/10/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.62	< 0.001	449	< 0.005	< 0.005	0.2	5.97	0.001	0.2	0.677	< 0.0001	< 0.001	7.1	3.4	< 0.002	3,700	< 0.0005	5,280
1181M-CCR	CTLN-1705-322	5/31/2017	< 0.001	0.001	< 0.05	< 0.001	0.65	< 0.001	467	< 0.005	< 0.005	0.2	5.49	0.002	0.2	0.663	< 0.0001	< 0.001	7.1	2.8	0.003	4,090	< 0.0007	5,860
1181M-CCR	CTLN-1706-418	6/26/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.74	< 0.001	525	< 0.005	< 0.005	0.2	5.69	< 0.001	0.2	0.685	< 0.0001	< 0.001	7.1	1.2	< 0.001	3,800	< 0.0005	5,420
1181M-CCR	CTLN-1707-413	7/31/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.71	< 0.001	496	< 0.005	< 0.005	0.2	4.53	< 0.001	0.2	0.647	< 0.0001	< 0.001	7.1	5.8	< 0.001	3,690	< 0.0005	5,480
1181M-CCR	CTLN-1708-472	8/30/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.67	< 0.001	460	< 0.005	< 0.005	0.3	4.93	< 0.001	0.1	0.669	< 0.0001	< 0.001	7	1.4	< 0.001	3,620	< 0.0005	5,520
1183M-CCR	CTLN-1605-241	5/2/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.85	< 0.001	656	< 0.005	< 0.005	0.2	4.93	0.002	0.3	0.662	< 0.0001	< 0.001	7.1	3.2	< 0.004	3,820	< 0.0005	6,190
1183M-CCR	CTLN-1606-430	6/15/2016	< 0.001	< 0.001	< 0.05	0.001	0.83	< 0.001	643	< 0.005	< 0.005	0.2	5.68	< 0.001	0.2	0.652	< 0.0001	< 0.001	7.0	3.7	< 0.001	3,820	< 0.0005	6,140
1183M-CCR	CTLN-1608-901	8/12/2016	< 0.001	< 0.001	< 0.05	< 0.002	0.83	< 0.001	712	< 0.005	< 0.005	0.2	5.6	< 0.001	0.3	0.69	< 0.0001	< 0.001	7.0	3.6	< 0.002	3,940	< 0.0005	6,190
1183M-CCR	CTLN-1610-387	10/17/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.92	< 0.001	725	< 0.005	< 0.005	0.2	5.8	< 0.001	0.3	0.624	< 0.0001	< 0.001	7.0	2.3	0.005	3,840	< 0.0005	6,190
1183M-CCR	CTLN-1610-388	10/17/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.98	< 0.001	726	< 0.005	< 0.005	0.2	5.84	< 0.001	0.3	0.635	< 0.0001	< 0.001	7.0	2	0.005	3,610	< 0.0005	6,280
1183M-CCR	CTLN-1611-236	11/30/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.81	< 0.001	736	< 0.005	< 0.005	0.2	5.48	< 0.001	0.3	0.66	< 0.0001	< 0.001	7.0	1.6	< 0.002	4,070	< 0.0005	6,300
1183M-CCR	CTLN-1701-132	1/25/2017	< 0.001	< 0.002	< 0.05	< 0.001	0.81	< 0.001	681	< 0.005	< 0.005	0.2	5.4	< 0.001	0.2	0.658	< 0.0001	< 0.001	7.0	2.5	< 0.004	4,020	0.0042	6,020
1183M-CCR	CTLN-1702-726	2/27/2017	< 0.001	< 0.002	< 0.05	< 0.001	0.84	< 0.001	674	< 0.005	< 0.005	0.2	5.24	< 0.001	0.2	0.672	< 0.0001	< 0.001	7.0	2.9	< 0.004	3,860	< 0.0005	6,190
1183M-CCR	CTLN-1704-923	4/18/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.83	< 0.001	667	< 0.005	< 0.005	0.3	5.2	< 0.001	0.2	0.678	< 0.0001	< 0.001	7	1.8	< 0.002	3,590	< 0.0005	5,860
1183M-CCR	CTLN-1705-321	5/31/2017	< 0.001	0.002	< 0.05	< 0.001	0.81	< 0.001	686	< 0.005	< 0.005	0.2	5.37	< 0.001	0.2	0.659	< 0.0001	0.001	7	1.3	0.008	4,230	< 0.0007	6,500
1183M-CCR	CTLN-1706-429	6/28/2017	< 0.001	0.002	< 0.05	< 0.001	0.83	< 0.001	688	< 0.005	< 0.005	0.2	5.29	< 0.001	0.2	0.632	< 0.0001	< 0.001	7.1	4.6	< 0.001	3,930	< 0.0005	5,760
1183M-CCR	CTLN-1708-414	8/1/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.81	< 0.001	716	< 0.005	< 0.005	0.2	5.82	< 0.001	0.2	0.691	< 0.0001	< 0.001	7	6.9	< 0.001	3,900	< 0.0005	6,200
1183M-CCR	CTLN-1708-320	8/31/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.66	< 0.001	680	< 0.005	< 0.005	0.3	5.62	< 0.001	0.2	0.708	< 0.0001	< 0.001	7	3.1	< 0.001	3,900	< 0.0005	6,030
1184D-CCR	CTLN-1604-128	4/13/2016	< 0.001	< 0.001	< 0.05	< 0.001	3.19	< 0.001	600	< 0.005	0.007	0.5	4.3	0.003	0.2	0.27	< 0.0001	0.003	7.2	7.9	< 0.002	4,460	< 0.0005	7,060
1184D-CCR	CTLN-1606-419	6/1/2016	< 0.001	0.004	< 0.05	< 0.001	8.69	< 0.001	647	< 0.005	< 0.005	0.5	8.06	< 0.001	0.2	0.132	< 0.0001	< 0.001	6.9	5.2	0.016	4,030	< 0.0005	6,400
1184D-CCR	CTLN-1607-521	7/11/2016	< 0.001	0.001	< 0.05	< 0.001	7.93	< 0.001	575	< 0.005	< 0.005	0.5	8.33	< 0.001	0.2	0.125	< 0.0001	< 0.001	7.0	4.3	0.007	3,920	< 0.0005	6,400
1184D-CCR	CTLN-1608-923	8/24/2016	< 0.001	< 0.001	< 0.05	< 0.001	7.67	< 0.001	583	< 0.005	< 0.005	0.4	7.71	< 0.001	0.2	0.111	< 0.0001	< 0.001	7.2	4.2	< 0.002	3,890	< 0.0005	6,300
1184D-CCR	CTLN-1612-240	12/1/2016	< 0.001	< 0.001	< 0.05	< 0.001	8.13	< 0.001	676	< 0.005	< 0.005	0.5	8.16	< 0.001	0.2	0.11	< 0.0001	< 0.001	7.0	4.2	< 0.002	3,980	< 0.0005	6,180
1184D-CCR	CTLN-1701-134	1/25/2017	< 0.001	< 0.002	< 0.05	< 0.001	7.51	< 0.001	569	< 0.005	< 0.005	0.5	7.52	< 0.001	0.1	0.097	< 0.0001	< 0.001	7.0	4.4	< 0.004	3,920	0.0026	6,150
1184D-CCR	CTLN-1703-737	3/8/2017	< 0.001	< 0.002	< 0.05	< 0.001	7.76	0.002	566	< 0.005	< 0.005	0.5	8.18	< 0.001	0.1	0.1	< 0.0001	< 0.001	7.0	6.7	< 0.004	3,740	< 0.0005	6,040
1184D-CCR	CTLN-1704-914	4/12/2017	< 0.001	< 0.001	< 0.05	< 0.001	8.28	< 0.001	577	< 0.005	< 0.005	0.4	8.44	< 0.001	0.1	0.099	< 0.0001	< 0.001	7.1	3.2	< 0.002	3,740	< 0.0005	5,440
1184D-CCR	CTLN-1705-323	5/31/2017	< 0.001	< 0.001	< 0.05	< 0.001	8.21	< 0.001	579	< 0.005	< 0.005	0.4	8.25	< 0.001	0.1	0.095	< 0.0001	< 0.001	7	4	0.005	3,810	< 0.001	6,240
1184D-CCR	CTLN-1706-428	6/28/2017	< 0.001	0.001	< 0.05	< 0.001	8.39	< 0.001	572	< 0.005	< 0.005	0.4	7.85	< 0.001	0.2	0.094	< 0.0001	< 0.001	7	3.7	< 0.001	3,640	< 0.0005	5,720
1184D-CCR	CTLN-1707-323	7/27/2017	< 0.001	< 0.001	< 0.05	< 0.001	7.9	< 0.001	540	< 0.005	< 0.005	0.4	8.24	< 0.001	0.1	0.095	< 0.0001	< 0.001	7	3.6	< 0.001	3,740	< 0.0005	6,030
1184D-CCR	CTLN-1708-471	8/30/2017	< 0.001	< 0.001	< 0.05	< 0.001	8.14	< 0.001	543	< 0.005	< 0.005	0.5	7.94	< 0.001	< 0.1	0.095	< 0.0001	< 0.001	6.9	3	< 0.001	3,720	< 0.0005	5,820
1185M-CCR	CTLN-1605-244	5/3/2016	< 0.001	0.005	< 0.05	< 0.001	3.66	< 0.001	449	< 0.005	< 0.005	0.5	3.94	< 0.001	0.4	0.88	< 0.0001	0.002	7.0	4.3	< 0.004	3,000	< 0.0005	4,760
1185M-CCR	CTLN-1606-418	6/1/2016	< 0.001	0.006	< 0.05	< 0.001	3.63	< 0.001	461	< 0.005	< 0.005	0.4	4.67	< 0.001	0.4	0.868	< 0.0001	0.002	6.9	3.8	< 0.001	2,980	< 0.0005	4,540
1185M-CCR	CTLN-1607-520	7/11/2016	< 0.001 TRC < 0.001 DIS	0.008 TRC 0.008 DIS	< 0.05 TRC < 0.05 DIS	< 0.001 TRC < 0.001 DIS	3.42 TRC 3.11 DIS	< 0.001 TRC < 0.001 DIS	449	< 0.005 TRC < 0.005 DIS	< 0.005 TRC < 0.005 DIS	0.4	5.78 TRC 4.81 DIS	< 0.001 TRC < 0.001 DIS	0.3 **TRC** 0.3 **DIS**	0.996 **TRC** 0.949 **DIS**	< 0.0001	< 0.001 TRC < 0.001 DIS	7.0	3.1	< 0.001 TRC 0.020 DIS	2,860	< 0.0005 TRC < 0.0005 DIS	4,510
1185M-CCR	CTLN-1608-922	8/24/2016	< 0.001	0.005	< 0.05	< 0.001	3.17	< 0.001	454	< 0.005	< 0.005	0.4	5.48	< 0.001	0.4	0.956	< 0.0001	< 0.001	7.2	3.7	< 0.001	2,980	< 0.0005	4,370
1185M-CCR	CTLN-1611-216	11/17/2016	< 0.001	0.003	< 0.05	< 0.001	3.24	< 0.001	484	< 0.005	< 0.005	0.4	7.04	< 0.001	0.4	0.923	< 0.0001	< 0.001	7.0	3	< 0.002	2,920	< 0.0005	4,280
1185M-CCR	CTLN-1701-133	1/25/2017	< 0.001	0.005	< 0.05	< 0.001	2.99	< 0.001	457	< 0.005	< 0.005	0.4	6.71	< 0.001	0.3	0.867	< 0.0001	< 0.001	6.9	2.8	< 0.004	2,980	0.0031	4,420

**** DRAFT ****

2/20/2019

Appendix F

Colstrip SES Federal CCR Rule Groundwater Draft Baseline Monitoring Data - 2016 Through August 2017

Comparison to USEPA MCLs (If No MCL Listed Then EPA RSL For Tapwater - Ingestion For Child, RSL Limit Was Used)

***Metals analyzed as Total Recoverable (TRC) unless turbidity >10, then metals ran both as Total Recoverable (TRC) and Dissolved (DIS).**

Highlighted Values Exceed MCL or EPA Tapwater RSL

Highlighted Values Are Detection Limits Higher than the MCL or EPA Tapwater RSL

Site Code	Sample Code	Date	ANTIMONY 7440-36-0 mg/L	ARSENIC 7440-38-2 mg/L	BARIUM 7440-39-3 mg/L	BERYLLIUM 7440-41-7 mg/L	BORON 7440-42-8 mg/L	CADMIUM 7440-43-9 mg/L	CALCIUM 7440-70-2 mg/L	CHROMIUM 7440-47-3 mg/L	COBALT 7440-48-4 mg/L	FLUORIDE 16984-48-8 mg/L	IRON 7439-89-6 mg/L	LEAD 7439-92-1 mg/L	LITHIUM 7439-93-2 mg/L	MANGANESE 7439-96-5 mg/L	MERCURY 7439-97-6 mg/L	MOLYBDENUM 7439-98-7 mg/L	pH NA standard units	RADIUM 226/228 7440-14-4 pCi/L	SELENIUM 7782-49-2 mg/L	SULFATE 14808-79-8 mg/L	THALLIUM 7440-28-0 mg/L	TDS NA mg/L
			MCL - 0.006	MCL - 0.01	MCL - 2.0	MCL - 0.004	RSL - 4.0	MCL - 0.005	No MCL/ RSL	MCL - 0.1	RSL - 0.006	MCL - 4.0	RSL - 14.0	MCL - 0.015	RSL - 0.04	RSL - 0.43	MCL - 0.002	RSL - 0.1	No MCL/ RSL	MCL - 5.0	MCL - 0.05	No MCL/ RSL	MCL - 0.002	No MCL/ RSL
1185M-CCR	CTLN-1703-736	3/8/2017	< 0.001	0.005	< 0.05	< 0.001	3.12	< 0.001	466	< 0.005	< 0.005	0.4	6.92	< 0.001	0.3	0.834	< 0.0001	< 0.001	6.9	2.6	< 0.002	2,880	< 0.0005	4,330
1185M-CCR	CTLN-1703-738	3/8/2017	< 0.001	0.004	< 0.05	< 0.001	3.01	< 0.001	455	< 0.005	< 0.005	0.4	6.62	< 0.001	0.3	0.875	< 0.0001	< 0.001	6.9	2	< 0.002	2,780	0.0007	4,360
1185M-CCR	CTLN-1704-913	4/12/2017	< 0.001	0.002	< 0.05	< 0.001	3.14	< 0.001	451	< 0.005	< 0.005	0.4	6.58	< 0.001	0.3	0.94	< 0.0001	< 0.001	7.1	2.7	< 0.001	2,880	< 0.0005	4,160
1185M-CCR	CTLN-1705-324	5/31/2017	< 0.001	0.005	< 0.05	< 0.001	2.84	< 0.001	433	< 0.005	< 0.005	0.4	6.38	< 0.001	0.3	0.856	< 0.0001	< 0.001	6.9	2.1	0.003	3,210	< 0.0005	4,460
1185M-CCR	CTLN-1706-427	6/28/2017	< 0.001	0.003	< 0.05	< 0.001	3.16	< 0.001	474	< 0.005	< 0.005	0.4	6.75	< 0.001	0.4	0.948	< 0.0001	< 0.001	7	0.9	< 0.001	3,030	< 0.0005	4,080
1185M-CCR	CTLN-1707-322	7/27/2017	< 0.001	0.004	< 0.05	< 0.001	2.93	< 0.001	440	< 0.005	< 0.005	0.4	7.11	< 0.001	0.3	0.888	< 0.0001	< 0.001	6.9	1.2	< 0.001	2,890	< 0.0005	4,210
1185M-CCR	CTLN-1708-467	8/29/2017	< 0.001	0.005	< 0.05	< 0.001	2.84	< 0.001	465	< 0.005	< 0.005	0.4	6.88	< 0.001	0.3	0.917	< 0.0001	< 0.001	6.9	0.1	< 0.001	3,170	< 0.0005	4,220
1185M-CCR (Dup)	CTLN-1708-468	8/29/2017	< 0.001	0.005	< 0.05	< 0.001	2.89	< 0.001	465	< 0.005	< 0.005	0.4	6.76	< 0.001	0.3	0.915	< 0.0001	< 0.001	6.9	0.5	< 0.001	3,110	< 0.0005	4,250
1187D-CCR	CTLN-1605-243	5/3/2016	0.006	0.004	< 0.05	< 0.001	1.4	< 0.001	175	< 0.005	< 0.005	0.9	0.61	0.002	0.1	0.146	< 0.0001	0.044	7.5	2.9	< 0.004	2,160	< 0.0005	3,490
1187D-CCR	CTLN-1606-437	6/16/2016	0.001	0.004	< 0.05	< 0.001	0.73	< 0.001	111	< 0.005	< 0.005	1.4	0.28	< 0.001	< 0.1	0.231	< 0.0001	0.018	7.7	2.7	< 0.001	1,910	< 0.09	3,210
1187D-CCR	CTLN-1607-534	7/27/2016	< 0.001	0.004	< 0.05	< 0.001	0.57	< 0.001	92	< 0.005	< 0.005	1.5	0.48	< 0.001	< 0.1	0.221	< 0.0001	0.01	7.6	1.7	< 0.001	1,810	< 0.0005	3,110
1187D-CCR	CTLN-1608-930	8/29/2016	< 0.001	0.005	< 0.05	< 0.001	0.49	< 0.001	93	< 0.005	< 0.005	1.5	0.58	< 0.001	< 0.1	0.176	< 0.0001	0.006	7.8	3.8	< 0.001	1,910	< 0.0005	3,080
1187D-CCR	CTLN-1611-209	11/16/2016	< 0.001	0.003	< 0.05	< 0.001	0.5	< 0.001	80	< 0.005	< 0.005	1.5	0.84	< 0.001	0.1	0.11	< 0.0001	0.002	7.7	2.4	< 0.002	1,870	< 0.0005	2,990
1187D-CCR	CTLN-1701-124	1/23/2017	< 0.001	0.002	< 0.05	< 0.001	0.31	< 0.001	77	< 0.005	< 0.005	1.6	0.77	< 0.001	< 0.1	0.086	< 0.0001	0.002	7.7	1.7	< 0.004	1,830	< 0.0005	2,980
1187D-CCR	CTLN-1703-740	3/8/2017	< 0.001	0.002	< 0.05	< 0.001	0.4	< 0.001	76	< 0.005	< 0.005	1.7	0.7	< 0.001	< 0.1	0.068	< 0.0001	0.002	7.7	2	< 0.002	1,850	< 0.0007	2,950
1187D-CCR	CTLN-1704-941	4/24/2017	< 0.001	0.002	< 0.05	< 0.001	0.42	< 0.001	76	< 0.005	< 0.005	1.7	0.72	< 0.001	< 0.1	0.07	< 0.0001	< 0.001	7.7	4.4	< 0.002	1,950	< 0.0005	2,870
1187D-CCR	CTLN1705-302B	5/15/2017	< 0.001	0.004	< 0.05	< 0.001	0.4	< 0.001	75	< 0.005	< 0.005	1.7	0.85	< 0.001	< 0.1	0.066	< 0.0001	0.002	7.8	3.7	0.001	1,960	< 0.0005	2,990
1187D-CCR	CTLN-1706-302	6/13/2017	< 0.001	0.001	< 0.05	< 0.001	0.36	< 0.001	73	< 0.005	< 0.005	1.6	0.32	< 0.001	< 0.1	0.039	< 0.0001	0.001	7.8	3.2	< 0.002	3,830	< 0.0005	2,970
1187D-CCR	CTLN-1707-301	7/17/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.38	< 0.001	74	< 0.005	< 0.005	1.6	0.06	< 0.001	< 0.1	0.024	< 0.0001	0.001	7.8	2.1	< 0.002	1,910	< 0.0007	3,010
1187D-CCR	CTLN-1708-301	8/22/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.59	< 0.001	80	< 0.005	< 0.005	1.8	0.02	< 0.001	< 0.1	0.012	< 0.0001	< 0.001	7.8	3.1	< 0.001	1,920	< 0.0005	2,910
1188S-CCR	CTLN-1604-207	4/20/2016	< 0.001	0.001	< 0.05	< 0.001	13	< 0.001	489	< 0.005	0.013	0.4	8.04	< 0.001	0.3	3.4	< 0.0001	0.001	7.2	1	0.002	4,900	< 0.0005	7,670
1188S-CCR	CTLN-1606-438	6/16/2016	< 0.001	0.001	< 0.05	< 0.001	10.1	< 0.001	416	< 0.005	0.011	0.4	7.68	< 0.001	0.2	2.48	< 0.0001	0.002	7.0	1.8	< 0.001	4,400	< 0.0005	6,720
1188S-CCR	CTLN-1607-535	7/27/2016	< 0.001	0.001	< 0.05	< 0.001	10.2	< 0.001	409	< 0.005	0.011	0.4	7.58	< 0.001	0.2	2.52	< 0.0001	0.002	7.0	0.6	0.006	4,270	< 0.0005	6,480
1188S-CCR	CTLN-1610-375	10/11/2016	< 0.001	0.002	< 0.05	< 0.001	9.78	< 0.001	399	< 0.005	0.01	0.4	6.88	< 0.001	0.3	2.2	< 0.0001	0.002	7.0	1.6	< 0.002	4,030	< 0.0005	5,980
1188S-CCR	CTLN-1611-210	11/16/2016	< 0.001	< 0.001	< 0.05	< 0.001	10.4	< 0.001	433	< 0.005	0.01	0.4	7.46	< 0.001	0.3	2.14	< 0.0001	< 0.001	7.1	0.7	< 0.004	4,060	0.0007	6,190
1188S-CCR	CTLN-1611-230	11/29/2016	< 0.001	0.002	< 0.05	< 0.001	10.3	< 0.001	456	< 0.005	0.011	0.5	7.34	< 0.001	0.2	2.28	< 0.0001	0.001	7.0	-1	< 0.002	4,150	< 0.0005	6,290
1188S-CCR	CTLN-1701-125	1/23/2017	< 0.001	< 0.002	< 0.05	< 0.001	9.98	< 0.001	428	< 0.005	0.01	0.4	7.29	< 0.001	0.2	2.18	< 0.0001	0.002	7.0	0.3	< 0.004	4,200	0.0023	5,990
1188S-CCR	CTLN-1703-741	3/8/2017	< 0.001	0.002	< 0.05	< 0.001	9.75	< 0.001	420	< 0.005	0.013	0.5	7.48	< 0.001	0.2	2.41	< 0.0001	0.001	7.1	0.8	< 0.004	4,300	0.0007	6,180
1188S-CCR	CTLN-1704-942	4/24/2017	< 0.001	< 0.002	< 0.05	< 0.001	10.1	< 0.001	418	< 0.005	0.013	0.4	7.61	< 0.001	0.2	2.37	< 0.0001	0.002	7	1.3	< 0.004	4,190	< 0.0005	6,000
1188S-CCR	CTLN1705-301B	5/15/2017	< 0.001	< 0.001	< 0.05	< 0.001	9.78	< 0.001	413	< 0.005	0.011	0.4	7.47	< 0.001	0.2	2.29	< 0.0001	0.002	7.1	0.9	0.001	4,440	< 0.0005	6,440
1188S-CCR	CTLN-1706-301	6/13/2017	< 0.001	0.001	< 0.05	< 0.001	9.99	< 0.001	436	< 0.005	0.01	0.4	8.18	< 0.001	0.2	2.26	< 0.0001	0.002	7	-0.08	< 0.002	4,260	< 0.0005	6,980
1188S-CCR	CTLN-1707-302	7/17/2017	< 0.001	0.001	< 0.05	< 0.001	9.72	< 0.001	432	< 0.005	0.011	0.4	8.23	< 0.001	0.1	2.13	< 0.0001	0.002	7	1.4	< 0.002	4,340	0.0027	6,530
1188S-CCR (Dup)	CTLN-1707-303	7/17/2017	< 0.001	0.002	< 0.05	< 0.001	10	< 0.001	470	< 0.005	0.011	0.4	8.24	< 0.001	0.1	2.18	< 0.0001	0.002	7	1.9	< 0.002	4,340	< 0.0007	6,470
1188S-CCR	CTLN-1708-302A	8/22/2017	< 0.001	0.001	< 0.05	< 0.001	10.1	< 0.001	438	< 0.005	0.01	0.5	7.44	< 0.001	< 0.1	2.3	< 0.0001	0.001	7	6	< 0.001	4,200	< 0.0005	6,380
555M	TLN-1602-326-CCR	2/16/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.96	< 0.001	248	< 0.005	< 0.005	0.4	0.14	< 0.001	< 0.1	0.563	< 0.0001	0.001	7.0	1.3	0.005	872	< 0.0005	1,670
555M	CTLN-1604-209	4/21/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.84	< 0.001	267	< 0.005	< 0.005	0.4	0.05	< 0.001	< 0.1	0.607	< 0.0001	0.001	7.0	1	0.012	807	< 0.0005	1,600
555M	CTLN-1605-403	5/26/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.84	< 0.001	253	< 0.005	0.009	0.4	< 0.02	< 0.001	< 0.1	0.609	< 0.0001	0.002	7.1	3.6	0.009	814	< 0.0005	1,600
555M	CTLN-1607-500	7/5/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.82	< 0.001	248	< 0.005	< 0.005	0.3	0.02	< 0.001	< 0.1	0.542	< 0.0001	0.002	7.1	2.9	0.01	714	< 0.0005	1,570
555M	CTLN-1608-912	8/23/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.83	< 0.001	249	< 0.005	< 0.005	0.3	< 0.05	< 0.001	< 0.1	0.57	< 0.0001	0.002	7.0	2.2	0.012	847	< 0.0005	1,560
555M	CTLN-1611-204	11/15/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.89	< 0.001	254	< 0.005	< 0.005	0.4	0.03	< 0.001	< 0.1	0.522	< 0.0001	0.002	7.0	1.8	0.008	850	< 0.0005	1,560
555M	CTLN-1612-100	12/27/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.69	< 0.001	261	< 0.005	< 0.005	0.4	0.04	< 0.001	< 0.1	0.541	< 0.0001	0.002	7.0	1.6	0.008	814	< 0.0005	1,540
555M	CTLN-1703-733	3/7/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.86	< 0.001	261	< 0.005	< 0.005	0.4	0.03	< 0.001	< 0.1	0.549	< 0.0001	0.002	7.0	1.6	0.009	786	< 0.0005	1,540
555M	CTLN-1704-915	4/13/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.87	< 0.001	250	< 0.005	< 0.005	0.4	< 0.02	< 0.001	< 0.1	0.59	< 0.0001	0.002	7.2	1.8	0.009	785	< 0.0005	1,490
555M	CTLN1705-308B	5/17/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.83	< 0.001	250	< 0.005	< 0.005	0.4	< 0.02	< 0.001	< 0.1	0.554	< 0.0001	0.003	7.2	1.8	0.011	800	< 0.0005	1,570
555M	CTLN-1706-308	6/15/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.83	< 0.001	252	< 0.005	< 0.005	0.3	< 0.02	< 0.001	< 0.1	0.574	< 0.0001	0.002	7	3.7	0.01	792	< 0.0005	1,520
555M	CTLN-1707-309	7/19/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.72	< 0.001	228	< 0.005	< 0.005	0.3	< 0.02	< 0.001	< 0.1	0.548	< 0.0001	0.002	7	3.4	0.01	818	< 0.0005	1,500
555M	CTLN-1708-312	8/28/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.75	< 0.001	248	< 0.005	< 0.005	0.4	< 0.02	< 0.001	< 0.1	0.588	< 0.0001	0.002	7	1	0.008	799	< 0.0005	1,480
588D	TLN-1602-310-CCR	2/9/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.42	< 0.001	79	< 0.005	< 0.005	0.6	0.41	< 0.001	< 0.1	0.008	< 0.0001	< 0.001	7.4	1.5	< 0.001	842	< 0.0005	1,610
588D	CTLN-1605-247	5/3/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.46	< 0.001	69	< 0.005	< 0.005	0.6	0.41	< 0.001	< 0.1	0.008	< 0.0001	< 0.001	7.6	2.1	< 0.002	832	< 0.0005	1,620
588D	CTLN-1606-428	6/14/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.47	< 0.001	73	< 0.005	< 0.005	0.7	0.47	< 0.001	< 0.1	0.008	< 0.0001	< 0.001	7.5	3.7	< 0.001	837	< 0.0005	1,620
588D (Dup)	CTLN-1606-429	6/14/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.48	< 0.001	74	< 0.005	< 0.005	0.6	0.48	< 0.001	< 0.1	0.008	< 0.0001	< 0.001	7.5	2.6	< 0.001	834	< 0.0005	1,630
588D	CTLN-1607-525	7/12/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.45	< 0.001	66	< 0.005	< 0.005	0.6	0.42	< 0.001	< 0.1	0.008	< 0.0001	< 0.001	7.6	1.8	< 0.001	857	< 0.0005	1,590
588D	CTLN-1610-382	10/13/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.5	< 0.001	68	< 0.005	< 0.005	0.6	0.92	< 0.001	< 0.1	0.008	< 0.0001	< 0.001	7.6	1.2	< 0.001	865	< 0.0005	1,630
588D	CTLN-1612-239	12/1/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.48	< 0.001	88	< 0.005	< 0.005	0.6	0.68	< 0.001	< 0.1	0.007	< 0.0001	< 0.001	7.6	1.6	< 0.001	857	< 0.0005	1,590
588D	CTLN-1701-130	1/24/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.44	< 0.001	73	< 0.005	< 0.005	0.6	0.63	< 0.001	< 0.1	0.01	< 0.0001	< 0.001	7.5	1.3	< 0.002	861	< 0.0005	1,590
588D	CTLN-1702-712	2/21/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.47	< 0.001	76	< 0.005	< 0.005	0.6	0.4	< 0.001	< 0.1	0.012	< 0.0001	< 0.001	7.6	3.4	< 0.002	842	< 0.0005	1,600
588D	CTLN-1704-924	4/18/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.48	< 0.001	75	< 0.005	< 0.005	0.7	0.49	< 0.001	< 0.1	0.01	< 0.0001	< 0.001	7.6	0.9	< 0.002	859	< 0.0005	1,570
588D	CTLN-1705-319	5/30/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.44	< 0.001	69	< 0.005	< 0.005	0.6	0.43	< 0.001	< 0.1	0.009	< 0.0001	< 0.001	7.6	1.8	< 0.001	881	< 0.0005	1,620
588D	CTLN-1706-430	6/28/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.44	< 0.001	73	< 0.005	< 0.005	0.5	1.23	< 0.001	< 0.1	0.009	< 0.0001	< 0.001	7.6	1.4	< 0.001	884	< 0.0005	1,590
588D	CTLN-1708-415	8/1/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.45	< 0.001	74	< 0.005	< 0.005	0.6	0.47	< 0.001	< 0.1	0.009	< 0.0001	< 0.001	7.6	4.1	< 0.001	871	< 0.0005	1,610
588D	CTLN-1708-319	8/30/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.41	< 0.001	76	< 0.005	< 0.005	0.6	0.47	< 0.001	< 0.1	0.009	< 0.0001	< 0.001	7.6	2	< 0.001	874	< 0.0005	1,580
590M	TLN-1602-321-CCR	2/11/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.76	< 0.001	128	< 0.005	< 0.005	0.5	0.06	< 0.001	< 0.1	0.046	< 0.0001	< 0.001	7.2	-0.2	< 0.001	705	< 0.0005	1,300

**** DRAFT ****

2/20/2019

Appendix F

Colstrip SES Federal CCR Rule Groundwater Draft Baseline Monitoring Data - 2016 Through August 2017

Comparison to USEPA MCLs (If No MCL Listed Then EPA RSL For Tapwater - Ingestion For Child, RSL Limit Was Used)

***Metals analyzed as Total Recoverable (TRC) unless turbidity >10, then metals ran both as Total Recoverable (TRC) and Dissolved (DIS).**

Highlighted Values Exceed MCL or EPA Tapwater RSL

Highlighted Values Are Detection Limits Higher than the MCL or EPA Tapwater RSL

			ANTIMONY	ARSENIC	BARIUM	BERYLLIUM	BORON	CADMIUM	CALCIUM	CHROMIUM	COBALT	FLUORIDE	IRON	LEAD	LITHIUM	MANGANESE	MERCURY	MOLYBDENUM	pH	RADIUM 226/228	SELENIUM	SULFATE	THALLIUM	TDS
Site Code	Sample Code	Date	7440-36-0 mg/L	7440-38-2 mg/L	7440-39-3 mg/L	7440-41-7 mg/L	7440-42-8 mg/L	7440-43-9 mg/L	7440-70-2 mg/L	7440-47-3 mg/L	7440-48-4 mg/L	16984-48-8 mg/L	7439-89-6 mg/L	7439-92-1 mg/L	7439-93-2 mg/L	7439-96-5 mg/L	7439-97-6 mg/L	7439-98-7 mg/L	NA standard units	7440-14-4 pCi/L	7782-49-2 mg/L	14808-79-8 mg/L	7440-28-0 mg/L	NA mg/L
			MCL - 0.006	MCL - 0.01	MCL - 2.0	MCL - 0.004	RSL - 4.0	MCL - 0.005	No MCL/ RSL	MCL - 0.1	RSL - 0.006	MCL - 4.0	RSL - 14.0	MCL - 0.015	RSL - 0.04	RSL - 0.43	MCL - 0.002	RSL - 0.1	No MCL/ RSL	MCL - 5.0	MCL - 0.05	No MCL/ RSL	MCL - 0.002	No MCL/ RSL
590M	CTLN-1605-250	5/4/2016	< 0.001	0.001	< 0.05	< 0.001	0.76	< 0.001	126	< 0.005	< 0.005	0.5	0.24	< 0.001	< 0.1	0.129	< 0.0001	< 0.001	7.3	2	< 0.001	709	< 0.0005	1,340
590M	CTLN-1606-423	6/13/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.75	0.001	127	< 0.005	< 0.005	0.5	0.17	< 0.001	< 0.1	0.134	< 0.0001	< 0.001	7.3	1.6	< 0.001	713	< 0.0005	1,330
590M	CTLN-1607-523	7/12/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.75	< 0.001	122	< 0.005	< 0.005	0.5	0.13	< 0.001	< 0.1	0.132	< 0.0001	< 0.001	7.3	1.6	< 0.001	724	< 0.0005	1,370
590M	CTLN-1608-915	8/23/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.74	< 0.001	127	< 0.005	< 0.005	0.4	0.14	< 0.001	< 0.1	0.124	< 0.0001	< 0.001	7.4	5.5	< 0.001	763	< 0.0005	1,400
590M	CTLN-1611-200	11/14/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.62	< 0.001	115	< 0.005	< 0.005	0.4	0.25	< 0.001	< 0.1	0.126	< 0.0001	< 0.001	7.2	2	< 0.001	761	< 0.0005	1,360
590M	CTLN-1612-103	12/29/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.74	< 0.001	141	< 0.005	< 0.005	0.5	0.11	< 0.001	< 0.1	0.131	< 0.0001	< 0.001	7.2	1.8	< 0.001	760	< 0.0005	1,360
590M	CTLN-1702-720	2/23/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.76	< 0.001	136	0.005	< 0.005	0.5	0.15	< 0.001	< 0.1	0.139	< 0.0001	< 0.001	7.2	1.2	< 0.001	765	< 0.0005	1,390
590M	CTLN-1704-931	4/20/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.75	< 0.001	135	< 0.005	< 0.005	0.5	0.13	< 0.001	< 0.1	0.141	< 0.0001	< 0.001	7.2	1.6	< 0.001	780	< 0.0005	1,340
590M	CTLN1705-315B	5/18/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.75	< 0.001	135	< 0.005	< 0.005	0.5	0.1	< 0.001	< 0.1	0.143	< 0.0001	< 0.001	7.3	2	< 0.001	784	< 0.0005	1,410
590M	CTLN-1706-414	6/22/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.82	< 0.001	132	< 0.005	< 0.005	0.5	< 0.02	< 0.001	< 0.1	0.037	< 0.0001	< 0.001	7.4	1.6	< 0.001	728	< 0.0005	1,300
590M	CTLN-1707-306	7/18/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.69	< 0.001	135	< 0.005	< 0.005	0.5	< 0.02	< 0.001	< 0.1	0.001	< 0.0001	< 0.001	7.4	2.9	< 0.001	745	< 0.0005	1,330
590M	CTLN-1708-304	8/23/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.79	< 0.001	134	< 0.005	< 0.005	0.5	< 0.02	< 0.001	< 0.1	0.001	< 0.0001	< 0.001	7.4	6.2	< 0.001	733	< 0.0005	1,310
602S	TLN-1602-301-CCR	2/4/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.49	< 0.001	530	< 0.005	< 0.005	0.3	0.11	< 0.001	0.1	0.28	< 0.0001	< 0.001	6.8	5.5	0.002	4,280	< 0.0005	6,370
602S	CTLN-1605-200	5/10/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.53	< 0.001	575	< 0.005	< 0.005	0.3	0.1	< 0.001	0.2	0.18	< 0.0001	< 0.001	6.8	6.1	< 0.002	4,150	< 0.0005	6,700
602S	CTLN-1606-439	6/16/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.37	< 0.001	529	< 0.005	< 0.005	0.2	0.26	< 0.001	0.1	0.131	< 0.0001	< 0.001	6.8	5.5	< 0.001	4,270	< 0.0005	6,500
602S	CTLN-1607-536	7/28/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.41	< 0.001	516	< 0.005	< 0.005	0.3	0.05	< 0.001	0.1	0.13	< 0.0001	< 0.001	6.8	4	0.005	4,270	< 0.0005	6,490
602S	CTLN-1610-383	10/13/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.48	< 0.001	511	< 0.005	< 0.005	0.3	0.14	< 0.001	0.2	0.131	< 0.0001	< 0.001	6.8	4.4	< 0.002	4,470	< 0.0005	6,660
602S	CTLN-1611-205	11/15/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.41	< 0.001	554	< 0.005	< 0.005	0.3	0.11	< 0.001	0.2	0.079	< 0.0001	< 0.001	6.8	7.4	< 0.004	4,360	< 0.0005	6,400
602S	CTLN-1611-206	11/15/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.42	< 0.001	549	0.005	< 0.005	0.3	0.15	< 0.001	0.2	0.085	< 0.0001	< 0.001	6.8	5.7	< 0.004	4,310	0.0006	6,400
602S	CTLN-1701-140	1/26/2017	< 0.001 TRC < 0.001 DIS	< 0.002 TRC < 0.002 DIS	< 0.05 TRC < 0.05 DIS	< 0.001 TRC < 0.001 DIS	1.46 TRC 1.40 DIS	< 0.001 TRC < 0.001 DIS	567 TRC 536 DIS	< 0.005 TRC < 0.005 DIS	< 0.005 TRC < 0.005 DIS	0.3	1.81 TRC 0.02 DIS	< 0.001 TRC < 0.001 DIS	0.1 TRC 0.1 DIS	0.133 TRC 0.069 DIS	< 0.0001 TRC < 0.0001 DIS	< 0.001 TRC < 0.001 DIS	6.8	5.8	< 0.004 TRC < 0.004 DIS	4,270	0.0014 TRC 0.0018 DIS	6,460
602S	CTLN-1702-717	2/22/2017	< 0.001	< 0.002	< 0.05	< 0.001	1.37	< 0.001	543	< 0.005	< 0.005	0.6	0.23	< 0.001	0.2	0.069	< 0.0001	< 0.001	6.8	4.8	< 0.004	4,180	< 0.0005	6,360
602S	CTLN-1704-943	4/25/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.46	< 0.001	544	< 0.005	< 0.005	0.3	0.15	< 0.001	0.1	0.06	< 0.0001	< 0.001	6.8	4.4	< 0.002	4,270	< 0.0005	6,410
602S	CTLN1705-304B	5/16/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.43	< 0.001	544	< 0.005	< 0.005	0.3	0.14	< 0.001	0.1	0.044	< 0.0001	0.006	7	4.1	< 0.002	4,190	< 0.0005	6,590
602S	CTLN-1706-307	6/14/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.42	< 0.001	573	< 0.005	< 0.005	0.3	0.03	< 0.001	0.2	0.05	< 0.0001	< 0.001	6.8	3.7	< 0.002	4,310	< 0.0005	6,270
602S	CTLN-1707-300	7/13/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.31	< 0.001	523	< 0.005	< 0.005	0.3	0.02	< 0.001	< 0.1	0.065	< 0.0001	< 0.001	6.8	9.6	< 0.001	4,240	< 0.0007	6,510
602S	CTLN-1708-309	8/24/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.41	< 0.001	552	< 0.005	< 0.005	0.3	< 0.02	< 0.001	< 0.1	0.047	< 0.0001	< 0.001	6.8	3.7	< 0.001	4,280	< 0.0005	6,570
614D	TLN-1602-329-CCR	2/17/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.98	< 0.001	338	< 0.005	< 0.005	0.3	3.34	< 0.001	0.2	0.21	< 0.0001	< 0.001	7.0	4.4	< 0.001	1,960	< 0.0005	3,230
614D	CTLN-1604-216	4/26/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.99	< 0.001	352	< 0.005	< 0.005	0.3	4.4	< 0.001	0.2	0.203	< 0.0001	< 0.001	7.1	3.3	< 0.002	1,960	< 0.0005	3,180
614D	CTLN-1605-416	5/31/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.98	< 0.001	336	< 0.005	< 0.005	0.3	4.17	< 0.001	0.2	0.201	< 0.0001	< 0.001	7.0	5.4	< 0.001	1,950	< 0.0005	3,090
614D	CTLN-1607-514	7/7/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.87	< 0.001	331	< 0.005	< 0.005	0.3	4.22	< 0.001	0.2	0.2	< 0.0001	< 0.001	7.0	4.7	< 0.001	2,020	< 0.0005	3,140
614D	CTLN-1610-374	10/11/2016	< 0.001	< 0.001	< 0.05	< 0.001	2	< 0.001	312	< 0.005	< 0.005	0.3	3.85	< 0.001	0.2	0.209	< 0.0001	< 0.001	7.0	7.5	< 0.001	1,960	< 0.0005	3,120
614D	CTLN-1611-212	11/17/2016	< 0.001	< 0.001	< 0.05	< 0.001	2.09	< 0.001	354	< 0.005	< 0.005	0.3	4.27	< 0.001	0.2	0.178	< 0.0001	< 0.001	7.1	1.3	< 0.002	2,040	< 0.0005	3,100
614D	CTLN-1701-137	1/26/2017	< 0.001 TRC < 0.001 DIS	< 0.001 TRC < 0.001 DIS	< 0.05 TRC < 0.05 DIS	< 0.001 TRC < 0.001 DIS	1.92 TRC 1.95 DIS	< 0.001 TRC < 0.001 DIS	338	< 0.005 TRC < 0.005 DIS	< 0.005 TRC < 0.005 DIS	0.3	5.95 TRC 3.54 DIS	< 0.001 TRC < 0.001 DIS	0.2 TRC 0.2 DIS	0.188 TRC 0.189 DIS	< 0.0001 TRC < 0.0001 DIS	< 0.001 TRC < 0.001 DIS	7.0	4.1	< 0.002 TRC < 0.002 DIS	2,060	0.0008 TRC 0.0011 DIS	3,150
614D	CTLN-1703-732	3/6/2017	< 0.001	< 0.001	< 0.05	< 0.001	2.07	< 0.001	354	< 0.005	< 0.005	0.3	4.36	< 0.001	0.2	0.173	< 0.0001	< 0.001	7.1	3.8	< 0.002	2,050	< 0.0005	3,750
614D	CTLN-1704-907	4/10/2017	< 0.001	< 0.001	< 0.05	< 0.001	2.07	< 0.001	339	< 0.005	< 0.005	0.3	4.21	< 0.001	0.2	0.196	< 0.0001	< 0.001	7.2	3.6	< 0.001	1,980	< 0.0005	3,060
614D	CTLN1705-303B	5/15/2017	< 0.001	< 0.001	< 0.05	< 0.001	2.03	< 0.001	339	< 0.005	< 0.005	0.3	4.35	< 0.001	0.2	0.188	< 0.0001	0.001	7.3	4.8	< 0.001	2,200	< 0.0005	3,150
614D	CTLN-1706-303	6/14/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.98	< 0.001	338	< 0.005	< 0.005	0.3	9.22	< 0.001	0.2	0.178	< 0.0001	< 0.001	7.1	6.1	< 0.001	1,910	< 0.0005	3,070
614D	CTLN-1707-313	7/24/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.82	< 0.001	316	< 0.005	< 0.005	0.3	3.89	< 0.001	0.1	0.178	< 0.0001	< 0.001	7	5.6	< 0.001	2,080	< 0.0005	3,240
614D	CTLN-1708-311	8/25/2017	< 0.001	< 0.001	< 0.05	< 0.001	2.12	< 0.001	337	< 0.005	< 0.005	0.3	4.12	< 0.001	0.1	0.191	< 0.0001	< 0.001	7.1	3.8	< 0.001	2,100	< 0.0005	3,310
615D	TLN-1602-303-CCR	2/5/2016	< 0.001	< 0.001	< 0.05	< 0.001	3.26	< 0.001	366	< 0.005	< 0.005	0.4	4.87	< 0.001	0.4	1.01	< 0.0001	< 0.001	7.0	2	0.002	2,510	< 0.0005	3,700
615D	CTLN-1604-215	4/26/2016	< 0.001	< 0.001	< 0.05	< 0.001	3.4	< 0.001	396	< 0.005	< 0.005	0.4	5.36	< 0.001	0.4	0.899	< 0.0001	< 0.001	7.0	1.9	< 0.002	2,520	< 0.0005	3,830
615D	CTLN-1605-215	5/24/2016	< 0.001	< 0.001	< 0.05	< 0.001	8.1	< 0.001	382	< 0.005	< 0.005	0.2	0.03	< 0.001	0.1	0.137	< 0.0001	0.005	7.0	1.7	0.006	2,520	< 0.0005	3,810
615D	CTLN-1605-407	5/27/2016	< 0.001	< 0.001	< 0.05	< 0.001	3.41	< 0.001	388	< 0.005	< 0.005	0.4	5.25	< 0.001	0.4	0.989	< 0.0001	< 0.001	7.0	2.6	< 0.001	2,620	< 0.0005	3,780
615D	CTLN-1607-516	7/8/2016	< 0.001	< 0.001	< 0.05	< 0.001	3.32	< 0.001	380	< 0.005	< 0.005	0.4	4.88	< 0.001	0.4	0.918	< 0.0001	< 0.001	7.0	0.6	< 0.001	2,630	< 0.0005	3,760
615D	CTLN-1608-929	8/29/2016	< 0.001	< 0.001	< 0.05	< 0.001	3.4	< 0.001	379	< 0.005	< 0.005	0.4	5.05	< 0.001	0.4	0.838	< 0.0001	< 0.001	7.0	1.5	< 0.001	2,550	< 0.0005	3,740
615D	CTLN-1611-215	11/17/2016	< 0.001	< 0.001	< 0.05	< 0.001	3.31	< 0.001	381	< 0.005	< 0.005	0.5	5.3	< 0.001	0.4	0.887	< 0.0001	< 0.001	7.0	0.6	< 0.002	2,630	< 0.0005	3,710
615D	CTLN-1701-136	1/26/2017	< 0.001	< 0.001	< 0.05	< 0.001	3.25	< 0.001	387	< 0.005	< 0.005	0.4	4.76	< 0.001	0.4	0.854	< 0.0001	< 0.001	7.0	0.9	< 0.002	2,540	0.0008	3,770
615D	CTLN-1703-731	3/6/2017	< 0.001	< 0.001	< 0.05	< 0.001	3.38	< 0.001	416	< 0.005	< 0.005	0.4	5.23	< 0.001	0.4	0.914	< 0.0001	< 0.001	7.1	0.9	< 0.002	13,100	< 0.0005	18,800
615D	CTLN-1704-938	4/24/2017	< 0.001	< 0.001	< 0.05	< 0.001	3.44	< 0.001	390	< 0.005	< 0.005	0.5	4.98	< 0.001	0.4	0.926	< 0.0001	< 0.001	7	2.2	< 0.002	2,630	< 0.0005	3,670
615D	CTLN1705-313B	5/18/2017	< 0.001	< 0.001	< 0.05	< 0.001	3.48	< 0.001	389	< 0.005	< 0.005	0.4	5.13	< 0.001	0.4	0.949	< 0.0001	0.001	7.2	0.08	0.001	2,620	< 0.0005	3,840
615D	CTLN-1706-310	6/15/2017	< 0.001	< 0.001	< 0.05	< 0.001	3.23	< 0.001	416	< 0.005	< 0.005	0.4	5.25	< 0.001	0.4	0.913	< 0.0001	< 0.001	7	7.8	< 0.001	2,610	< 0.0005	3,760
615D	CTLN-1707-317	7/25/2017	< 0.001	< 0.001	< 0.05	< 0.001	3.37	< 0.001	380	< 0.005	< 0.005	0.4	5.33	< 0.001	0.3	0.894	< 0.0001	< 0.001	7	2.6	< 0.001	2,630	< 0.0005	3,650
615D	CTLN-1708-310	8/24/2017	< 0.001	< 0.001	< 0.05	< 0.001	3.45	< 0.001	399	< 0.005	< 0.005	0.4	5.06	< 0.001	0.3	0.945	< 0.0001	< 0.001	7	3.1	< 0.001	2,710	< 0.0005	3,780
622D-P	CTLN-1607-537	7/28/2016	< 0.001	< 0.001	< 0.05	< 0.001	70.1	0.001	480	< 0.005	0.009	0.4	0.02	0.002	0.6	3.82	< 0.0001	< 0.001	7.0	4.6	< 0.004	12,900	< 0.0005	18,800
622D-P	CTLN-1610-376	10/11/2016	< 0.001	0.004	< 0.05	< 0.001	75.1	0.001	457	< 0.005	0.009	0.4	< 0.2	< 0.001	0.8	3.38	< 0.0001	< 0.001	7.0	4.1	< 0.004	12,600	< 0.0005	18,700
622D-P	CTLN-1611-211	11/17/2016	< 0.001	< 0.001	< 0.05	< 0.001	81	< 0.001	503	< 0.005	0.012	0.4	< 0.2	0.003	0.9	3.5	< 0.0001	< 0.001	7.0	3.1	< 0.008	13,100	0.002	19,000
622D-P	CTLN-1701-138	1/26/2017	< 0.001	< 0.003	< 0.05	< 0.002	69.6	< 0.001	528	< 0.005	0.009	0.4	< 0.07	0.001	0.5	3.42	< 0.0001	< 0.001	7.0	4.2	< 0.007	13,000	0.0059	19,100
622D-P (Dup)	CTLN-1701-139	1/26/2017	< 0.001	< 0.003	< 0.05	< 0.002	73	0.002	480	< 0.005	0.01	0.4	< 0.07	0.002	0.6	3.56	< 0.0001	< 0.001	7.0	4.2	< 0.007	13,000	0.0043	18,800
622D-P	CTLN-1703-735	3/7/2017	< 0.001	< 0.003	< 0.05	< 0.002	73.9	0.002	508	< 0.005	0.01	0.4	2.7	< 0.001	0.5	3.61	< 0.0001	< 0.001	7.0	7.3	< 0.007	12,700	0.0011	18,600
622D-P	CTLN-1604-101	4/4/2016	< 0.001	< 0.001	< 0.05	< 0.001	71.2	0.002	505	< 0.005	0.01	0.4	< 0.1	< 0.001	0.6	3.31	< 0.0001	< 0.001	7.0	4.4	0.004	13,600	0.0007	18,800

**** DRAFT ****

2/20/2019

Appendix F

Colstrip SES Federal CCR Rule Groundwater Draft Baseline Monitoring Data - 2016 Through August 2017

Comparison to USEPA MCLs (If No MCL Listed Then EPA RSL For Tapwater - Ingestion For Child, RSL Limit Was Used)

***Metals analyzed as Total Recoverable (TRC) unless turbidity >10, then metals ran both as Total Recoverable (TRC) and Dissolved (DIS).**

Highlighted Values Exceed MCL or EPA Tapwater RSL

Highlighted Values Are Detection Limits Higher than the MCL or EPA Tapwater RSL

Site Code	Sample Code	Date	ANTIMONY 7440-36-0 mg/L	ARSENIC 7440-38-2 mg/L	BARIUM 7440-39-3 mg/L	BERYLLIUM 7440-41-7 mg/L	BORON 7440-42-8 mg/L	CADMIUM 7440-43-9 mg/L	CALCIUM 7440-70-2 mg/L	CHROMIUM 7440-47-3 mg/L	COBALT 7440-48-4 mg/L	FLUORIDE 16984-48-8 mg/L	IRON 7439-89-6 mg/L	LEAD 7439-92-1 mg/L	LITHIUM 7439-93-2 mg/L	MANGANESE 7439-96-5 mg/L	MERCURY 7439-97-6 mg/L	MOLYBDENUM 7439-98-7 mg/L	pH NA standard units	RADIUM 226/228 7440-14-4 pCi/L	SELENIUM 7782-49-2 mg/L	SULFATE 14808-79-8 mg/L	THALLIUM 7440-28-0 mg/L	TDS NA mg/L
			MCL - 0.006	MCL - 0.01	MCL - 2.0	MCL - 0.004	RSL - 4.0	MCL - 0.005	No MCL/ RSL	MCL - 0.1	RSL - 0.006	MCL - 4.0	RSL - 14.0	MCL - 0.015	RSL - 0.04	RSL - 0.43	MCL - 0.002	RSL - 0.1	No MCL/ RSL	MCL - 5.0	MCL - 0.05	No MCL/ RSL	MCL - 0.002	No MCL/ RSL
622D-P	CTLN-1704-939	4/24/2017	< 0.001	< 0.003	< 0.05	< 0.002	72.2	0.001	480	< 0.005	0.012	0.4	0.03	0.001	0.6	3.67	< 0.0001	0.001	7	4.1	< 0.007	12,800	0.0009	17,500
622D-P (Dup)	CTLN-1704-940	4/24/2017	< 0.001	< 0.003	< 0.05	< 0.002	74.4	< 0.001	495	< 0.005	0.013	0.4	0.06	0.002	0.6	3.85	< 0.0001	0.002	7	4	< 0.007	12,900	0.0008	17,900
622D-P	CTLN1705-300B	5/15/2017	< 0.001	< 0.002	< 0.05	0.001	76.1	< 0.001	486	< 0.005	0.011	0.4	0.12	0.003	0.6	3.55	< 0.0001	0.001	7.1	2.9	< 0.004	13,400	0.0008	19,100
622D-P	CTLN-1706-300	6/13/2017	< 0.001	< 0.003	< 0.05	< 0.002	75.4	0.001	497	< 0.005	0.009	0.4	0.13	< 0.001	0.7	3.44	< 0.0001	0.001	7	3.1	< 0.007	13,300	0.0006	18,900
622D-P	CTLN-1707-307	7/19/2017	< 0.001	< 0.002	< 0.05	< 0.001	71.4	0.001	475	< 0.005	0.01	0.4	< 0.02	< 0.001	0.6	3.56	< 0.0001	< 0.001	7	5.8	< 0.004	13,800	< 0.001	18,400
622D-P	CTLN-1708-300	8/22/2017	< 0.001	< 0.001	< 0.05	< 0.001	70.3	0.001	479	< 0.005	0.009	0.4	0.05	< 0.001	0.5	3.67	< 0.0001	< 0.001	7	3.3	< 0.001	6,060	< 0.0005	18,800
659D	TLN-1602-314-CCR	2/10/2016	< 0.001	< 0.001	< 0.05	< 0.001	2.19	< 0.001	524	< 0.005	< 0.005	0.3	3.2	< 0.001	0.3	0.418	< 0.0001	< 0.001	7.0	3.5	< 0.001	2,960	< 0.0005	4,550
659D	CTLN-1604-217	4/27/2016	< 0.001 TRC < 0.001 DIS	< 0.001 TRC < 0.001 DIS	< 0.05 TRC < 0.05 DIS	0.001 TRC < 0.001 DIS	2.28 TRC 2.17 DIS	< 0.001 TRC < 0.001 DIS	510 TRC 466 DIS	< 0.005 TRC < 0.005 DIS	< 0.005 TRC < 0.005 DIS	0.2	11.4 TRC 1.73 DIS	< 0.001 TRC < 0.001 DIS	0.3 **TRC** 0.3 **DIS**	0.352 TRC 0.365 DIS	< 0.0001 TRC < 0.0001 DIS	< 0.001 TRC < 0.001 DIS	7.2	4.7	< 0.002 TRC < 0.001 DIS	2,770	< 0.0005 TRC < 0.0005 DIS	4,240
659D	CTLN-1606-435	6/15/2016	< 0.001 TRC < 0.001 DIS	< 0.001 TRC < 0.001 DIS	< 0.05 TRC < 0.05 DIS	< 0.001 TRC < 0.001 DIS	2.27 TRC 2.15 DIS	< 0.001 TRC < 0.001 DIS	472 TRC 466 DIS	< 0.005 TRC < 0.005 DIS	< 0.005 TRC < 0.005 DIS	0.2	15.6 **TRC** 2.25 DIS	< 0.001 TRC < 0.001 DIS	0.2 **TRC** 0.2 **DIS**	0.391 TRC 0.392 DIS	< 0.0001 TRC < 0.0001 DIS	< 0.001 TRC < 0.001 DIS	7.1	5.5 **TRC**	< 0.001 TRC < 0.001 DIS	2,950	< 0.0005 TRC < 0.0005 DIS	4,540
659D	CTLN-1607-529	7/26/2016	< 0.001 TRC < 0.001 DIS	< 0.001 TRC < 0.001 DIS	< 0.05 TRC < 0.05 DIS	< 0.001 TRC < 0.001 DIS	2.25 TRC 2.23 DIS	< 0.001 TRC < 0.001 DIS	474 TRC 480 DIS	< 0.005 TRC < 0.005 DIS	< 0.005 TRC < 0.005 DIS	0.3	4.79 TRC 2.14 DIS	< 0.001 TRC < 0.001 DIS	0.3 **TRC** 0.2 **DIS**	0.424 TRC 0.389 DIS	< 0.0001	< 0.001 TRC < 0.001 DIS	7.1	4.4	0.002 TRC 0.001 DIS	2,910	< 0.0005 TRC < 0.0005 DIS	4,520
659D	CTLN-1608-927	8/25/2016	< 0.001 TRC < 0.001 DIS	< 0.001 TRC < 0.001 DIS	< 0.05 TRC < 0.05 DIS	< 0.001 TRC < 0.001 DIS	2.42 TRC 2.24 DIS	< 0.001 TRC < 0.001 DIS	512 TRC 503 DIS	< 0.005 TRC < 0.005 DIS	< 0.005 TRC < 0.005 DIS	0.2	4.88 TRC 2.24 DIS	< 0.001 TRC < 0.001 DIS	0.3 **TRC** 0.3 **DIS**	0.373 TRC 0.363 DIS	< 0.0001 TRC < 0.0001 DIS	< 0.001 TRC < 0.001 DIS	7.2	3.5	< 0.001 TRC < 0.001 DIS	3,130	< 0.0005 TRC < 0.0005 DIS	4,460
659D	CTLN-1611-214	11/17/2016	< 0.001 TRC < 0.001 DIS	< 0.001 TRC < 0.001 DIS	< 0.05 TRC < 0.05 DIS	< 0.001 TRC < 0.001 DIS	2.26 TRC 2.26 DIS	< 0.001 TRC < 0.001 DIS	491 TRC 484 DIS	< 0.005 TRC < 0.005 DIS	< 0.005 TRC < 0.005 DIS	0.2	13.7 TRC 2.30 DIS	< 0.001 TRC < 0.001 DIS	0.3 **TRC** 0.3 **DIS**	0.371 TRC 0.371 DIS	< 0.0001 TRC < 0.0001 DIS	< 0.001 TRC < 0.001 DIS	7.2	5.4 **TRC**	< 0.002 TRC < 0.001 DIS	2,950	< 0.0005 TRC < 0.0005 DIS	4,360
659D	CTLN-1612-105	12/29/2016	< 0.001 TRC < 0.001 DIS	0.010 TRC < 0.001 DIS	0.11 TRC < 0.05 DIS	0.001 TRC < 0.001 DIS	1.94 TRC 2.24 DIS	< 0.001 TRC < 0.001 DIS	506 TRC 491 DIS	0.021 TRC < 0.005 DIS	0.009 **TRC** < 0.005 DIS	0.2	38.4 **TRC** 1.70 DIS	0.022 **TRC** < 0.001 DIS	0.2 **TRC** 0.3 **DIS**	0.530 **TRC** 0.374 DIS	< 0.0001 TRC < 0.0001 DIS	< 0.001 TRC < 0.001 DIS	7.1	3.3	< 0.002 TRC < 0.001 DIS	2,810	< 0.0005 TRC < 0.0005 DIS	4,220
659D	CTLN-1703-730	3/6/2017	< 0.001 TRC < 0.001 DIS	< 0.001 TRC < 0.001 DIS	< 0.05 TRC < 0.05 DIS	< 0.001 TRC < 0.001 DIS	2.23 TRC 2.29 DIS	< 0.001 TRC < 0.001 DIS	492 TRC 476 DIS	< 0.005 TRC < 0.005 DIS	< 0.005 TRC < 0.005 DIS	0.3	7.93 TRC 2.56 DIS	0.002 TRC < 0.001 DIS	0.2 **TRC** 0.2 **DIS**	0.412 TRC 0.397 DIS	< 0.0001 TRC < 0.0001 DIS	< 0.001 TRC < 0.001 DIS	7.3	4.5	< 0.002 TRC < 0.002 DIS	2,930	< 0.0005 TRC < 0.0005 DIS	4,590
659D	CTLN-1704-906	4/10/2017	< 0.001 TRC < 0.001 DIS	< 0.001 TRC < 0.001 DIS	< 0.05 TRC < 0.05 DIS	< 0.001 TRC < 0.001 DIS	2.26 TRC 1.82 DIS	< 0.001 TRC < 0.001 DIS	477 TRC 495 DIS	< 0.005 TRC < 0.005 DIS	< 0.005 TRC < 0.005 DIS	0.3	7.1 TRC 2.46 DIS	0.001 TRC < 0.001 DIS	0.2 **TRC** 0.2 **DIS**	0.386 TRC 0.369 DIS	< 0.0001 TRC < 0.0001 DIS	< 0.001 TRC < 0.001 DIS	7.3	2.8	< 0.002 TRC < 0.002 DIS	2,960	< 0.0005 TRC < 0.0005 DIS	4,320
659D	CTLN1705-312B	5/17/2017	< 0.001 TRC < 0.001 DIS	< 0.001 TRC < 0.001 DIS	< 0.05 TRC < 0.05 DIS	< 0.001 TRC < 0.001 DIS	2.23 TRC 2.05 DIS	< 0.001 TRC < 0.001 DIS	478 TRC 475 DIS	< 0.005 TRC < 0.005 DIS	< 0.005 TRC < 0.005 DIS	0.3	22.3 **TRC** 1.88 DIS	0.002 TRC < 0.001 DIS	0.2 **TRC** 0.2 **DIS**	0.354 TRC 0.374 DIS	< 0.0001 TRC < 0.0001 DIS	0.002 TRC < 0.001 DIS	7.2	3.2	< 0.001 TRC < 0.002 DIS	2,960	< 0.0005 TRC < 0.0005 DIS	4,200
659D	CTLN-1706-422	6/27/2017	< 0.001 TRC < 0.001 DIS	< 0.001 TRC < 0.001 DIS	< 0.05 TRC < 0.05 DIS	< 0.001 TRC < 0.001 DIS	2.34 TRC 2.22 DIS	< 0.001 TRC < 0.001 DIS	514 TRC 505 DIS	< 0.005 TRC < 0.005 DIS	< 0.005 TRC < 0.005 DIS	0.2	10.6 TRC 1.95 DIS	< 0.001 TRC < 0.001 DIS	0.2 **TRC** 0.3 **DIS**	0.354 TRC 0.375 DIS	< 0.0001 TRC < 0.0001 DIS	< 0.001 TRC < 0.001 DIS	7.2	5.7	< 0.001 TRC < 0.001 DIS	2,980	< 0.0005 TRC < 0.0005 DIS	4,200
659D	CTLN-1707-315	7/24/2017	< 0.001 TRC < 0.001 DIS	< 0.001 TRC < 0.001 DIS	< 0.05 TRC < 0.05 DIS	< 0.001 TRC < 0.001 DIS	2.28 TRC 2.35 DIS	< 0.001 TRC < 0.001 DIS	493 TRC 506 DIS	< 0.005 TRC < 0.005 DIS	< 0.005 TRC < 0.005 DIS	0.2	19.7 **TRC** 1.92 DIS	0.001 TRC < 0.001 DIS	0.2 **TRC** 0.2 **DIS**	0.362 TRC 0.386 DIS	< 0.0001 TRC < 0.0001 DIS	< 0.001 TRC < 0.001 DIS	7.2	4.3	< 0.001 TRC < 0.001 DIS	3,060	< 0.0005 TRC < 0.0005 DIS	4,360
659D	CTLN-1708-317	8/30/2017	< 0.001 TRC < 0.001 DIS	< 0.001 TRC < 0.001 DIS	< 0.05 TRC < 0.05 DIS	< 0.001 TRC < 0.001 DIS	2.28 TRC 2.27 DIS	< 0.001 TRC < 0.001 DIS	537 TRC 528 DIS	< 0.005 TRC < 0.005 DIS	< 0.005 TRC < 0.005 DIS	0.2	12.8 TRC 2.86 DIS	0.002 TRC < 0.001 DIS	0.2 **TRC** 0.2 **DIS**	0.424 TRC 0.435 DIS	< 0.0001 TRC < 0.0001 DIS	< 0.001 TRC < 0.001 DIS	7.2	5.4	< 0.001 TRC < 0.001 DIS	3,170	< 0.0005 TRC < 0.0005 DIS	4,290
664D	TLN-1602-325-CCR	2/16/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.01	< 0.001	331	< 0.005	< 0.005	0.3	4.37	< 0.001	0.2	0.069	< 0.0001	< 0.001 DIS	6.8	8.5	< 0.002	3,200	< 0.0005	5,430
664D	CTLN-1604-210	4/21/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.08	< 0.001	341	< 0.005	< 0.005	0.3	5.1	< 0.001	0.2	0.071	< 0.0001	< 0.001	6.9	6.6	< 0.001	3,220	< 0.0005	5,360
664D	CTLN-1605-404	5/26/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.98	< 0.001	329	< 0.005	< 0.005	0.3	5.03	0.001	0.2	0.071	< 0.0001	< 0.001	6.9	9	< 0.001	3,290	< 0.0005	5,360
664D	CTLN-1607-501	7/5/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.99	< 0.001	334	< 0.005	< 0.005	0.2	4.6	< 0.001	0.2	0.07	< 0.0001	< 0.001	7.0	11	< 0.002	3,340	< 0.0005	5,200
664D	CTLN-1608-913	8/23/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.97	< 0.001	322	< 0.005	< 0.005	0.2	4.98	< 0.001	0.2	0.062	< 0.0001	< 0.001	7.0	9.6	< 0.002	3,270	< 0.0005	5,220
664D	CTLN-1611-203	11/15/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.93	< 0.001	323	< 0.005	< 0.005	0.2	5.2	0.001	0.2	0.067	< 0.0001	< 0.001	6.9	5.7	< 0.004	3,270	0.0006	5,220
664D	CTLN-1701-131	1/25/2017	< 0.001	< 0.002	< 0.05	< 0.001	0.97	< 0.001	343	< 0.005	< 0.005	0.3	6.12	< 0.001	0.2	0.07	< 0.0001	< 0.001	6.9	7.2	< 0.004	3,230	0.0067	5,140
664D	CTLN-1703-734	3/7/2017	< 0.001	< 0.002	< 0.05	< 0.001	1.06	< 0.001	353	< 0.005	< 0.005	0.3	5.48	< 0.001	0.2	0.068	< 0.0001	< 0.001	6.9	8.7	< 0.004	3,230	< 0.0005	5,400
664D	CTLN-1704-916	4/13/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.94	< 0.001	316	< 0.005	< 0.005	0.3	4.93	< 0.001	0.2	0.079	< 0.0001	< 0.001	7	6.9	< 0.002	3,380	< 0.0005	5,020
664D	CTLN1705-310B	5/17/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.98	< 0.001	330	< 0.005	< 0.005	0.3	5.11	< 0.001	0.2	0.066	< 0.0001	0.005	7	6.4	< 0.002	3,330	< 0.0005	5,530
664D	CTLN-1706-309	6/15/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.99	< 0.001	340	< 0.005	< 0.005	0.2	4.84	< 0.001	0.2	0.066	< 0.0001	< 0.001	6.9	8.9	< 0.002	3,350	< 0.0005	5,400
664D	CTLN-1707-308	7/19/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.83	< 0.001	369	< 0.005	< 0.005	0.2	4.56	< 0.001	0.1	0.066	< 0.0001	< 0.001	6.9	9.7	< 0.002	3,390	< 0.0007	5,210
664D	CTLN-1708-314	8/29/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.86	< 0.001	343	< 0.005	< 0.005	0.3	5.12	< 0.001	0.1	0.073	< 0.0001	< 0.001	6.9	6.3	< 0.001	3,330	< 0.0005	5,080
EAP-527	CTLN-1604-211	4/22/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.85	< 0.001	248	< 0.005	0.005	0.7	0.04	< 0.001	0.1	0.369	< 0.0001	0.006	7.3	1.8	0.002	833	< 0.0005	1,590
EAP-527	CTLN-1605-409	5/30/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.75	< 0.001	243	< 0.005	< 0.005	0.6	0.04	< 0.001	0.1	0.327	< 0.0001	0.006	7.2	2.4	0.002	847	< 0.0005	1,550
EAP-527	CTLN-1607-510	7/7/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.86	< 0.001	257	< 0.005	< 0.005	0.6	0.05	< 0.001	0.1	0.337	< 0.0001	0.006	7.2	7.1	0.001	816	< 0.0005	1,580
EAP-527	CTLN-1610-378	10/12/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.88	< 0.001	221	< 0.005	< 0.005	0.6	0.14	< 0.001	0.1	0.329	< 0.0001	0.005	7.2	3.7	0.001	838	< 0.0005	1,580
EAP-527	CTLN-1611-225	11/28/2016	< 0.001 TRC < 0.001 DIS	0.004 TRC < 0.001 DIS	< 0.05 TRC < 0.05 DIS	< 0.001 TRC < 0.001 DIS	0.84 TRC 0.87 DIS	< 0.001 TRC < 0.001 DIS	235 TRC 239 DIS	< 0.005 TRC < 0.005 DIS	< 0.005 TRC < 0.005 DIS	0.6	2.19 TRC 0.03 DIS	< 0.001 TRC < 0.001 DIS	0.1 **TRC** 0.1 **DIS**	0.348 TRC 0.340 DIS	< 0.0001 TRC < 0.0001 DIS	0.005 TRC 0.005 DIS	7.2	1.9	0.002 TRC 0.001 DIS	835	< 0.0005 TRC < 0.0005 DIS	1,570
EAP-527	CTLN-1701-107	1/9/2017	< 0.001 TRC < 0.001 DIS	0.002 TRC < 0.001 DIS	< 0.05 TRC < 0.05 DIS	< 0.001 TRC < 0.001 DIS	0.85 TRC 0.83 DIS	< 0.001 TRC < 0.001 DIS	244 TRC 247 DIS	< 0.005 TRC < 0.005 DIS	< 0.005 TRC < 0.005 DIS	0.5	0.90 TRC 0.02 DIS	< 0.001 TRC < 0.001 DIS	< 0.1 TRC < 0.1 DIS	0.331 TRC 0.327 DIS	< 0.0001 TRC < 0.0001 DIS	0.005 TRC 0.005 DIS	7.2	3.3	< 0.001 TRC 0.001 DIS	872	< 0.0005 TRC < 0.0005 DIS	1,570
EAP-527	CTLN-1702-704	2/15/2017	< 0.001	0.005	< 0.05	< 0.001	0.88	< 0.001	245	< 0.005	< 0.005	0.6	2.62	< 0.001	< 0.1	0.343	< 0.0001	0.006	7.3	2.5	0.002	873	< 0.0005	1,580
EAP-527	CTLN-1704-934	4/20/2017	< 0.001	0.001	< 0.05	< 0.001	0.87	< 0.001	246	< 0.005	< 0.005	0.6	2.07	< 0.001	< 0.1	0.34	< 0.0001	0.005	7.2	2.2	0.001	858	< 0.0005	1,530
EAP-527	CTLN-1705-405	5/17/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.86	< 0.001	237	< 0.005	< 0.005	0.6	0.46	< 0.001	< 0.1	0.318	< 0.0001	0.006	7.4	0.6	0.002	871	< 0.0005	1,610
EAP-527	CTLN-1706-408	6/21/2017	< 0.001	0.001	< 0.05	< 0.001	0.97	< 0.001	261	< 0.005	< 0.005	0.6	0.54	< 0.001	0.1	0.35	< 0.0001	0.005	7.4	2.7	0.002	860	< 0.0005	1,570
EAP-527	CTLN-1707-311	7/20/2017	< 0.001	0.002	< 0.05	< 0.001	0.75	< 0.001	229	< 0.005	< 0.005	0.6	0.6	< 0.001	< 0.1	0.331	< 0.0001	0.005	7.3	2.5	0.001	879	< 0.0005	1,560
EAP-527	CTLN-1708-460	8/22/2017	< 0.001	0.002	< 0.05	< 0.001	0.8	< 0.001	236	< 0.005	< 0.005	0.6	1.17	< 0.001	< 0.1	0.351	< 0.0001	0.005	7.2	2.6	0.002	908	< 0.0005	1,570
WM-126	TLN-1602-313-CCR	2/10/2016	< 0.001	< 0.001	< 0.05	< 0.001	3.74	< 0.001	341	< 0.005	< 0.005	0.1	< 0.02	< 0.001	0.3	0.9	< 0.0001	< 0.001	7.0	0.04	< 0.001	1,790	< 0.0005	2,740
WM-126	CTLN-1604-213	4/25/2016	< 0.001	< 0.001	< 0.05	< 0.001	3.61	< 0.001	331	< 0.005	< 0.005	0.1	0.03	< 0.001	0.3	0.928	< 0.0001	< 0.001	7.2	0.5	< 0.002	1,760	< 0.0005	2,800
WM-126	CTLN-1606-436	6/16/2016	< 0.001	< 0.001	< 0.05	< 0.001	3.72	< 0.001	303	< 0.005	< 0.005	0.1	0.03	< 0.001	0.3	0.987	< 0.0001	< 0.001	7.2	-0.2	< 0.001	1,780	< 0.0005	2,760
WM-126	CTLN-1607-528	7/26/2016	< 0.001	< 0.001	< 0.05	< 0.001	3.86	< 0.001	320	< 0.005	< 0.005	0.1	< 0.02	< 0.001	0.3	1.13	< 0.0001	< 0.001	7.2	1.3	< 0.001	1,660	< 0.0005	2,760

**** DRAFT ****

2/20/2019

Appendix F

Colstrip SES Federal CCR Rule Groundwater Draft Baseline Monitoring Data - 2016 Through August 2017

Comparison to USEPA MCLs (If No MCL Listed Then EPA RSL For Tapwater - Ingestion For Child, RSL Limit Was Used)

***Metals analyzed as Total Recoverable (TRC) unless turbidity >10, then metals ran both as Total Recoverable (TRC) and Dissolved (DIS).**

Highlighted Values Exceed MCL or EPA Tapwater RSL

Highlighted Values Are Detection Limits Higher than the MCL or EPA Tapwater RSL

Site Code	Sample Code	Date	ANTIMONY 7440-36-0 mg/L	ARSENIC 7440-38-2 mg/L	BARIUM 7440-39-3 mg/L	BERYLLIUM 7440-41-7 mg/L	BORON 7440-42-8 mg/L	CADMIUM 7440-43-9 mg/L	CALCIUM 7440-70-2 mg/L	CHROMIUM 7440-47-3 mg/L	COBALT 7440-48-4 mg/L	FLUORIDE 16984-48-8 mg/L	IRON 7439-89-6 mg/L	LEAD 7439-92-1 mg/L	LITHIUM 7439-93-2 mg/L	MANGANESE 7439-96-5 mg/L	MERCURY 7439-97-6 mg/L	MOLYBDENUM 7439-98-7 mg/L	pH NA standard units	RADIUM 226/228 7440-14-4 pCi/L	SELENIUM 7782-49-2 mg/L	SULFATE 14808-79-8 mg/L	THALLIUM 7440-28-0 mg/L	TDS NA mg/L
			MCL - 0.006	MCL - 0.01	MCL - 2.0	MCL - 0.004	RSL - 4.0	MCL - 0.005	No MCL/ RSL	MCL - 0.1	RSL - 0.006	MCL - 4.0	RSL - 14.0	MCL - 0.015	RSL - 0.04	RSL - 0.43	MCL - 0.002	RSL - 0.1	No MCL/ RSL	MCL - 5.0	MCL - 0.05	No MCL/ RSL	MCL - 0.002	No MCL/ RSL
WM-126	CTLN-1608-926	8/25/2016	< 0.001	< 0.001	< 0.05	< 0.001	4.09	< 0.001	337	< 0.005	< 0.005	0.1	< 0.05	< 0.001	0.3	1.05	< 0.0001	< 0.001	7.2	1.4	< 0.001	1,850	< 0.0005	2,770
WM-126	CTLN-1611-213	11/17/2016	< 0.001	< 0.001	< 0.05	< 0.001	3.93	< 0.001	335	< 0.005	< 0.005	0.1	< 0.02	< 0.001	0.4	0.914	< 0.0001	< 0.001	7.2	0.8	< 0.002	1,870	< 0.0005	2,780
WM-126	CTLN-1612-104	12/29/2016	< 0.001	< 0.001	< 0.05	< 0.001	3.89	< 0.001	342	< 0.005	< 0.005	0.1	< 0.02	< 0.001	0.3	1.02	< 0.0001	< 0.001	7.1	3.1	< 0.002	1,830	< 0.0005	2,740
WM-126	CTLN-1702-707	2/16/2017	< 0.001	< 0.001	< 0.05	< 0.001	3.83	< 0.001	306	< 0.005	< 0.005	0.1	< 0.02	< 0.001	0.3	1.01	< 0.0001	< 0.001	7.1	1	< 0.001	1,870	< 0.0005	2,760
WM-126	CTLN-1704-902	4/11/2017	< 0.001	< 0.001	< 0.05	< 0.001	3.69	< 0.001	300	< 0.005	< 0.005	0.1	< 0.02	< 0.001	0.3	1.02	< 0.0001	< 0.001	7.2	2.3	< 0.001	1,790	< 0.0005	2,490
WM-126	CTLN1705-311B	5/17/2017	< 0.001	< 0.001	< 0.05	< 0.001	3.78	< 0.001	315	< 0.005	< 0.005	0.1	< 0.02	< 0.001	0.3	1.09	< 0.0001	0.002	7.2	-0.4	< 0.001	1,760	< 0.0005	2,680
WM-126	CTLN-1706-421	6/27/2017	< 0.001	< 0.001	< 0.05	< 0.001	4.30	< 0.001	365	< 0.005	< 0.005	0.1	< 0.02	< 0.001	0.3	1.16	< 0.0001	< 0.001	7.2	2.4	< 0.001	2,020	< 0.0005	2,680
WM-126	CTLN-1707-314	7/24/2017	< 0.001	< 0.001	< 0.05	< 0.001	3.67	< 0.001	308	< 0.005	< 0.005	0.1	< 0.02	< 0.001	0.3	1.11	< 0.0001	< 0.001	7.2	1.5	< 0.001	1,880	< 0.0005	2,740
WM-126	CTLN-1708-318	8/30/2017	< 0.001	< 0.001	< 0.05	< 0.001	3.59	< 0.001	329	< 0.005	< 0.005	< 0.1	0.02	< 0.001	0.3	1.30	< 0.0001	< 0.001	7.2	-0.1	< 0.001	2,000	< 0.0005	2,630
Units 3&4 EHP Background Wells																								
1186A-CCR	CTLN-1604-126	4/12/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.15	< 0.001	324	< 0.005	< 0.005	1	0.08	< 0.001	0.2	0.007	< 0.0001	< 0.001	7.5	1.3	0.001	2,120	< 0.0005	3,400
1186A-CCR (Dup)	CTLN-1604-127	4/12/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.2	< 0.001	331	< 0.005	< 0.005	1	0.09	< 0.001	0.2	0.003	< 0.0001	< 0.003	7.5	1.3	< 0.001	2,130	< 0.0005	3,400
1186A-CCR	CTLN-1605-402	5/25/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.29	< 0.001	354	< 0.005	< 0.005	0.9	< 0.03	< 0.001	0.2	0.001	< 0.0001	< 0.001	7.4	2.7	0.001	2,190	< 0.0005	3,460
1186A-CCR	CTLN-1607-508	7/6/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.15	< 0.001	353	< 0.005	< 0.005	0.9	< 0.02	< 0.001	0.1	0.001	< 0.0001	< 0.001	7.3	1.8	< 0.001	2,090	< 0.0005	3,320
1186A-CCR (Dup)	CTLN-1607-509	7/6/2016	0.001	< 0.001	< 0.05	< 0.001	1.15	< 0.001	354	< 0.005	< 0.005	0.9	< 0.02	< 0.001	0.2	0.001	< 0.0001	0.002	7.3	0.3	< 0.001	2,150	< 0.0005	3,310
1186A-CCR	CTLN-1609-372	9/28/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.36	< 0.001	369	< 0.005	< 0.005	1.1	< 0.02	< 0.001	0.2	0.001	< 0.0001	< 0.001	7.3	1.5	0.002	2,200	< 0.0005	3,530
1186A-CCR	CTLN-1612-241	12/1/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.65	< 0.001	375	< 0.005	< 0.005	1	0.03	< 0.001	0.2	< 0.005	< 0.0001	< 0.001	7.3	0.3	0.002	2,260	< 0.0005	3,440
1186A-CCR (Dup)	CTLN-1612-242	12/1/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.69	< 0.001	379	< 0.005	< 0.005	1	0.03	< 0.001	0.2	< 0.001	< 0.0001	< 0.001	7.3	-0.4	0.002	2,260	< 0.0005	3,480
1186A-CCR	CTLN-1701-113	1/10/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.44	< 0.001	322	< 0.005	< 0.005	1	< 0.02	< 0.001	0.1	< 0.001	< 0.0001	< 0.001	7.3	1.2	< 0.002	2,210	< 0.0005	3,330
1186A-CCR	CTLN-1702-718	2/22/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.2	< 0.001	313	< 0.005	< 0.005	1	< 0.04	< 0.001	0.1	0.001	< 0.0001	0.002	7.4	1	< 0.002	2,050	< 0.0005	3,210
1020D	TLN-1602-333-CCR	2/24/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.52	< 0.001	168	< 0.005	< 0.005	0.4	0.07	< 0.001	< 0.1	0.265	< 0.0001	0.002	7.3	2.7	< 0.001	909	< 0.0005	1,610
1020D	CTLN-1604-212	4/25/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.42	< 0.001	173	< 0.005	< 0.005	0.4	0.05	< 0.001	< 0.1	0.039	< 0.0001	< 0.001	7.5	1	< 0.001	894	< 0.0005	1,540
1020D	CTLN-1605-408	5/27/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.45	< 0.001	159	< 0.005	< 0.005	0.4	0.05	0.004	< 0.1	0.095	< 0.0001	0.001	7.5	1.9	< 0.001	897	0.0009	1,570
1020D	CTLN-1607-507	7/6/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.42	< 0.001	158	< 0.005	< 0.005	0.4	0.12	< 0.001	< 0.1	0.194	< 0.0001	0.002	7.5	3.5	< 0.001	890	< 0.0005	1,520
1020D	CTLN-1608-921	8/24/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.45	< 0.001	163	< 0.005	< 0.005	0.5	0.31	< 0.001	< 0.1	0.207	< 0.0001	0.002	7.6	0.9	< 0.001	923	< 0.0005	1,580
1020D	CTLN-1611-223	11/22/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.47	< 0.001	161	< 0.005	< 0.005	0.4	0.13	< 0.001	< 0.1	0.08	< 0.0001	0.001	7.5	2.6	< 0.001	875	< 0.0005	1,500
1020D	CTLN-1701-114	1/11/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.42	< 0.001	158	< 0.005	< 0.005	0.4	0.15	< 0.001	< 0.1	0.166	< 0.0001	0.002	7.5	2.6	< 0.001	926	< 0.0005	1,500
1020D	CTLN-1702-719	2/23/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.43	< 0.001	162	< 0.005	< 0.005	0.9	0.06	< 0.001	< 0.1	0.066	< 0.0001	0.002	7.5	1	< 0.001	901	< 0.0005	1,510
1020D	CTLN-1704-929	4/19/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.38	< 0.001	150	< 0.005	< 0.005	0.4	0.08	< 0.001	< 0.1	0.163	< 0.0001	0.002	7.4	0.7	< 0.001	912	< 0.0005	1,430
1020D	CTLN-1705-413	5/30/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.44	< 0.001	164	< 0.005	< 0.005	0.4	0.15	< 0.001	< 0.1	0.139	< 0.0001	0.002	7.5	2.2	< 0.001	899	< 0.0005	1,540
1020D	CTLN-1706-401	6/14/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.36	< 0.001	162	< 0.005	< 0.005	0.4	0.04	< 0.001	< 0.1	0.083	< 0.0001	0.001	7.6	2.9	< 0.001	914	< 0.0005	1,450
1020D	CTLN-1707-401	7/24/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.42	< 0.001	150	< 0.005	< 0.005	0.4	0.33	< 0.001	< 0.1	0.149	< 0.0001	0.001	7.5	2	< 0.001	911	< 0.0005	1,490
1020D	CTLN-1708-461	8/28/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.42	< 0.001	166	< 0.005	< 0.005	0.4	0.24	< 0.001	< 0.1	0.23	< 0.0001	0.001	7.6	5.1	< 0.001	900	< 0.0005	1,440
1022A	CTLN-1604-105	4/5/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.28	< 0.001	279	< 0.005	< 0.005	0.2	0.05	< 0.001	< 0.1	0.006	< 0.0001	0.001	7.4	0.6	0.01	2,060	< 0.0005	3,510
1022A	CTLN-1606-434	6/15/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.3	< 0.001	371	< 0.005	< 0.005	0.2	< 0.03	< 0.001	< 0.1	0.052	< 0.0001	0.001	7.3	2.7	0.009	2,130	< 0.0005	3,480
1022A	CTLN-1607-531	7/27/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.34	< 0.001	373	< 0.005	< 0.005	0.3	< 0.02	< 0.001	< 0.1	0.014	< 0.0001	0.002	7.3	1.3	0.009	2,120	< 0.0005	3,510
1022A	CTLN-1607-532	7/27/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.3	< 0.001	360	< 0.005	< 0.005	0.3	< 0.02	< 0.001	< 0.1	0.013	< 0.0001	0.001	7.3	1	0.008	2,070	< 0.0005	3,510
1022A	CTLN-1609-371	9/28/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.71	< 0.001	484	< 0.005	< 0.005	0.3	0.71	< 0.001	< 0.1	1.5	< 0.0001	< 0.001	7.2	0.4	< 0.001	2,420	< 0.0005	3,880
1022A	CTLN-1611-222	11/22/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.44	< 0.001	396	< 0.005	< 0.005	0.3	0.23	< 0.001	0.1	0.112	< 0.0001	0.001	7.3	-0.9	0.006	2,340	< 0.0005	3,520
1022A	CTLN-1701-123	1/23/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.72	< 0.001	438	< 0.005	< 0.005	0.3	0.86	< 0.001	< 0.1	0.607	< 0.0001	< 0.001	7.3	0.8	< 0.002	2,410	< 0.0005	3,740
1022A	CTLN-1703-739	3/8/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.66	< 0.001	469	< 0.005	< 0.005	0.3	0.31	< 0.001	< 0.1	0.153	< 0.0001	< 0.001	7.3	1	< 0.002	2,500	< 0.0005	3,900
1022A	CTLN-1704-928	4/19/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.55	< 0.001	459	< 0.005	< 0.005	0.3	0.51	< 0.001	< 0.1	0.17	< 0.0001	< 0.001	7.3	0.3	< 0.002	2490	< 0.0005	3820
1022A	CTLN-1705-414	5/30/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.61	< 0.001	486	< 0.005	< 0.005	0.3	0.6	< 0.001	< 0.1	0.138	< 0.0001	< 0.001	7.2	1.8	< 0.001	2710	< 0.0005	4070
1022A	CTLN-1706-402	6/14/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.44	< 0.001	435	< 0.005	< 0.005	0.3	0.49	< 0.001	0.1	0.206	< 0.0001	< 0.001	7.4	2.3	< 0.001	2560	< 0.0005	3770
1022A	CTLN-1707-409	7/26/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.58	< 0.001	456	< 0.005	< 0.005	0.3	0.46	< 0.001	< 0.1	0.276	< 0.0001	< 0.001	7.4	2.5	< 0.001	2650	< 0.0005	3980
1022A	CTLN-1708-465	8/29/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.6	< 0.001	492	< 0.005	< 0.005	0.3	0.39	< 0.001	< 0.1	0.33	< 0.0001	< 0.001	7.3	-0.3	< 0.001	2730	< 0.0005	3820
1138D	TLN-1602-332-CCR	2/24/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.07	< 0.001	285	< 0.005	0.01	0.3	0.04	< 0.001	< 0.1	0.155	< 0.0001	0.003	7.1	3.3	< 0.001	1,620	< 0.0005	2,670
1138D	CTLN-1604-224	4/28/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.03	< 0.001	299	< 0.005	0.008	0.4	0.66	< 0.001	< 0.1	0.145	< 0.0001	0.003	7.3	4.8	< 0.001	1,620	< 0.0005	2,700
1138D	CTLN-1606-433	6/15/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.13	< 0.001	274	< 0.005	0.009	0.3	0.51	< 0.001	< 0.1	0.134	< 0.0001	0.002	7.2	3.5	< 0.001	1,630	< 0.0005	2,630
1138D	CTLN-1607-530	7/27/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.1	< 0.001	268	< 0.005	0.006	0.4	0.11	< 0.001	< 0.1	0.11	< 0.0001	0.002	7.2	2	< 0.001	1,490	< 0.0005	2,640
1138D	CTLN-1609-370	9/28/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.18	< 0.001	282	< 0.005	< 0.005	0.3	0.04	< 0.001	< 0.1	0.014	< 0.0001	0.002	7.2	2.6	< 0.001	1,650	< 0.0005	2,610
1138D	CTLN-1611-221	11/22/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.25	< 0.001	291	< 0.005	< 0.005	0.4	0.04	< 0.001	< 0.1	0.011	< 0.0001	0.002	7.2	3.7	< 0.002	1,620	< 0.0005	2,580
1138D	CTLN-1701-115	1/11/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.15	< 0.001	269	< 0.005	< 0.005	0.3	< 0.02	< 0.001	< 0.1	0.03	< 0.0001	0.002	7.2	3.4	< 0.002	1,680	< 0.0005	2,590
1138D	CTLN-1702-716	2/22/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.2	< 0.001	282	< 0.005	< 0.005	0.5	< 0.02	< 0.001	< 0.1	0.06	< 0.0001	0.001	7.2	2.3	< 0.002	1,610	< 0.0005	2,610
1138D	CTLN-1704-927	4/19/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.15	< 0.001	274	< 0.005	< 0.005	0.4	0.05	< 0.001	< 0.1	0.11	< 0.0001	0.001	7.2	2.7	< 0.002	1610	< 0.0005	2510
1138D	CTLN-1705-415	5/30/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.25	< 0.001	292	< 0.005	0.009	0.4	0.46	< 0.001	< 0.1	0.165	< 0.0001	0.001	7.2	1.9	< 0.001	1600	< 0.0005	2630
1138D	CTLN-1706-419	6/26/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.23	< 0.001	328	< 0.005	< 0.005	0.4	0.95	< 0.001	< 0.1	0.123	< 0.0001	< 0.001	7.2	2.8	< 0.001	1880	< 0.0005	2660
1138D (Dup)	CTLN-1706-420	6/26/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.34	< 0.001	307	< 0.005	0.01	0.4	0.22	< 0.001	< 0.1	0.169	< 0.0001	< 0.001	7.2	2.1	< 0.001	1840	< 0.0005	2520
1138D	CTLN-1707-408	7/26/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.17	< 0.001	263	< 0.005	0.008	0.3	0.13	< 0.001	< 0.1	0.16	< 0.0001	< 0.001	7.3	2.3	< 0.001	1690	< 0.0005	2580
1138D	CTLN-1708-464	8/29/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.19	< 0.001	285	< 0.005	0.006	0.4	0.03	< 0.001	< 0.1	0.136	< 0.0001	< 0.001	7.4	0.09	< 0.001	1780	< 0.0005	2530
601M	CTLN-1604-100	4/4/2016	< 0.001	0.004	< 0.05	< 0.001	0.65	< 0.001	164	< 0.005	< 0.005	0.5	< 0.02	< 0.001	< 0.1	0.073	< 0.0001	0.003	7.3	1.9	< 0.001	792	< 0.0005	1,530

**** DRAFT ****

2/20/2019

Appendix F

Colstrip SES Federal CCR Rule Groundwater Draft Baseline Monitoring Data - 2016 Through August 2017

Comparison to USEPA MCLs (If No MCL Listed Then EPA RSL For Tapwater - Ingestion For Child, RSL Limit Was Used)

***Metals analyzed as Total Recoverable (TRC) unless turbidity >10, then metals ran both as Total Recoverable (TRC) and Dissolved (DIS).**

Highlighted Values Exceed MCL or EPA Tapwater RSL

Highlighted Values Are Detection Limits Higher than the MCL or EPA Tapwater RSL

Site Code	Sample Code	Date	ANTIMONY 7440-36-0 mg/L	ARSENIC 7440-38-2 mg/L	BARIUM 7440-39-3 mg/L	BERYLLIUM 7440-41-7 mg/L	BORON 7440-42-8 mg/L	CADMIUM 7440-43-9 mg/L	CALCIUM 7440-70-2 mg/L	CHROMIUM 7440-47-3 mg/L	COBALT 7440-48-4 mg/L	FLUORIDE 16984-48-8 mg/L	IRON 7439-89-6 mg/L	LEAD 7439-92-1 mg/L	LITHIUM 7439-93-2 mg/L	MANGANESE 7439-96-5 mg/L	MERCURY 7439-97-6 mg/L	MOLYBDENUM 7439-98-7 mg/L	pH NA standard units	RADIUM 226/228 7440-14-4 pCi/L	SELENIUM 7782-49-2 mg/L	SULFATE 14808-79-8 mg/L	THALLIUM 7440-28-0 mg/L	TDS NA mg/L
			MCL - 0.006	MCL - 0.01	MCL - 2.0	MCL - 0.004	RSL - 4.0	MCL - 0.005	No MCL/ RSL	MCL - 0.1	RSL - 0.006	MCL - 4.0	RSL - 14.0	MCL - 0.015	RSL - 0.04	RSL - 0.43	MCL - 0.002	RSL - 0.1	No MCL/ RSL	MCL - 5.0	MCL - 0.05	No MCL/ RSL	MCL - 0.002	No MCL/ RSL
601M	CTLN-1606-426	6/14/2016	< 0.001	0.003	< 0.05	< 0.001	0.66	< 0.001	214	< 0.005	< 0.005	0.5	0.06	< 0.001	< 0.1	0.333	< 0.0001	0.003	7.2	1.9	< 0.001	793	< 0.0005	1,540
601M	CTLN-1607-524	7/12/2016	< 0.001	0.003	< 0.05	< 0.001	0.66	< 0.001	204	< 0.005	< 0.005	0.5	0.17	< 0.001	< 0.1	0.274	< 0.0001	0.003	7.2	2.4	< 0.001	788	< 0.0005	1,530
601M	CTLN-1608-931	8/30/2016	< 0.001	0.004	< 0.05	< 0.001	0.65	< 0.001	214	< 0.005	< 0.005	0.5	0.35	< 0.001	< 0.1	0.2	< 0.0001	0.003	7.3	2.6	< 0.001	810	< 0.0005	1,530
601M	CTLN-1611-219	11/21/2016	< 0.001	0.005	< 0.05	< 0.001	0.7	< 0.001	228	< 0.005	< 0.005	0.5	0.6	< 0.001	0.1	0.202	< 0.0001	0.003	7.2	2.1	< 0.001	798	< 0.0005	1,480
601M	CTLN-1701-110	1/10/2017	< 0.001	0.005	< 0.05	< 0.001	0.64	< 0.001	214	< 0.005	< 0.005	0.4	0.62	< 0.001	< 0.1	0.173	< 0.0001	0.003	7.2	2.5	< 0.001	822	< 0.0005	1,480
601M	CTLN-1702-700	2/14/2017	< 0.001	0.006	< 0.05	< 0.001	0.67	< 0.001	213	< 0.005	< 0.005	0.5	0.67	< 0.001	< 0.1	0.164	< 0.0001	0.003	7.2	3.6	< 0.001	818	< 0.0005	1,510
1182M-CCR	CTLN-1605-246	5/3/2016	0.002	0.003	< 0.05	< 0.001	1.73	< 0.001	283	< 0.005	0.006	0.4	0.17	< 0.001	0.2	0.474	< 0.0001	0.006	7.4	3.3	< 0.002	2,070	< 0.0005	3,230
1182M-CCR	CTLN-1606-431	6/15/2016	< 0.001	0.003	< 0.05	< 0.001	1.29	< 0.001	236	< 0.005	0.006	0.3	0.63	< 0.001	0.2	0.511	< 0.0001	0.002	7.4	3.9	< 0.001	1,450	< 0.0005	2,370
1182M-CCR	CTLN-1607-527	7/26/2016	< 0.001 TRC < 0.001 DIS	0.002 0.002	< 0.05 < 0.05	< 0.001 TRC < 0.001 DIS	1.24 TRC 1.12 DIS	< 0.001 TRC < 0.001 DIS	224 TRC 214 DIS	< 0.005 TRC < 0.005 DIS	< 0.005 TRC < 0.005 DIS	0.3	2.13 TRC 0.35 DIS	< 0.001 TRC < 0.001 DIS	0.2 **TRC** 0.2 **DIS**	0.583 **TRC** 0.501 **DIS**	< 0.0001	0.001 TRC < 0.001 DIS	7.4	2.3	< 0.001 0.179 **DIS**	1,260	< 0.0005 TRC < 0.0005 DIS	2,160
1182M-CCR	CTLN-1608-932	8/30/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.97	< 0.001	229	< 0.005	< 0.005	0.3	0.66	< 0.001	0.2	0.419	< 0.0001	< 0.001	7.4	5	< 0.001	1,190	< 0.0005	2,030
1182M-CCR	CTLN-1611-220	11/22/2016	< 0.001	< 0.001	< 0.05	< 0.001	0.84	< 0.001	222	< 0.005	< 0.005	0.2	1.95	< 0.001	0.2	0.258	< 0.0001	< 0.001	7.3	1.3	< 0.002	1,200	< 0.0005	1,950
1182M-CCR	CTLN-1701-111	1/10/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.76	< 0.001	214	< 0.005	< 0.005	0.2	2.29	< 0.001	0.1	0.236	< 0.0001	< 0.001	7.3	3.3	< 0.002	1,270	< 0.0005	2,020
1182M-CCR	CTLN-1702-702	2/15/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.79	< 0.001	227	< 0.005	< 0.005	0.2	2.34	< 0.001	0.1	0.225	< 0.0001	< 0.001	7.3	2	< 0.001	1,290	< 0.0005	2,100
1182M-CCR	CTLN-1704-926	4/19/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.68	< 0.001	246	< 0.005	< 0.005	0.2	2.46	< 0.001	0.1	0.231	< 0.0001	< 0.001	7.2	0.6	< 0.002	1350	< 0.0005	2120
1182M-CCR	CTLN-1705-404	5/17/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.68	< 0.001	222	< 0.005	< 0.005	0.2	2.33	< 0.001	0.1	0.198	< 0.0001	< 0.001	7.3	0.2	< 0.001	1410	< 0.0005	2150
1182M-CCR	CTLN-1706-412	6/22/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.8	< 0.001	245	< 0.005	< 0.005	0.2	2.52	< 0.001	0.1	0.225	< 0.0001	< 0.001	7.3	2.3	< 0.001	1420	< 0.0005	2210
1182M-CCR	CTLN-1707-316	7/25/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.69	< 0.001	242	< 0.005	< 0.005	0.2	2.78	< 0.001	0.1	0.207	< 0.0001	< 0.001	7.3	5.6	< 0.001	1460	< 0.0005	2270
1182M-CCR	CTLN-1708-307	8/24/2017	< 0.001	< 0.001	< 0.05	< 0.001	0.86	< 0.001	287	< 0.005	< 0.005	0.2	2.66	< 0.001	< 0.1	0.216	< 0.0001	< 0.001	7.3	4.4	< 0.001	1510	< 0.0005	2400
WM-127	TLN-1602-316-CCR	2/10/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.76	< 0.001	505	< 0.005	< 0.005	0.2	13.8	< 0.001	0.2	1.1	< 0.0001	< 0.001	6.8	1.8	< 0.002	5,240	< 0.0005	7,900
WM-127	CTLN-1604-214	4/26/2016	< 0.001	0.001	< 0.05	< 0.001	1.77	< 0.001	519	< 0.005	< 0.005	0.2	14.7	< 0.001	0.2	1.09	< 0.0001	< 0.001	6.9	1.1	< 0.004	5,300	< 0.0005	8,050
WM-127	CTLN-1606-421	6/1/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.87	< 0.001	477	< 0.005	< 0.005	0.2	15.3	< 0.001	0.3	1.03	< 0.0001	< 0.001	6.8	1.8	< 0.002	5,370	< 0.0005	7,710
WM-127	CTLN-1607-519	7/11/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.85	< 0.001	474	< 0.005	0.009	0.2	14.6	< 0.001	0.2	1.15	< 0.0001	< 0.001	6.9	7.9	< 0.002	5,610	< 0.0005	7,990
WM-127	CTLN-1610-381	10/13/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.94	< 0.001	461	< 0.005	< 0.005	0.2	14.9	< 0.001	0.3	1.09	< 0.0001	< 0.001	6.9	4.5	< 0.3	5,530	< 0.0005	8,070
WM-127	CTLN-1611-227	11/28/2016	< 0.001	< 0.001	< 0.05	< 0.001	1.81	< 0.001	464	< 0.005	< 0.005	0.2	15.1	< 0.001	0.2	1.14	< 0.0001	< 0.001	6.9	0.9	< 0.002	5,640	< 0.0005	7,870
WM-127	CTLN-1701-112	1/10/2017	< 0.001	< 0.002	< 0.05	< 0.001	1.73	< 0.001	465	< 0.005	< 0.005	0.2	14.2	< 0.001	0.2	1.13	< 0.0001	< 0.001	6.9	1.9	< 0.004	5,550	< 0.0005	7,660
WM-127	CTLN-1702-714	2/22/2017	< 0.001	< 0.002	< 0.05	< 0.001	1.78	< 0.001	488	< 0.005	< 0.005	0.2	15.7	< 0.001	0.2	1.14	< 0.0001	< 0.001	6.9	2.3	< 0.004	5,320	0.0007	7,750
WM-127	CTLN-1704-900	4/11/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.77	< 0.001	467	< 0.005	< 0.005	0.2	15.3	< 0.001	0.2	1.15	< 0.0001	0.002	7.0	1.3	< 0.002	5,350	< 0.0005	7,000
WM-127	CTLN-1705-412	5/30/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.85	< 0.001	503	< 0.005	< 0.005	0.2	16.5	< 0.001	0.2	1.15	< 0.0001	< 0.001	6.8	2.1	0.003	5,460	< 0.0007	8,220
WM-127	CTLN-1706-400	6/13/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.62	< 0.001	456	< 0.005	< 0.005	0.2	16.1	< 0.001	0.2	1.09	< 0.0001	0.005	6.9	6.6	< 0.002	5,010	< 0.0005	7,540
WM-127	CTLN-1707-400	7/24/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.63	< 0.001	442	< 0.005	< 0.005	0.2	16.2	< 0.001	0.1	1.23	< 0.0001	< 0.001	6.8	1.5	< 0.001	5,420	< 0.0005	7,700
WM-127	CTLN-1708-091	8/25/2017	< 0.001	< 0.001	< 0.05	< 0.001	1.89	< 0.001	466	< 0.005	< 0.005	0.2	14.8	< 0.001	< 0.1	1.14	< 0.0001	< 0.001	6.9	1.3	< 0.001	5,590	< 0.0005	7,230

APPENDIX G

USDOE RAIS Radium PRG Calculator Outputs

Site-Specific
Resident Equation Inputs for Soil

Variable	Value
TR (target cancer risk) unitless	0.000001
t_{res} (time - resident) yr	26
ED_{res} (exposure duration - resident) yr	26
ET_{res} (exposure time - resident) hr/day	24
ET_{res-c} (exposure time - resident child) hr/day	24
ET_{res-a} (exposure time - resident adult) hr/day	24
ET_{res-i} (exposure time - indoor resident) hr/day	16.416
ET_{res-o} (exposure time - outdoor resident) hr/day	1.752
ED_{res-c} (exposure duration - resident child) yr	6
ED_{res-a} (exposure duration - resident adult) yr	20
EF_{res} (exposure frequency - resident) day/yr	270
EF_{res-c} (exposure frequency - resident child) day/yr	270
EF_{res-a} (exposure frequency - resident adult) day/yr	270
IRS_{res-a} (soil intake rate - resident adult) mg/day	100
IRS_{res-c} (soil intake rate - resident child) mg/day	200
IRA_{res-a} (inhalation rate - resident adult) m^3/day	20
IRA_{res-c} (inhalation rate - resident child) m^3/day	10
$IFS_{res-adj}$ (age-adjusted soil ingestion factor - resident) mg	864000
$IFA_{res-adj}$ (age-adjusted soil inhalation factor - resident) m^3	124200
GSF_i (gamma shielding factor - indoor) unitless	0.4
$MLF_{produce}$ (produce mass loading factor) unitless	0.0135
Site area for ACF (area correction factor) m^2	1000
Cover thickness for GSF_o (gamma shielding factor) cm	0
IRV_{res-a} (vegetable consumption rate - resident adult) g/day	128.9
IRV_{res-c} (vegetable consumption rate - resident child) g/day	41.7
$IFV_{res-adj}$ (age-adjusted vegetable consumption factor - resident) g	763614
$IFF_{res-adj}$ (age-adjusted fruit consumption factor - resident) g	1128222
IRF_{res-a} (fruit consumption rate - resident adult) g/day	188.5
IRF_{res-c} (fruit consumption rate - resident child) g/day	68.1
$CF_{res-produce}$ (contaminated plant fraction) unitless	0.25
TR (target cancer risk) unitless	0.000001
ED_{res-c} (exposure duration - resident child) yr	6
ED_{res-a} (exposure duration - resident adult) yr	20
EF_{res-c} (exposure frequency - resident child) day/yr	270
EF_{res-a} (exposure frequency - resident adult) day/yr	270
City (Climate Zone)	29
A_s (acres)	0.5

Q/C_{wp} (g/m^2-s per kg/m^3)	93.77
PEF (particulate emission factor) m^3/kg	1359344438
A (PEF Dispersion Constant)	16.2302
B (PEF Dispersion Constant)	18.7762
C (PEF Dispersion Constant)	216.108
V (fraction of vegetative cover) unitless	0.5
U_m (mean annual wind speed) m/s	4.69
U_t (equivalent threshold value)	11.32
F(x) (function dependent on U_m/U_t) unitless	0.194

Output generated 22MAY2018:10:25:37

Site-Specific
Resident PRG for Soil

Isotope	ICRP Lung Absorption Type	ICRP Lung Absorption Type	Inhalation Slope Factor (risk/pCi)	External Exposure Slope Factor (risk/yr per pCi/g)	Food Ingestion Slope Factor (risk/pCi)	Soil Ingestion Slope Factor (risk/pCi)	Particulate Emission Factor (m^3/kg)	Lambda (1/yr)	Halflife (yr)	1000 m^2 Soil Volume Area Correction Factor	0 cm Soil Volume Gamma Shielding Factor	Wet Soil-to-plant transfer factor (pCi/g-fresh plant per pCi/g-wet soil)	Ingestion PRG (pCi/g)	Inhalation PRG (pCi/g)	External Exposure PRG (pCi/g)	Produce Consumption PRG (pCi/g)	Total PRG (pCi/g)
Ra-226	S	S	2.82E-08	2.50E-08	5.14E-10	6.77E-10	1.36E+09	4.33E-04	1.60E+03	6.85E-01	1.00E+00	1.70E-02	1.72E+00	3.91E+02	8.81E+00	1.36E-01	1.24E-01
Ra-228	S	S	4.37E-08	3.43E-11	1.42E-09	1.98E-09	1.36E+09	1.21E-01	5.75E+00	1.00E+00	1.00E+00	1.70E-02	1.92E+00	8.21E+02	1.43E+04	1.59E-01	1.47E-01

Output generated 22MAY2018:10:25:37

Site-Specific
Outdoor Worker Equation Inputs for Soil

Variable	Value
Slab size for ACF (area correction factor) m^2	1000
Cover layer thickness for GSF (gamma shielding factor) cm	0
TR (target cancer risk) unitless	0.000001
t_{ow} (time - outdoor worker) yr	25
EF_{ow} (exposure frequency - outdoor worker) day/yr	187
ED_{ow} (exposure duration - outdoor worker) yr	25
IRS_{ow} (soil intake rate - outdoor worker) mg/day	100
IRA_{ow} (inhalation rate - outdoor worker) m^3/day	60
ET_{ow} (exposure time - outdoor worker) hr/day	8
City (Climate Zone)	29
A_s (acres)	0.5
Q/C_{wp} (g/m^2-s per kg/m^3)	93.77
PEF (particulate emission factor) m^3/kg	1359344438
A (PEF Dispersion Constant)	16.2302
B (PEF Dispersion Constant)	18.7762
C (PEF Dispersion Constant)	216.108
V (fraction of vegetative cover) unitless	0.5
U_m (mean annual wind speed) m/s	4.69
U_t (equivalent threshold value)	11.32
F(x) (function dependent on U_m/U_t) unitless	0.194

Output generated 22MAY2018:10:44:43

Site-Specific
Outdoor Worker PRG for Soil

Isotope	ICRP Lung Absorption Type	ICRP Lung Absorption Type	Inhalation Slope Factor (risk/pCi)	External Exposure Slope Factor (risk/yr per pCi/g)	Adult Soil Ingestion Slope Factor (risk/pCi)	Particulate Emission Factor (m^3/kg)	Lambda (1/yr)	Halflife (yr)	1000 m^2 Soil Volume Area Correction Factor	0 cm Soil Volume Gamma Shielding Factor	Ingestion PRG (pCi/g)	Inhalation PRG (pCi/g)	External Exposure PRG (pCi/g)	Total PRG (pCi/g)
Ra-226	S	S	2.82E-08	2.50E-08	2.95E-10	1.36E+09	4.33E-04	1.60E+03	6.85E-01	1.00E+00	7.30E+00	5.19E+02	1.38E+01	4.73E+00
Ra-228	S	S	4.37E-08	3.43E-11	6.70E-10	1.36E+09	1.21E-01	5.75E+00	1.00E+00	1.00E+00	1.01E+01	1.06E+03	2.16E+04	1.00E+01

Output generated 22MAY2018:10:44:43

Site-Specific
Excavation Worker Equation Inputs for Soil

Variable	Value
Cover layer thickness for GSF (gamma shielding factor) cm	0
TR (target cancer risk) unitless	0.000001
t_{ew} (time - excavation worker) yr	1
EF_{ew} (exposure frequency - excavation worker) day/yr	124
ED_{ew} (exposure duration - excavation worker) yr	1
ET_{ew} (outdoor exposure time - excavation worker) hr/day	8
IRA_{ew} (inhalation rate - excavation worker) m^3/day	60
IR_{ew} (soil intake rate - excavation worker) mg/day	330
City (Climate Zone)	29
A_s (acres)	0.5
Q/C_{wp} (g/m^2-s per kg/m^3)	93.77
PEF (particulate emission factor) m^3/kg	1359344438
A (PEF Dispersion Constant)	16.2302
B (PEF Dispersion Constant)	18.7762
C (PEF Dispersion Constant)	216.108
V (fraction of vegetative cover) unitless	0.5
U_m (mean annual wind speed) m/s	4.69
U_t (equivalent threshold value)	11.32
F(x) (function dependent on U_m/U_t) unitless	0.194

Output generated 22MAY2018:10:52:40

Site-Specific
Excavation Worker PRG for Soil

Isotope	ICRP Lung Absorption Type	ICRP Lung Absorption Type	Inhalation Slope Factor (risk/pCi)	External Exposure Slope Factor (risk/yr per pCi/g)	Adult Soil Ingestion Slope Factor (risk/pCi)	Particulate Emission Factor (m^3/kg)	Lambda (1/yr)	Halflife (yr)	1000 m^2 Soil Volume Area Correction Factor	0 cm Soil Volume Gamma Shielding Factor	Ingestion PRG (pCi/g)	Inhalation PRG (pCi/g)	External Exposure PRG (pCi/g)	Total PRG (pCi/g)
Ra-226	S	S	2.82E-08	2.50E-08	2.95E-10	1.36E+09	4.33E-04	1.60E+03	6.85E-01	1.00E+00	8.30E+01	1.95E+04	5.16E+02	7.12E+01
Ra-228	S	S	4.37E-08	3.43E-11	6.70E-10	1.36E+09	1.21E-01	5.75E+00	1.00E+00	1.00E+00	3.87E+01	1.33E+04	2.73E+05	3.86E+01

Output generated 22MAY2018:10:52:40

APPENDIX H

SPLP Calculations

NJDEP SPLP Spreadsheet, V3.1, November 2013

CALCULATE SITE SPECIFIC IGW STANDARD | Reset Spreadsheet | Print Results | Instructions | Print to file | Exit

Case name/area of concern:	Colstrip 3&4 EHP Area EU 9 Drain Pit 3 Seep Area
Case number:	8/7/2019 (revised)
Sampling date:	5/8/2018 to 5/10/2018
Contaminant:	Arsenic (total)
CAS No:	7440-38-2
Water solubility (mg/L)	NA (enter NA if inorganic)
Aqueous reporting limit (µg/L):	3.00E+00
Soil reporting limit (mg/kg):	1.00E+00 (if unavailable, enter a value below lowest concentration measured)
Health-based GWQC (µg/L)	1.00E+01
DAF (20, or site-specific if approved):	**10**
Leachate Criterion (µg/L):	1.00E+02
Henry's law constant (dimensionless):	0.00E+00 (enter 0 if inorganic)

NOTE:
USE ONE PAGE PER CONTAMINANT, do not leave empty rows between samples
Do not enter samples with soil concentrations at or below the reporting limit.
When leachate concentration is non-detect, enter the aqueous reporting limit
Enter site-specific dilution-attenuation factor (DAF) if desired

Data entry cells (do not skip rows)
Optional data entry
Calculated or locked cells
Indicates that Alternative Remediation Standard needs to be recalculated

Sample ID	Soil sample weight (kg)	Leachate Volume (L)	Total Soil Concentration (mg/kg)	SPLP Leachate Concentration (µg/L)	Final pH of Leachate (except VOCs)	Optional data				Kd (L/kg)	% Contaminant in Leachate	Field leachate concentration (µg/L)	Pass or fail?
						Sampling Depth (ft)	Soil Type	Organic Carbon (mg/kg)	Organic Carbon (%)				
DP3-2 (3-4 ft)	0.1	2	18	1	8.5					17980.0	0.11	1.00	PASS
DP3-2 (1-2 ft)	0.1	2	47	4	8.67					11730.0	0.17	4.01	PASS
DP3-2 (0-6 in)	0.1	2	18	7	8.8					2551.4	0.78	7.05	PASS

SPLP RESULTS for

OPTION 1a: All adjusted leachate concentrations are below the leachate criterior

REMEDIATION STANDARD = 47 mg/kg

OPTION 1b: Simple inspection of tabulated results to find highest acceptable standard
EVERYTHING PASSED, OPTION 1b NOT VALID

OPTION 2: Remediation standard using site-specific Kd value
Kd ratio = 7.05, AVERAGING Kds OK
Kd USED FOR CALCULATING STANDARD = 10753.81 L/kg
result before rounding = 1075.3963 mg/kg
REMEDIATION STANDARD = 47 mg/kg (controlled by maximum soil concentration)

OPTION 3: Remediation standard using linear regression
Number of points = 2
(points were eliminated because leachate concentrations were not above the aqueous reporting limit)
Less than three points with leachate concentrations above the aqueous reporting limit
LINEAR REGRESSION CANNOT BE CONDUCTED

NJDEP SPLP Spreadsheet, V3.1, November 2013

CALCULATE SITE SPECIFIC IGW STANDARD | Reset Spreadsheet | Print Results | Instructions | Print to file | Exit

Case name/area of concern:	Colstrip 3&4 EHP Area EU 10 Drain Pit 5 Spill/Seep Area
Case number:	8/7/2019 (revised)
Sampling date:	5/8/2018 to 5/10/2018
Contaminant:	Arsenic (total)
CAS No:	7440-38-2
Water solubility (mg/L)	NA (enter NA if inorganic)
Aqueous reporting limit (µg/L):	3.00E+00
Soil reporting limit (mg/kg):	1.00E+00 (if unavailable, enter a value below lowest concentration measured)
Health-based GWQC (µg/L)	1.00E+01
DAF (20, or site-specific if approved):	**10**
Leachate Criterion (µg/L):	1.00E+02
Henry's law constant (dimensionless):	0.00E+00 (enter 0 if inorganic)

NOTE:
USE ONE PAGE PER CONTAMINANT, do not leave empty rows between samples
Do not enter samples with soil concentrations at or below the reporting limit.
When leachate concentration is non-detect, enter the aqueous reporting limit
Enter site-specific dilution-attenuation factor (DAF) if desired

Data entry cells (do not skip rows)
Optional data entry
Calculated or locked cells
Indicates that Alternative Remediation Standard needs to be recalculated

Sample ID	Soil sample weight (kg)	Leachate Volume (L)	Total Soil Concentration (mg/kg)	SPLP Leachate Concentration (µg/L)	Final pH of Leachate (except VOCs)	Optional data				Kd (L/kg)	% Contaminant in Leachate	Field leachate concentration (µg/L)	Pass or fail?
						Sampling Depth (ft)	Soil Type	Organic Carbon (mg/kg)	Organic Carbon (%)				
DP5-3 (6-7 ft)	0.1	2	47	2	9.2					23480.0	0.09	2.00	PASS
DP5-3 (1-2 ft)	0.1	2	10	5	9.25					1980.0	1.00	5.05	PASS
DP5-4 (1-2 ft)	0.1	2	10	6	8.92					1646.7	1.20	6.07	PASS

SPLP RESULTS for

OPTION 1a: All adjusted leachate concentrations are below the leachate criterior

REMEDIATION STANDARD = 47 mg/kg

OPTION 1b: Simple inspection of tabulated results to find highest acceptable standard
EVERYTHING PASSED, OPTION 1b NOT VALID

OPTION 2: Remediation standard using site-specific Kd value
Kd ratio = 14.26, USE MINIMUM Kd
Kd USED FOR CALCULATING STANDARD = 1646.67 L/kg
result before rounding = 164.682 mg/kg
REMEDIATION STANDARD = 47 mg/kg (controlled by maximum soil concentration)

OPTION 3: Remediation standard using linear regression
Number of points = 2
(points were eliminated because leachate concentrations were not above the aqueous reporting limit)
Less than three points with leachate concentrations above the aqueous reporting limit
LINEAR REGRESSION CANNOT BE CONDUCTED

NJDEP SPLP Spreadsheet, V3.1, November 2013

CALCULATE SITE SPECIFIC IGW STANDARD | Reset Spreadsheet | Print Results | Instructions | Print to file | Exit

Case name/area of concern:	Colstrip 3&4 EHP Area EU 12 Main Dam Seep Area
Case number:	8/7/2019 (revised)
Sampling date:	5/8/2018 to 5/10/2018
Contaminant:	Arsenic (total)
CAS No:	7440-38-2 (enter NA if inorganic)
Water solubility (mg/L)	NA
Aqueous reporting limit (µg/L):	3.00E+00
Soil reporting limit (mg/kg):	1.00E+00 (if unavailable, enter a value below lowest concentration measured)
Health-based GWQC (µg/L)	1.00E+01
DAF (20, or site-specific if approved):	**10**
Leachate Criterion (µg/L):	1.00E+02
Henry's law constant (dimensionless):	0.00E+00 (enter 0 if inorganic)

NOTE:
USE ONE PAGE PER CONTAMINANT, do not leave empty rows between samples
Do not enter samples with soil concentrations at or below the reporting limit.
When leachate concentration is non-detect, enter the aqueous reporting limit
Enter site-specific dilution-attenuation factor (DAF) if desired

Data entry cells (do not skip rows)
Optional data entry
Calculated or locked cells
Indicates that Alternative Remediation Standard needs to be recalculated

Sample ID	Soil sample weight (kg)	Leachate Volume (L)	Total Soil Concentration (mg/kg)	SPLP Leachate Concentration (µg/L)	Final pH of Leachate (except VOCs)	Optional data				Kd (L/kg)	% Contaminant in Leachate	Field leachate concentration (µg/L)	Pass or fail?
						Sampling Depth (ft)	Soil Type	Organic Carbon (mg/kg)	Organic Carbon (%)				
MD-3 (6-7 ft)	0.1	2	38	1	6.8					37980.0	0.05	1.00	PASS
MD-7 (6-7 ft)	0.1	2	14	2	8.83					6980.0	0.29	2.00	PASS
MD-11 (1-2 ft)	0.1	2	18	6	8.47					2980.0	0.67	6.04	PASS

SPLP RESULTS for

OPTION 1a: All adjusted leachate concentrations are below the leachate criterior

REMEDIATION STANDARD = 38 mg/kg

OPTION 1b: Simple inspection of tabulated results to find highest acceptable standard
EVERYTHING PASSED, OPTION 1b NOT VALID

OPTION 2: Remediation standard using site-specific Kd value
Kd ratio = 12.74, USE MINIMUM Kd
Kd USED FOR CALCULATING STANDARD = 2980. L/kg
result before rounding = 298.0153 mg/kg
REMEDIATION STANDARD = 38 mg/kg (controlled by maximum soil concentration)

OPTION 3: Remediation standard using linear regression
Number of points = 1
(points were eliminated because leachate concentrations were not above the aqueous reporting limit)
Less than three points with leachate concentrations above the aqueous reporting limit
LINEAR REGRESSION CANNOT BE CONDUCTED

NJDEP SPLP Spreadsheet, V3.1, November 2013

CALCULATE SITE SPECIFIC IGW STANDARD | Reset Spreadsheet | Print Results | Instructions | Print to file | Exit

Case name/area of concern:	Colstrip 3&4 EHP Area EU 14 South Fork Cow Creek Seep
Case number:	8/7/2019 (revised)
Sampling date:	5/8/2018 to 5/10/2018
Contaminant:	Arsenic (total)
CAS No:	7440-38-2 (enter NA if inorganic)
Water solubility (mg/L)	NA
Aqueous reporting limit (µg/L):	3.00E+00
Soil reporting limit (mg/kg):	1.00E+00 (if unavailable, enter a value below lowest concentration measured)
Health-based GWQC (µg/L)	1.00E+01
DAF (20, or site-specific if approved):	**10**
Leachate Criterion (µg/L):	1.00E+02
Henry's law constant (dimensionless):	0.00E+00 (enter 0 if inorganic)

NOTE:
USE ONE PAGE PER CONTAMINANT, do not leave empty rows between samples
Do not enter samples with soil concentrations at or below the reporting limit.
When leachate concentration is non-detect, enter the aqueous reporting limit
Enter site-specific dilution-attenuation factor (DAF) if desired

Data entry cells (do not skip rows)
Optional data entry
Calculated or locked cells
Indicates that Alternative Remediation Standard needs to be recalculated

Sample ID	Soil sample weight (kg)	Leachate Volume (L)	Total Soil Concentration (mg/kg)	SPLP Leachate Concentration (µg/L)	Final pH of Leachate (except VOCs)	Optional data				Kd (L/kg)	% Contaminant in Leachate	Field leachate concentration (µg/L)	Pass or fail?
						Sampling Depth (ft)	Soil Type	Organic Carbon (mg/kg)	Organic Carbon (%)				
SFCC-6 (1-2 ft)	0.1	2	17	1	8.08					16980.0	0.12	1.00	PASS
SFCC-18 (4-5 ft)	0.1	2	24	1	8.01					23980.0	0.08	1.00	PASS
SFCC-24 (1-2 ft)	0.1	2	21	5	8.8					4180.0	0.48	5.02	PASS

SPLP RESULTS for

OPTION 1a: All adjusted leachate concentrations are below the leachate criterior

REMEDIATION STANDARD = 24 mg/kg

OPTION 1b: Simple inspection of tabulated results to find highest acceptable standard
EVERYTHING PASSED, OPTION 1b NOT VALID

OPTION 2: Remediation standard using site-specific Kd value
Kd ratio = 5.74, AVERAGING Kds OK
Kd USED FOR CALCULATING STANDARD = 15046.67 L/kg
result before rounding = 1504.682 mg/kg
REMEDIATION STANDARD = 24 mg/kg (controlled by maximum soil concentration)

OPTION 3: Remediation standard using linear regression
Number of points = 1
(points were eliminated because leachate concentrations were not above the aqueous reporting limit)
Less than three points with leachate concentrations above the aqueous reporting limit
LINEAR REGRESSION CANNOT BE CONDUCTED

NJDEP SPLP Spreadsheet, V3.1, November 2013

CALCULATE SITE SPECIFIC IGW STANDARD | Reset Spreadsheet | Print Results | Instructions | Print to file | Exit

Case name/area of concern:	Colstrip 3&4 EHP Area EU 9 Drain Pit 3 Seep Area
Case number:	8/7/2019 (revised)
Sampling date:	5/8/2018 to 5/10/2018
Contaminant:	Barium (total)
CAS No:	7440-39-3
Water solubility (mg/L)	NA ← enter NA if inorganic
Aqueous reporting limit (µg/L):	2.00E+02
Soil reporting limit (mg/kg):	2.00E+01 ← if unavailable, enter a value below lowest concentration measured
Health-based GWQC (µg/L)	1.00E+03
DAF (20, or site-specific if approved):	**10**
Leachate Criterion (µg/L):	1.00E+04
Henry's law constant (dimensionless):	0.00E+00 ← enter 0 if inorganic

NOTE:
USE ONE PAGE PER CONTAMINANT, do not leave empty rows between samples
Do not enter samples with soil concentrations at or below the reporting limit.
When leachate concentration is non-detect, enter the aqueous reporting limit
Enter site-specific dilution-attenuation factor (DAF) if desired

Data entry cells (do not skip rows)
Optional data entry
Calculated or locked cells
Indicates that Alternative Remediation Standard needs to be recalculated

Sample ID	Soil sample weight (kg)	Leachate Volume (L)	Total Soil Concentration (mg/kg)	SPLP Leachate Concentration (µg/L)	Final pH of Leachate (except VOCs)	Optional data				Kd (L/kg)	% Contaminant in Leachate	Field leachate concentration (µg/L)	Pass or fail?
						Sampling Depth (ft)	Soil Type	Organic Carbon (mg/kg)	Organic Carbon (%)				
DP3-5 (0-6 in)	0.1	2	489	50	8.32					9760.0	0.20	50.00	PASS
DP3-3 (1-2 ft)	0.1	2	787	50	8.37					15720.0	0.13	50.00	PASS
DP3-5 (1-2 ft)	0.1	2	498	60	8.17					8280.0	0.24	60.00	PASS

SPLP RESULTS for

OPTION 1a: All adjusted leachate concentrations are below the leachate criterior

REMEDIATION STANDARD = 787 mg/kg

OPTION 1b: Simple inspection of tabulated results to find highest acceptable standard
EVERYTHING PASSED, OPTION 1b NOT VALID

OPTION 2: Remediation standard using site-specific Kd value
Kd ratio = 1.90, AVERAGING Kds OK
Kd USED FOR CALCULATING STANDARD = 11253.33 L/kg
result before rounding = 112534.8667 mg/kg
REMEDIATION STANDARD = 790 mg/kg (controlled by maximum soil concentration)

OPTION 3: Remediation standard using linear regression
Number of points = 1
(points were eliminated because leachate concentrations were not above the aqueous reporting limit)
Less than three points with leachate concentrations above the aqueous reporting limit
LINEAR REGRESSION CANNOT BE CONDUCTED

NJDEP SPLP Spreadsheet, V3.1, November 2013

CALCULATE SITE SPECIFIC IGW STANDARD | Reset Spreadsheet | Print Results | Instructions | Print to file | Exit

Case name/area of concern:	Colstrip 3&4 EHP Area EU 10 Drain Pit 5 Spill/Seep Area
Case number:	8/7/2019 (revised)
Sampling date:	5/8/2018 to 5/10/2018
Contaminant:	Barium (total)
CAS No:	7440-39-3
Water solubility (mg/L)	NA (enter NA if inorganic)
Aqueous reporting limit (µg/L):	2.00E+02
Soil reporting limit (mg/kg):	2.00E+01 (if unavailable, enter a value below lowest concentration measured)
Health-based GWQC (µg/L)	1.00E+03
DAF (20, or site-specific if approved):	**10**
Leachate Criterion (µg/L):	1.00E+04
Henry's law constant (dimensionless):	0.00E+00 (enter 0 if inorganic)

NOTE:
USE ONE PAGE PER CONTAMINANT, do not leave empty rows between samples
Do not enter samples with soil concentrations at or below the reporting limit.
When leachate concentration is non-detect, enter the aqueous reporting limit
Enter site-specific dilution-attenuation factor (DAF) if desired

Data entry cells (do not skip rows)
Optional data entry
Calculated or locked cells
Indicates that Alternative Remediation Standard needs to be recalculated

Sample ID	Soil sample weight (kg)	Leachate Volume (L)	Total Soil Concentration (mg/kg)	SPLP Leachate Concentration (µg/L)	Final pH of Leachate (except VOCs)	Optional data				Kd (L/kg)	% Contaminant in Leachate	Field leachate concentration (µg/L)	Pass or fail?
						Sampling Depth (ft)	Soil Type	Organic Carbon (mg/kg)	Organic Carbon (%)				
DP5-3 (6-7 ft)	0.1	2	449	50	9.2					8960.0	0.22	50.00	PASS
DP5-1 (0-6 in)	0.1	2	772	100	8.98					7700.0	0.26	100.00	PASS
DP5-2 (0-6 in)	0.1	2	2530	190	9.22					13295.8	0.15	190.00	PASS

SPLP RESULTS for

OPTION 1a: All adjusted leachate concentrations are below the leachate criterior

REMEDIATION STANDARD = 2530 mg/kg

OPTION 1b: Simple inspection of tabulated results to find highest acceptable standard
EVERYTHING PASSED, OPTION 1b NOT VALID

OPTION 2: Remediation standard using site-specific Kd value
Kd ratio = 1.73, AVERAGING Kds OK
Kd USED FOR CALCULATING STANDARD = 9985.26 L/kg
result before rounding = 99854.1649 mg/kg
REMEDIATION STANDARD = 2500 mg/kg (controlled by maximum soil concentration)

OPTION 3: Remediation standard using linear regression
Number of points = 1
(points were eliminated because leachate concentrations were not above the aqueous reporting limit)
Less than three points with leachate concentrations above the aqueous reporting limit
LINEAR REGRESSION CANNOT BE CONDUCTED

NJDEP SPLP Spreadsheet, V3.1, November 2013

CALCULATE SITE SPECIFIC IGW STANDARD | Reset Spreadsheet | Print Results | Instructions | Print to file | Exit

Case name/area of concern:	Colstrip 3&4 EHP Area EU 12 Main Dam Seep Area
Case number:	8/7/2019 (revised)
Sampling date:	5/8/2018 to 5/10/2018

Contaminant:	Barium (total)	
CAS No:	7440-39-3	enter NA if inorganic
Water solubility (mg/L)	NA	
Aqueous reporting limit (µg/L):	2.00E+02	if unavailable, enter a value below lowest concentration measured
Soil reporting limit (mg/kg):	2.00E+01	
Health-based GWQC (µg/L)	1.00E+03	
DAF (20, or site-specific if approved):	**10**	
Leachate Criterion (µg/L):	1.00E+04	
Henry's law constant (dimensionless):	0.00E+00	enter 0 if inorganic

NOTE:
USE ONE PAGE PER CONTAMINANT, do not leave empty rows between samples
Do not enter samples with soil concentrations at or below the reporting limit.
When leachate concentration is non-detect, enter the aqueous reporting limit
Enter site-specific dilution-attenuation factor (DAF) if desired

Data entry cells (do not skip rows)
Optional data entry
Calculated or locked cells
Indicates that Alternative Remediation Standard needs to be recalculated

Sample ID	Soil sample weight (kg)	Leachate Volume (L)	Total Soil Concentration (mg/kg)	SPLP Leachate Concentration (µg/L)	Final pH of Leachate (except VOCs)	Optional data				Kd (L/kg)	% Contaminant in Leachate	Field leachate concentration (µg/L)	Pass or fail?
						Sampling Depth (ft)	Soil Type	Organic Carbon (mg/kg)	Organic Carbon (%)				
MD-7 (6-7 ft)	0.1	2	443	50	8.83					8840.0	0.23	50.00	PASS
MD-6 (0-6 in)	0.1	2	634	90	8.71					7024.4	0.28	90.00	PASS
MD-6 dup (0-6 in)	0.1	2	543	100	8.41					5410.0	0.37	100.00	PASS
MD-7 (0-6 in)	0.1	2	931	110	8.56					8443.6	0.24	110.00	PASS
MD-11 (1-2 ft)	0.1	2	537	150	8.47					3560.0	0.56	150.00	PASS

SPLP RESULTS for

OPTION 1a: All adjusted leachate concentrations are below the leachate criterion

REMEDIATION STANDARD = 931 mg/kg

OPTION 1b: Simple inspection of tabulated results to find highest acceptable standard
EVERYTHING PASSED, OPTION 1b NOT VALID

OPTION 2: Remediation standard using site-specific Kd value
Kd ratio = 2.48, AVERAGING Kds OK
Kd USED FOR CALCULATING STANDARD = 6655.62 L/kg
result before rounding = 66557.6949 mg/kg
REMEDIATION STANDARD = 930 mg/kg (controlled by maximum soil concentration)

OPTION 3: Remediation standard using linear regression
Number of points = 1
(points were eliminated because leachate concentrations were not above the aqueous reporting limit)
Less than three points with leachate concentrations above the aqueous reporting limit
LINEAR REGRESSION CANNOT BE CONDUCTED

NJDEP SPLP Spreadsheet, V3.1, November 2013

CALCULATE SITE SPECIFIC IGW STANDARD | Reset Spreadsheet | Print Results | Instructions | Print to file | Exit

Case name/area of concern:	Colstrip 3&4 EHP Area EU 13 Saddle Dam Seep Area
Case number:	8/7/2019 (revised)
Sampling date:	5/8/2018 to 5/10/2018

Contaminant:	Barium (total)	
CAS No:	7440-39-3	enter NA if inorganic
Water solubility (mg/L)	NA	
Aqueous reporting limit (µg/L):	2.00E+02	if unavailable, enter a value below lowest concentration measured
Soil reporting limit (mg/kg):	2.00E+01	
Health-based GWQC (µg/L)	1.00E+03	
DAF (20, or site-specific if approved):	**10**	
Leachate Criterion (µg/L):	1.00E+04	
Henry's law constant (dimensionless):	0.00E+00	enter 0 if inorganic

NOTE:
USE ONE PAGE PER CONTAMINANT, do not leave empty rows between samples
Do not enter samples with soil concentrations at or below the reporting limit.
When leachate concentration is non-detect, enter the aqueous reporting limit
Enter site-specific dilution-attenuation factor (DAF) if desired

Data entry cells (do not skip rows)
Optional data entry
Calculated or locked cells
Indicates that Alternative Remediation Standard needs to be recalculated

Sample ID	Soil sample weight (kg)	Leachate Volume (L)	Total Soil Concentration (mg/kg)	SPLP Leachate Concentration (µg/L)	Final pH of Leachate (except VOCs)	Optional data				Kd (L/kg)	% Contaminant in Leachate	Field leachate concentration (µg/L)	Pass or fail?
						Sampling Depth (ft)	Soil Type	Organic Carbon (mg/kg)	Organic Carbon (%)				
SD-2 (1-2 ft)	0.1	2	314	50	8.44					6260.0	0.32	50.00	PASS
SD-3 (0-6 in)	0.1	2	429	70	8.74					6108.6	0.33	70.00	PASS
SD-14 (0-6 in)	0.1	2	510	120	8.63					4230.0	0.47	120.00	PASS

SPLP RESULTS for

OPTION 1a: All adjusted leachate concentrations are below the leachate criterior

REMEDIATION STANDARD = 510 mg/kg

OPTION 1b: Simple inspection of tabulated results to find highest acceptable standard
EVERYTHING PASSED, OPTION 1b NOT VALID

OPTION 2: Remediation standard using site-specific Kd value
Kd ratio = 1.48, AVERAGING Kds OK
Kd USED FOR CALCULATING STANDARD = 5532.86 L/kg
result before rounding = 55330.1048 mg/kg
REMEDIATION STANDARD = 510 mg/kg (controlled by maximum soil concentration)

OPTION 3: Remediation standard using linear regression
Number of points = 1
(points were eliminated because leachate concentrations were not above the aqueous reporting limit)
Less than three points with leachate concentrations above the aqueous reporting limit
LINEAR REGRESSION CANNOT BE CONDUCTED

NJDEP SPLP Spreadsheet, V3.1, November 2013

CALCULATE SITE SPECIFIC IGW STANDARD | Reset Spreadsheet | Print Results | Instructions | Print to file | Exit

Case name/area of concern:	Colstrip 3&4 EHP Area EU 14 South Fork Cow Creek Seep
Case number:	8/7/2019 (revised)
Sampling date:	5/8/2018 to 5/10/2018

Contaminant:	Barium (total)	
CAS No:	7440-39-3	enter NA if inorganic
Water solubility (mg/L)	NA	
Aqueous reporting limit (µg/L):	2.00E+02	if unavailable, enter a value below lowest concentration measured
Soil reporting limit (mg/kg):	2.00E+01	
Health-based GWQC (µg/L)	1.00E+03	
DAF (20, or site-specific if approved):	**10**	
Leachate Criterion (µg/L):	1.00E+04	
Henry's law constant (dimensionless):	0.00E+00	enter 0 if inorganic

NOTE:
USE ONE PAGE PER CONTAMINANT, do not leave empty rows between samples
Do not enter samples with soil concentrations at or below the reporting limit.
When leachate concentration is non-detect, enter the aqueous reporting limit
Enter site-specific dilution-attenuation factor (DAF) if desired

Data entry cells (do not skip rows)
Optional data entry
Calculated or locked cells
Indicates that Alternative Remediation Standard needs to be recalculated

Sample ID	Soil sample weight (kg)	Leachate Volume (L)	Total Soil Concentration (mg/kg)	SPLP Leachate Concentration (µg/L)	Final pH of Leachate (except VOCs)	Optional data				Kd (L/kg)	% Contaminant in Leachate	Field leachate concentration (µg/L)	Pass or fail?
						Sampling Depth (ft)	Soil Type	Organic Carbon (mg/kg)	Organic Carbon (%)				
SFCC-24 (1-2 ft)	0.1	2	583	100	8.8					5810.0	0.34	100.00	PASS
SFCC-11 (0-6 in)	0.1	2	394	220	8.34					1770.9	1.12	222.47	PASS
SFCC-7 (0-6 in)	0.1	2	519	640	8.07					790.9	2.47	656.06	PASS

SPLP RESULTS for

OPTION 1a: All adjusted leachate concentrations are below the leachate criterior

REMEDIATION STANDARD = 583 mg/kg

OPTION 1b: Simple inspection of tabulated results to find highest acceptable standard
EVERYTHING PASSED, OPTION 1b NOT VALID

OPTION 2: Remediation standard using site-specific Kd value
Kd ratio = 7.35, AVERAGING Kds OK
Kd USED FOR CALCULATING STANDARD = 2790.62 L/kg
result before rounding = 27907.6886 mg/kg
REMEDIATION STANDARD = 580 mg/kg (controlled by maximum soil concentration)

OPTION 3: Remediation standard using linear regression
Number of points = 2
(points were eliminated because leachate concentrations were not above the aqueous reporting limit)
Less than three points with leachate concentrations above the aqueous reporting limit
LINEAR REGRESSION CANNOT BE CONDUCTED

NJDEP SPLP Spreadsheet, V3.1, November 2013

CALCULATE SITE SPECIFIC IGW STANDARD | Reset Spreadsheet | Print Results | Instructions | Print to file | Exit

Case name/area of concern:	Colstrip 3&4 EHP Area EU 13 Saddle Dam Seep Area
Case number:	8/7/2019 (revised)
Sampling date:	5/8/2018 to 5/10/2018

Contaminant:	Boron	
CAS No:	7440-42-8	enter NA if inorganic
Water solubility (mg/L)	8.70E+03	
Aqueous reporting limit (µg/L):	2.00E+01	if unavailable, enter a value below lowest concentration measured
Soil reporting limit (mg/kg):	1.00E+00	
Health-based GWQC (µg/L)	4.00E+03	
DAF (20, or site-specific if approved):	10	
Leachate Criterion (µg/L):	4.00E+04	
Henry's law constant (dimensionless):	0.00E+00	enter 0 if inorganic

NOTE:
USE ONE PAGE PER CONTAMINANT, do not leave empty rows between samples
Do not enter samples with soil concentrations at or below the reporting limit.
When leachate concentration is non-detect, enter the aqueous reporting limit
Enter site-specific dilution-attenuation factor (DAF) if desired
Data entry cells (do not skip rows)
Optional data entry
Calculated or locked cells
Indicates that Alternative Remediation Standard needs to be recalculated

Sample ID	Soil sample weight (kg)	Leachate Volume (L)	Total Soil Concentration (mg/kg)	SPLP Leachate Concentration (µg/L)	Final pH of Leachate (except VOCs)	Optional data				Kd (L/kg)	% Contaminant in Leachate	Field leachate concentration (µg/L)	Pass or fail?
						Sampling Depth (ft)	Soil Type	Organic Carbon (mg/kg)	Organic Carbon (%)				
SD-7 (0-6 in)	0.1	2	70	2510	8.2					7.9	71.71	8704.54	PASS
SD-3 (0-6 in)	0.1	2	125	3760	8.74					13.2	60.16	9329.74	PASS
SD-2 (1-2 ft)	0.1	2	155	5810	8.44					6.7	74.97	22689.10	PASS

SPLP RESULTS for

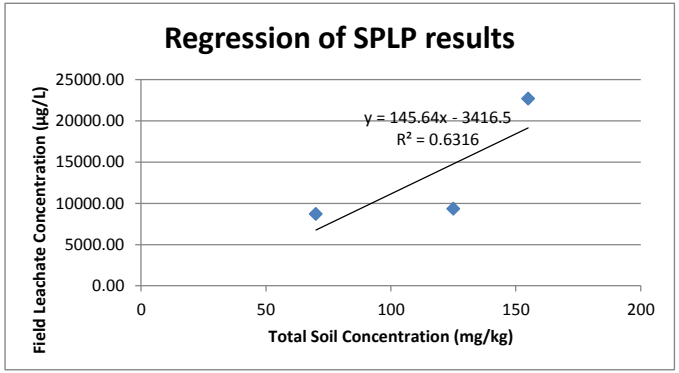
OPTION 1a: All adjusted leachate concentrations are below the leachate criterion

REMEDIATION STANDARD = 155 mg/kg

OPTION 1b: Simple inspection of tabulated results to find highest acceptable standard
EVERYTHING PASSED, OPTION 1b NOT VALID

OPTION 2: Remediation standard using site-specific Kd value
Kd ratio = 1.98, AVERAGING Kds OK
Kd USED FOR CALCULATING STANDARD = 9.27 L/kg
result before rounding = 376.9502 mg/kg
REMEDIATION STANDARD = 160 mg/kg (controlled by maximum soil concentration)

OPTION 3: Remediation standard using linear regression
Number of points = 3
Soil concentration midrange = 112.5
Number of points above midrange = 2
Enough points above midrange? YES
R-Square high enough? NO
Leachate criterion within range of leachate concentrations? NO
OPTION 3 NOT VALID



NJDEP SPLP Spreadsheet, V3.1, November 2013

CALCULATE SITE SPECIFIC IGW STANDARD | Reset Spreadsheet | Print Results | Instructions | Print to file | Exit

Case name/area of concern:	Colstrip 3&4 EHP Area EU 10 Drain Pit 5 Spill/Seep Area
Case number:	8/7/2019 (revised)
Sampling date:	5/8/2018 to 5/10/2018

Contaminant:	Cobalt (total)
CAS No:	7440-48-4 (enter NA if inorganic)
Water solubility (mg/L)	NA
Aqueous reporting limit (µg/L):	5.00E-01
Soil reporting limit (mg/kg):	5.00E+00 (if unavailable, enter a value below lowest concentration measured)
Health-based GWQC (µg/L)	6.00E+00
DAF (20, or site-specific if approved):	10
Leachate Criterion (µg/L):	6.00E+01
Henry's law constant (dimensionless):	0.00E+00 (enter 0 if inorganic)

NOTE:
USE ONE PAGE PER CONTAMINANT, do not leave empty rows between samples
Do not enter samples with soil concentrations at or below the reporting limit.
When leachate concentration is non-detect, enter the aqueous reporting limit
Enter site-specific dilution-attenuation factor (DAF) if desired
Data entry cells (do not skip rows)
Optional data entry
Calculated or locked cells
Indicates that Alternative Remediation Standard needs to be recalculated

Sample ID	Soil sample weight (kg)	Leachate Volume (L)	Total Soil Concentration (mg/kg)	SPLP Leachate Concentration (µg/L)	Final pH of Leachate (except VOCs)	Optional data				Kd (L/kg)	% Contaminant in Leachate	Field leachate concentration (µg/L)	Pass or fail?
						Sampling Depth (ft)	Soil Type	Organic Carbon (mg/kg)	Organic Carbon (%)				
DP5-3 (6-7 ft)	0.1	2	15	5	9.2					2980.0	0.67	5.03	PASS
DP5-1 (4-5 ft)	0.1	2	10	5	8.17					1980.0	1.00	5.05	PASS
DP5-5 (3-4 ft)	0.1	2	8	5	8.5					1580.0	1.25	5.06	PASS

SPLP RESULTS for

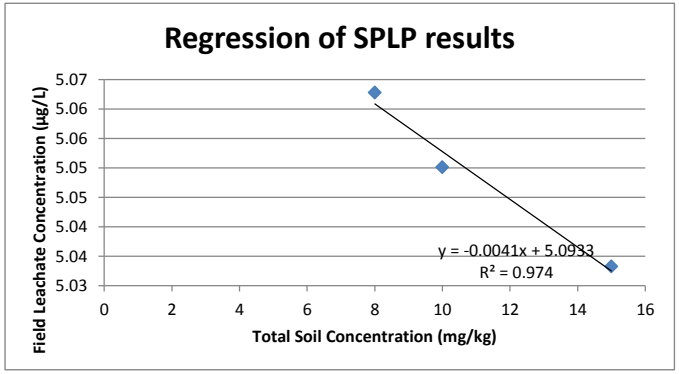
OPTION 1a: All adjusted leachate concentrations are below the leachate criterion

REMEDIATION STANDARD = 15 mg/kg

OPTION 1b: Simple inspection of tabulated results to find highest acceptable standard
EVERYTHING PASSED, OPTION 1b NOT VALID

OPTION 2: Remediation standard using site-specific Kd value
Kd ratio = 1.89, AVERAGING Kds OK
Kd USED FOR CALCULATING STANDARD = 2180. L/kg
result before rounding = 130.8092 mg/kg
REMEDIATION STANDARD = 15 mg/kg (controlled by maximum soil concentration)

OPTION 3: Remediation standard using linear regression
Number of points = 3
Soil concentration midrange = 11.5
Number of points above midrange = 1
Enough points above midrange? NO
R-Square high enough? YES
Leachate criterion within range of leachate concentrations? NO
OPTION 3 NOT VALID



NJDEP SPLP Spreadsheet, V3.1, November 2013

CALCULATE SITE SPECIFIC IGW STANDARD | Reset Spreadsheet | Print Results | Instructions | Print to file | Exit

Case name/area of concern:	Colstrip 3&4 EHP Area EU 12 Main Dam Seep Area
Case number:	8/7/2019 (revised)
Sampling date:	5/8/2018 to 5/10/2018
Contaminant:	Cobalt (total)
CAS No:	7440-48-4 (enter NA if inorganic)
Water solubility (mg/L)	NA
Aqueous reporting limit (µg/L):	5.00E-01
Soil reporting limit (mg/kg):	5.00E+00 (if unavailable, enter a value below lowest concentration measured)
Health-based GWQC (µg/L)	6.00E+00
DAF (20, or site-specific if approved):	10
Leachate Criterion (µg/L):	6.00E+01
Henry's law constant (dimensionless):	0.00E+00 (enter 0 if inorganic)

NOTE:
USE ONE PAGE PER CONTAMINANT, do not leave empty rows between samples
Do not enter samples with soil concentrations at or below the reporting limit.
When leachate concentration is non-detect, enter the aqueous reporting limit
Enter site-specific dilution-attenuation factor (DAF) if desired
Data entry cells (do not skip rows)
Optional data entry
Calculated or locked cells
Indicates that Alternative Remediation Standard needs to be recalculated

Sample ID	Soil sample weight (kg)	Leachate Volume (L)	Total Soil Concentration (mg/kg)	SPLP Leachate Concentration (µg/L)	Final pH of Leachate (except VOCs)	Optional data				Kd (L/kg)	% Contaminant in Leachate	Field leachate concentration (µg/L)	Pass or fail?
						Sampling Depth (ft)	Soil Type	Organic Carbon (mg/kg)	Organic Carbon (%)				
MD-7 (6-7 ft)	0.1	2	11	5	8.83					2180.0	0.91	5.05	PASS
MD-9 (3.3 - 4.3 ft)	0.1	2	10	5	8.94					1980.0	1.00	5.05	PASS
MD-11 (1-2 ft)	0.1	2	10	5	8.47					1980.0	1.00	5.05	PASS

SPLP RESULTS for

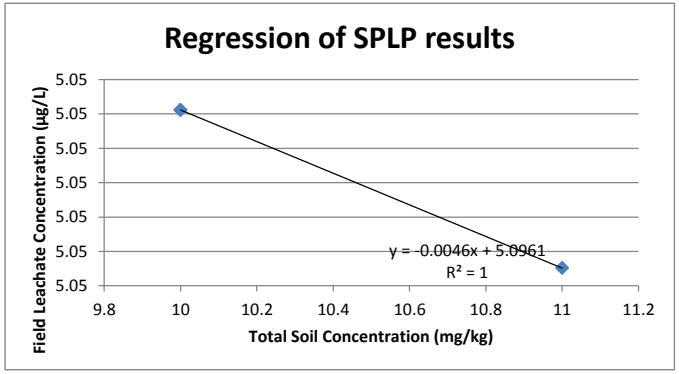
OPTION 1a: All adjusted leachate concentrations are below the leachate criterion

REMEDIATION STANDARD = 11 mg/kg

OPTION 1b: Simple inspection of tabulated results to find highest acceptable standard
EVERYTHING PASSED, OPTION 1b NOT VALID

OPTION 2: Remediation standard using site-specific Kd value
Kd ratio = 1.10, AVERAGING Kds OK
Kd USED FOR CALCULATING STANDARD = 2046.67 L/kg
result before rounding = 122.8092 mg/kg
REMEDIATION STANDARD = 11 mg/kg (controlled by maximum soil concentration)

OPTION 3: Remediation standard using linear regression
Number of points = 3
Soil concentration midrange = 10.5
Number of points above midrange = 1
Enough points above midrange? NO
R-Square high enough? YES
Leachate criterion within range of leachate concentrations? NO
OPTION 3 NOT VALID



NJDEP SPLP Spreadsheet, V3.1, November 2013

CALCULATE SITE SPECIFIC IGW STANDARD | Reset Spreadsheet | Print Results | Instructions | Print to file | Exit

Case name/area of concern:	Colstrip 3&4 EHP Area EU 14 South Fork Cow Creek Seep
Case number:	8/7/2019 (revised)
Sampling date:	5/8/2018 to 5/10/2018
Contaminant:	Cobalt (total)
CAS No:	7440-48-4 (enter NA if inorganic)
Water solubility (mg/L)	NA
Aqueous reporting limit (µg/L):	5.00E-01
Soil reporting limit (mg/kg):	5.00E+00 (if unavailable, enter a value below lowest concentration measured)
Health-based GWQC (µg/L)	6.00E+00
DAF (20, or site-specific if approved):	10
Leachate Criterion (µg/L):	6.00E+01
Henry's law constant (dimensionless):	0.00E+00 (enter 0 if inorganic)

NOTE:
USE ONE PAGE PER CONTAMINANT, do not leave empty rows between samples
Do not enter samples with soil concentrations at or below the reporting limit.
When leachate concentration is non-detect, enter the aqueous reporting limit
Enter site-specific dilution-attenuation factor (DAF) if desired
Data entry cells (do not skip rows)
Optional data entry
Calculated or locked cells
Indicates that Alternative Remediation Standard needs to be recalculated

Sample ID	Soil sample weight (kg)	Leachate Volume (L)	Total Soil Concentration (mg/kg)	SPLP Leachate Concentration (µg/L)	Final pH of Leachate (except VOCs)	Optional data				Kd (L/kg)	% Contaminant in Leachate	Field leachate concentration (µg/L)	Pass or fail?
						Sampling Depth (ft)	Soil Type	Organic Carbon (mg/kg)	Organic Carbon (%)				
SFCC-18 (4-5 ft)	0.1	2	13	5	8.01					2580.0	0.77	5.04	PASS
SFCC-20 (3-4 ft)	0.1	2	10	5	8.7					1980.0	1.00	5.05	PASS
SFCC-24 (1-2 ft)	0.1	2	10	5	8.8					1980.0	1.00	5.05	PASS

SPLP RESULTS for

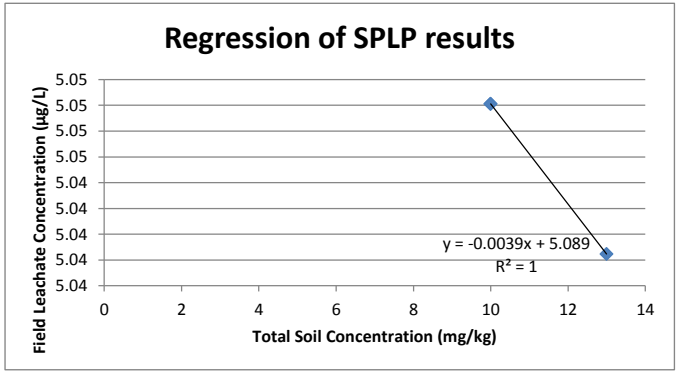
OPTION 1a: All adjusted leachate concentrations are below the leachate criterion

REMEDIATION STANDARD = 13 mg/kg

OPTION 1b: Simple inspection of tabulated results to find highest acceptable standard
EVERYTHING PASSED, OPTION 1b NOT VALID

OPTION 2: Remediation standard using site-specific Kd value
Kd ratio = 1.30, AVERAGING Kds OK
Kd USED FOR CALCULATING STANDARD = 2180. L/kg
result before rounding = 130.8092 mg/kg
REMEDIATION STANDARD = 13 mg/kg (controlled by maximum soil concentration)

OPTION 3: Remediation standard using linear regression
Number of points = 3
Soil concentration midrange = 11.5
Number of points above midrange = 1
Enough points above midrange? NO
R-Square high enough? YES
Leachate criterion within range of leachate concentrations? NO
OPTION 3 NOT VALID



NJDEP SPLP Spreadsheet, V3.1, November 2013

CALCULATE SITE SPECIFIC IGW STANDARD | Reset Spreadsheet | Print Results | Instructions | Print to file | Exit

Case name/area of concern:	Colstrip 3&4 EHP Area EU 12 Main Dam Seep Area
Case number:	8/7/2019 (revised)
Sampling date:	5/8/2018 to 5/10/2018
Contaminant:	Manganese (total)
CAS No:	7439-96-5 (enter NA if inorganic)
Water solubility (mg/L)	NA
Aqueous reporting limit (µg/L):	4.00E-01
Soil reporting limit (mg/kg):	2.00E+00 (if unavailable, enter a value below lowest concentration measured)
Health-based GWQC (µg/L)	5.00E+01
DAF (20, or site-specific if approved):	10
Leachate Criterion (µg/L):	5.00E+02
Henry's law constant (dimensionless):	0.00E+00 (enter 0 if inorganic)

NOTE:
USE ONE PAGE PER CONTAMINANT, do not leave empty rows between samples
Do not enter samples with soil concentrations at or below the reporting limit.
When leachate concentration is non-detect, enter the aqueous reporting limit
Enter site-specific dilution-attenuation factor (DAF) if desired
Data entry cells (do not skip rows)
Optional data entry
Calculated or locked cells
Indicates that Alternative Remediation Standard needs to be recalculated

Sample ID	Soil sample weight (kg)	Leachate Volume (L)	Total Soil Concentration (mg/kg)	SPLP Leachate Concentration (µg/L)	Final pH of Leachate (except VOCs)	Optional data				Kd (L/kg)	% Contaminant in Leachate	Field leachate concentration (µg/L)	Pass or fail?
						Sampling Depth (ft)	Soil Type	Organic Carbon (mg/kg)	Organic Carbon (%)				
MD-4 (6-7 ft)	0.1	2	2410	1	8.19					#######	0.00	1.00	PASS
MD-6 (3.3-4.3 ft)	0.1	2	822	14	8.6					58694.3	0.03	14.00	PASS
MD-11 (1-2 ft)	0.1	2	1790	160	8.47					11167.5	0.18	160.28	PASS

SPLP RESULTS for

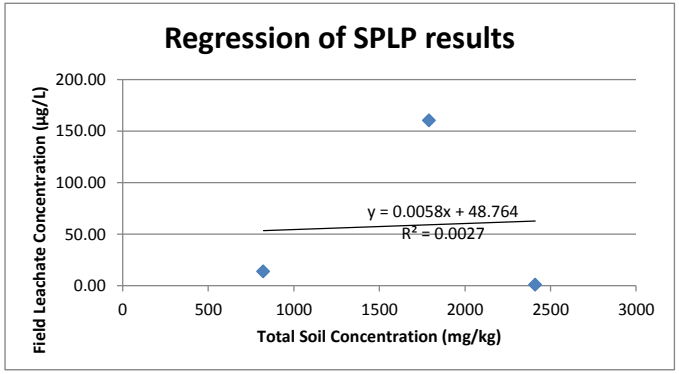
OPTION 1a: All adjusted leachate concentrations are below the leachate criterion

REMEDIATION STANDARD = 2410 mg/kg

OPTION 1b: Simple inspection of tabulated results to find highest acceptable standard
EVERYTHING PASSED, OPTION 1b NOT VALID

OPTION 2: Remediation standard using site-specific Kd value
Kd ratio = 215.80, USE MINIMUM Kd
Kd USED FOR CALCULATING STANDARD = 11167.5 L/kg
result before rounding = 5583.8267 mg/kg
REMEDIATION STANDARD = 2400 mg/kg (controlled by maximum soil concentration)

OPTION 3: Remediation standard using linear regression
Number of points = 3
Soil concentration midrange = 1616.
Number of points above midrange = 2
Enough points above midrange? YES
R-Square high enough? NO
Leachate criterion within range of leachate concentrations? NO
OPTION 3 NOT VALID



2409980.0 Kd - MD-4 (6-7 ft)
Spreadsheet locked by NJDEP & cannot change cell width. Value copied here.

NJDEP SPLP Spreadsheet, V3.1, November 2013

CALCULATE SITE SPECIFIC IGW STANDARD | Reset Spreadsheet | Print Results | Instructions | Print to file | Exit

Case name/area of concern:	Colstrip 3&4 EHP Area EU 14 South Fork Cow Creek
Case number:	8/7/2019 (revised)
Sampling date:	5/8/2018 to 5/10/2018
Contaminant:	Manganese (total)
CAS No:	7439-96-5 (enter NA if inorganic)
Water solubility (mg/L)	NA
Aqueous reporting limit (µg/L):	4.00E-01
Soil reporting limit (mg/kg):	2.00E+00
Health-based GWQC (µg/L)	5.00E+01
DAF (20, or site-specific if approved):	10
Leachate Criterion (µg/L):	5.00E+02
Henry's law constant (dimensionless):	0.00E+00 (enter 0 if inorganic)

(if unavailable, enter a value below lowest concentration measured)

NOTE:
USE ONE PAGE PER CONTAMINANT, do not leave empty rows between samples
Do not enter samples with soil concentrations at or below the reporting limit.
When leachate concentration is non-detect, enter the aqueous reporting limit
Enter site-specific dilution-attenuation factor (DAF) if desired
Data entry cells (do not skip rows)
Optional data entry
Calculated or locked cells
Indicates that Alternative Remediation Standard needs to be recalculated

Sample ID	Soil sample weight (kg)	Leachate Volume (L)	Total Soil Concentration (mg/kg)	SPLP Leachate Concentration (µg/L)	Final pH of Leachate (except VOCs)	Optional data				Kd (L/kg)	% Contaminant in Leachate	Field leachate concentration (µg/L)	Pass or fail?
						Sampling Depth (ft)	Soil Type	Organic Carbon (mg/kg)	Organic Carbon (%)				
SFCC-10 (1-2 ft)	0.1	2	619	23	8.16					26893.0	0.07	23.02	PASS
SFCC-20 (3-4 ft)	0.1	2	890	116	8.7					7652.4	0.26	116.30	PASS
SFCC-24 (1-2 ft)	0.1	2	944	182	8.8					5166.8	0.39	182.70	PASS

SPLP RESULTS for

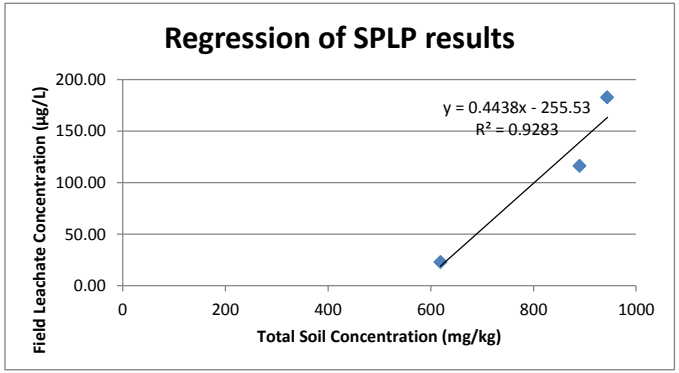
OPTION 1a: All adjusted leachate concentrations are below the leachate criterion

REMEDIATION STANDARD = 944 mg/kg

OPTION 1b: Simple inspection of tabulated results to find highest acceptable standard
EVERYTHING PASSED, OPTION 1b NOT VALID

OPTION 2: Remediation standard using site-specific Kd value
Kd ratio = 5.20, AVERAGING Kds OK
Kd USED FOR CALCULATING STANDARD = 13237.42 L/kg
result before rounding = 6618.7884 mg/kg
REMEDIATION STANDARD = 940 mg/kg (controlled by maximum soil concentration)

OPTION 3: Remediation standard using linear regression
Number of points = 3
Soil concentration midrange = 781.5
Number of points above midrange = 2
Enough points above midrange? YES
R-Square high enough? YES
Leachate criterion within range of leachate concentrations? NO
OPTION 3 NOT VALID



8/7/2019

Boron Properties/Constants

Property	Value Used	Reference
Water solubility (mg/L)	8,700 mg/L	PubChem Open Chemistry Database, National Institute of Health https://pubchem.ncbi.nlm.nih.gov/compound/7628#section=Solubility https://pubchem.ncbi.nlm.nih.gov/compound/10219853#section=Solubility
Aqueous reporting limit (ug/L)	20 µg/L	USEPA Practical Quantitation Limit http://colowqforum.org/pdfs/pql/02-2014/PQLWG%2020140207PQLguidancerevisions.pdf
Soil reporting limit (mg/kg)	1 mg/kg	Laboratory Analytical Report (Energy Labs)
Health-based GWQC (ug/L)	4,000 µg/L	USEPA Tapwater RSL https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables
Dilution Attenuation Factor (DAF)	10	MDEQ Default is 10
Leachate criterion (µg /L)	12,000 µg/L	NJDEP SPLP guidance document
Henry's Law Constant (dimensionless)	N/A	https://www.epa.gov/ccl/regulatory-determination-2-support-documents-boron

APPENDIX I

SPLP Laboratory Results

ANALYTICAL SUMMARY REPORT

August 27, 2018

Talen Energy Supply LLC
PO Box 38
Colstrip, MT 59323-0038

Work Order: B18050864

Project Name: Talen Montana, LLC Soil Sampling at Historic Spill

Energy Laboratories Inc Billings MT received the following 63 samples for Talen Energy Supply LLC on 5/8/2018 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
B18050864-001	TLN-1805-001	05/07/18 10:05	05/08/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18050864-002	TLN-1805-002	05/07/18 10:10	05/08/18	Soil	Same As Above
B18050864-003	TLN-1805-003	05/07/18 10:20	05/08/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A

ANALYTICAL SUMMARY REPORT

B18050864-004	TLN-1805-004	05/07/18 10:25	05/08/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18050864-005	TLN-1805-005	05/07/18 10:30	05/08/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18050864-006	TLN-1805-006	05/07/18 10:45	05/08/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio

ANALYTICAL SUMMARY REPORT

B18050864-007	TLN-1805-007	05/07/18 10:50	05/08/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18050864-008	TLN-1805-008	05/07/18 10:55	05/08/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18050864-009	TLN-1805-009	05/07/18 11:10	05/08/18	Soil	Same As Above
B18050864-010	TLN-1805-010	05/07/18 11:15	05/08/18	Soil	Same As Above
B18050864-011	TLN-1805-011	05/07/18 11:20	05/08/18	Soil	Same As Above
B18050864-012	TLN-1805-012	05/07/18 11:30	05/08/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A

ANALYTICAL SUMMARY REPORT

B18050864-013	TLN-1805-013	05/07/18 11:35	05/08/18	Splp Extract	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18050864-014	TLN-1805-014	05/07/18 11:40	05/08/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18050864-015	TLN-1805-015	05/07/18 13:05	05/08/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A

ANALYTICAL SUMMARY REPORT

B18050864-016	TLN-1805-016	05/07/18 13:10	05/08/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18050864-017	TLN-1805-017	05/07/18 13:15	05/08/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18050864-018	TLN-1805-018	05/07/18 13:45	05/08/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A

ANALYTICAL SUMMARY REPORT

B18050864-019	TLN-1805-019	05/07/18 13:50	05/08/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18050864-020	TLN-1805-020	05/07/18 13:55	05/08/18	Soil	Same As Above
B18050864-021	TLN-1805-021	05/07/18 14:05	05/08/18	Soil	Same As Above
B18050864-022	TLN-1805-022	05/07/18 14:15	05/08/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18050864-023	TLN-1805-023	05/07/18 14:20	05/08/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A

ANALYTICAL SUMMARY REPORT

B18050864-024	TLN-1805-024	05/07/18 14:10	05/08/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18050864-025	TLN-1805-025	05/07/18 14:30	05/08/18	Soil	Same As Above
B18050864-026	TLN-1805-026	05/07/18 14:35	05/08/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18050864-027	TLN-1805-027	05/07/18 14:45	05/08/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18050864-028	TLN-1805-028	05/07/18 14:50	05/08/18	Soil	Same As Above

ANALYTICAL SUMMARY REPORT

B18050864-029	TLN-1805-029	05/07/18 14:55	05/08/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18050864-030	TLN-1805-030	05/07/18 15:10	05/08/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18050864-031	TLN-1805-031	05/07/18 15:15	05/08/18	Soil	Same As Above
B18050864-032	TLN-1805-032	05/07/18 15:25	05/08/18	Soil	Same As Above
B18050864-033	TLN-1805-033	05/07/18 15:30	05/08/18	Soil	Same As Above
B18050864-034	TLN-1805-034	05/07/18 15:35	05/08/18	Soil	Same As Above
B18050864-035	TLN-1805-035	05/07/18 15:40	05/08/18	Soil	Same As Above
B18050864-036	TLN-1805-036	05/07/18 15:55	05/08/18	Soil	Same As Above
B18050864-037	TLN-1805-037	05/07/18 16:00	05/08/18	Soil	Same As Above
B18050864-038	TLN-1805-038	05/07/18 16:15	05/08/18	Soil	Same As Above
B18050864-039	TLN-1805-039	05/07/18 16:20	05/08/18	Soil	Same As Above
B18050864-040	TLN-1805-040	05/08/18 7:20	05/08/18	Soil	Same As Above
B18050864-041	TLN-1805-041	05/07/18 16:17	05/08/18	Soil	Same As Above

ANALYTICAL SUMMARY REPORT

B18050864-042	TLN-1805-042	05/08/18 7:30	05/08/18	Aqueous	Metals by ICP/ICPMS, Total Alkalinity Conductivity Mercury, Total Fluoride Chloride Sulfate/Anions by Ion Chromatography pH Metals Digestion by E200.2 Mercury Digestion by E245.1 Radium 226, Total Radium 228, Total Sodium Adsorption Ratio
B18050864-043	TLN-1805-043	05/08/18 7:55	05/08/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18050864-044	TLN-1805-044	05/08/18 8:00	05/08/18	Soil	Same As Above
B18050864-045	TLN-1805-045	05/08/18 8:05	05/08/18	Soil	Same As Above
B18050864-046	TLN-1805-046	05/08/18 8:10	05/08/18	Soil	Same As Above
B18050864-047	TLN-1805-047	05/08/18 8:20	05/08/18	Soil	Same As Above
B18050864-048	TLN-1805-048	05/08/18 8:25	05/08/18	Soil	Same As Above
B18050864-049	TLN-1805-049	05/08/18 8:35	05/08/18	Soil	Same As Above
B18050864-050	TLN-1805-050	05/08/18 8:40	05/08/18	Soil	Same As Above
B18050864-051	TLN-1805-051	05/08/18 8:45	05/08/18	Soil	Same As Above
B18050864-052	TLN-1805-052	05/08/18 8:47	05/08/18	Soil	Same As Above
B18050864-053	TLN-1805-053	05/08/18 8:50	05/08/18	Soil	Same As Above
B18050864-054	TLN-1805-054	05/08/18 9:00	05/08/18	Soil	Same As Above
B18050864-055	TLN-1805-055	05/08/18 9:05	05/08/18	Soil	Same As Above
B18050864-056	TLN-1805-056	05/08/18 9:20	05/08/18	Soil	Same As Above
B18050864-057	TLN-1805-057	05/08/18 9:25	05/08/18	Soil	Same As Above
B18050864-058	TLN-1805-058	05/08/18 9:40	05/08/18	Soil	Same As Above
B18050864-059	TLN-1805-059	05/08/18 9:45	05/08/18	Soil	Same As Above
B18050864-060	TLN-1805-060	05/08/18 10:05	05/08/18	Soil	Same As Above
B18050864-061	TLN-1805-061	05/08/18 10:10	05/08/18	Soil	Same As Above

ANALYTICAL SUMMARY REPORT

B18050864-062	TLN-1805-062	05/08/18 10:35	05/08/18	Soil	Same As Above
B18050864-063	TLN-1805-063	05/08/18 10:40	05/08/18	Soil	Same As Above

The analyses presented in this report were performed by Energy Laboratories, Inc., 1120 S 27th St., Billings, MT 59101, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

CLIENT: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic S
Work Order: B18050864

Revised Date: 08/27/18
Report Date: 06/13/18

CASE NARRATIVE

Tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories, PO Box 247, Casper, WY, EPA Number WY00002.

Revised Date: 8/3/2018

Workorder: B18050864
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Revised Samples:

TLN-1805-003
TLN-1805-004
TLN-1805-005
TLN-1805-007
TLN-1805-012
TLN-1805-013
TLN-1805-015
TLN-1805-017
TLN-1805-018
TLN-1805-022
TLN-1805-023
TLN-1805-026
TLN-1805-029

On 7/13/2018 a request was received from Jenny Vanek at Hydrometrics to revise this workorder by adding SPLP analysis.

The report has been revised and replaces any previously issued report in its entirety.

Revised Date: 8/27/2018

Workorder: B18050864
Project: Talen Montana, LLC Soil Sampling at Historic Spill

On 8/8/2018 a request was received from Jenny Vanek at Hydrometrics to revise this workorder by adding a table that includes Sample Weight, Leachate Voulme, and Final pH for the SPLP Extraction.

The report has been revised and replaces any previously issued report in its entirety.

Lab Number	Client Sample ID	Post Extraction pH	Sample Wt.	Leachate Volume
B18050864-003B	TLN-1805-003	8.8 s.u.	100 g	2000 mL
B18050864-004B	TLN-1805-004	8.67 s.u.	100 g	2000 mL
B18050864-005B	TLN-1805-005	8.5 s.u.	100 g	2000 mL
B18050864-007B	TLN-1805-007	8.37 s.u.	100 g	2000 mL
B18050864-012B	TLN-1805-012	8.32 s.u.	100 g	2000 mL
B18050864-013B	TLN-1805-013	8.17 s.u.	100 g	2000 mL
B18050864-015B	TLN-1805-015	8.98 s.u.	100 g	2000 mL
B18050864-017B	TLN-1805-017	8.17 s.u.	100 g	2000 mL
B18050864-018B	TLN-1805-018	9.22 s.u.	100 g	2000 mL
B18050864-022B	TLN-1805-022	9.25 s.u.	100 g	2000 mL
B18050864-023B	TLN-1805-023	9.2 s.u.	100 g	2000 mL
B18050864-026B	TLN-1805-026	8.92 s.u.	100 g	2000 mL
B18050864-029B	TLN-1805-029	8.5 s.u.	100 g	2000 mL

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-001
Client Sample ID: TLN-1805-001

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 10:05
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	11.7	wt%		0.2		D2974	05/11/18 10:18 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.2	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	1.0	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	5.76	meq/L		0.05		SW6010B	05/16/18 18:23 / rjh
Magnesium, sat. paste	3.91	meq/L		0.08		SW6010B	05/16/18 18:23 / rjh
Potassium, sat. paste	1.05	meq/L		0.03		SW6010B	05/16/18 18:23 / rjh
Sodium, sat. paste	0.29	meq/L		0.04		SW6010B	05/16/18 18:23 / rjh
Sodium Adsorption Ratio (SAR)	0.13	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	398	mg/L		4		ASA10-3	05/16/18 09:35 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 09:35 / rco
Bromide	ND	mg/L		0.5		E300.0	05/16/18 17:07 / ens
Chloride	55	mg/L		1		E300.0	05/16/18 17:07 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/16/18 17:07 / ens
Sulfate	96	mg/L		1		E300.0	05/16/18 17:07 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/12/18 10:19 / rlh
Arsenic	11	mg/kg	D	2		SW6020	05/12/18 10:19 / rlh
Barium	175	mg/kg		1		SW6020	05/12/18 10:19 / rlh
Beryllium	ND	mg/kg		1		SW6010B	05/17/18 15:59 / rjh
Boron	9	mg/kg		1		SW6010B	05/17/18 15:59 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 10:19 / rlh
Chromium	15	mg/kg		1		SW6020	05/12/18 10:19 / rlh
Cobalt	7	mg/kg		1		SW6020	05/12/18 10:19 / rlh
Lead	11	mg/kg		1		SW6020	05/15/18 08:03 / rlh
Lithium	11	mg/kg	D	5		SW6010B	05/17/18 15:59 / rjh
Manganese	315	mg/kg		1		SW6020	05/12/18 10:19 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 13:20 / jag
Molybdenum	1	mg/kg		1		SW6020	05/12/18 10:19 / rlh
Selenium	ND	mg/kg		1		SW6020	05/15/18 08:03 / rlh
Thallium	ND	mg/kg		1		SW6020	05/12/18 10:19 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 228	0.3	pCi/g-dry	U			RA-05	05/24/18 12:25 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-002
Client Sample ID: TLN-1805-002

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 10:10
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	12.9	wt%		0.2		D2974	05/11/18 10:21 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	3.8	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	29.7	meq/L		0.05		SW6010B	05/16/18 18:38 / rjh
Magnesium, sat. paste	26.1	meq/L		0.08		SW6010B	05/16/18 18:38 / rjh
Potassium, sat. paste	0.37	meq/L		0.03		SW6010B	05/16/18 18:38 / rjh
Sodium, sat. paste	2.37	meq/L		0.04		SW6010B	05/16/18 18:38 / rjh
Sodium Adsorption Ratio (SAR)	0.45	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	632	mg/L		4		ASA10-3	05/16/18 09:50 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 09:50 / rco
Bromide	3	mg/L	D	2		E300.0	05/16/18 18:06 / ens
Chloride	568	mg/L		1		E300.0	05/16/18 18:06 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/16/18 18:06 / ens
Sulfate	2290	mg/L	D	5		E300.0	05/16/18 18:06 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/12/18 10:24 / rlh
Arsenic	15	mg/kg	D	2		SW6020	05/12/18 10:24 / rlh
Barium	103	mg/kg		1		SW6020	05/12/18 10:24 / rlh
Beryllium	ND	mg/kg		1		SW6010B	05/17/18 16:11 / rjh
Boron	13	mg/kg		1		SW6010B	05/17/18 16:11 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 10:24 / rlh
Chromium	15	mg/kg		1		SW6020	05/12/18 10:24 / rlh
Cobalt	7	mg/kg		1		SW6020	05/12/18 10:24 / rlh
Lead	12	mg/kg		1		SW6020	05/15/18 08:07 / rlh
Lithium	12	mg/kg	D	5		SW6010B	05/17/18 16:11 / rjh
Manganese	328	mg/kg		1		SW6020	05/12/18 10:24 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 13:22 / jag
Molybdenum	2	mg/kg		1		SW6020	05/12/18 10:24 / rlh
Selenium	ND	mg/kg		1		SW6020	05/15/18 08:07 / rlh
Thallium	ND	mg/kg		1		SW6020	05/12/18 10:24 / rlh
RADIONUCLIDES							
Radium 226	0.7	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 226 precision (±)	0.2	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-003
Client Sample ID: TLN-1805-003

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 10:20
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	13.6	wt%		0.2		D2974	05/11/18 10:24 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	0.5	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	2.56	meq/L		0.05		SW6010B	05/16/18 18:46 / rjh
Magnesium, sat. paste	2.13	meq/L		0.08		SW6010B	05/16/18 18:46 / rjh
Potassium, sat. paste	0.73	meq/L		0.03		SW6010B	05/16/18 18:46 / rjh
Sodium, sat. paste	0.10	meq/L		0.04		SW6010B	05/16/18 18:46 / rjh
Sodium Adsorption Ratio (SAR)	0.07	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	304	mg/L		4		ASA10-3	05/16/18 09:53 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 09:53 / rco
Bromide	ND	mg/L		0.5		E300.0	05/16/18 18:25 / ens
Chloride	14	mg/L		1		E300.0	05/16/18 18:25 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/16/18 18:25 / ens
Sulfate	37	mg/L		1		E300.0	05/16/18 18:25 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/12/18 10:28 / rlh
Arsenic	18	mg/kg	D	2		SW6020	05/12/18 10:28 / rlh
Barium	259	mg/kg		1		SW6020	05/12/18 10:28 / rlh
Beryllium	ND	mg/kg		1		SW6010B	05/17/18 16:16 / rjh
Boron	8	mg/kg		1		SW6010B	05/17/18 16:16 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 10:28 / rlh
Chromium	15	mg/kg		1		SW6020	05/12/18 10:28 / rlh
Cobalt	6	mg/kg		1		SW6020	05/12/18 10:28 / rlh
Lead	9	mg/kg		1		SW6020	05/15/18 08:12 / rlh
Lithium	12	mg/kg	D	5		SW6010B	05/17/18 16:16 / rjh
Manganese	467	mg/kg		1		SW6020	05/12/18 10:28 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 13:24 / jag
Molybdenum	1	mg/kg		1		SW6020	05/12/18 10:28 / rlh
Selenium	1	mg/kg		1		SW6020	05/15/18 08:12 / rlh
Thallium	ND	mg/kg		1		SW6020	05/15/18 08:12 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-003
Client Sample ID: TLN-1805-003

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 10:20
DateReceived: 05/08/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Arsenic	0.007	mg/L		0.001		SW6020	08/02/18 18:13 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-004
Client Sample ID: TLN-1805-004

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 10:25
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	12.5	wt%		0.2		D2974	05/11/18 10:25 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	0.7	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	3.56	meq/L		0.05		SW6010B	05/16/18 18:50 / rjh
Magnesium, sat. paste	3.36	meq/L		0.08		SW6010B	05/16/18 18:50 / rjh
Potassium, sat. paste	0.34	meq/L		0.03		SW6010B	05/16/18 18:50 / rjh
Sodium, sat. paste	0.28	meq/L		0.04		SW6010B	05/16/18 18:50 / rjh
Sodium Adsorption Ratio (SAR)	0.15	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	249	mg/L		4		ASA10-3	05/16/18 10:18 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 10:18 / rco
Bromide	ND	mg/L		0.5		E300.0	05/16/18 18:45 / ens
Chloride	20	mg/L		1		E300.0	05/16/18 18:45 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/16/18 18:45 / ens
Sulfate	132	mg/L		1		E300.0	05/16/18 18:45 / ens
METALS, TOTAL - EPA SW846							
Antimony	7	mg/kg		1		SW6020	05/12/18 10:55 / rlh
Arsenic	47	mg/kg	D	2		SW6020	05/12/18 10:55 / rlh
Barium	347	mg/kg		1		SW6020	05/12/18 10:55 / rlh
Beryllium	ND	mg/kg		1		SW6010B	05/15/18 21:28 / rjh
Boron	9	mg/kg		1		SW6010B	05/15/18 21:28 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 10:55 / rlh
Chromium	20	mg/kg		1		SW6020	05/12/18 10:55 / rlh
Cobalt	7	mg/kg		1		SW6020	05/12/18 10:55 / rlh
Lead	13	mg/kg		1		SW6020	05/15/18 08:30 / rlh
Lithium	9	mg/kg	D	5		SW6010B	05/15/18 21:28 / rjh
Manganese	416	mg/kg		1		SW6020	05/12/18 10:55 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 13:25 / jag
Molybdenum	2	mg/kg		1		SW6020	05/12/18 10:55 / rlh
Selenium	ND	mg/kg	D	3		SW6020	05/12/18 10:55 / rlh
Thallium	ND	mg/kg		1		SW6020	05/12/18 10:55 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 228	0.3	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-004
Client Sample ID: TLN-1805-004

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 10:25
DateReceived: 05/08/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Arsenic	0.004	mg/L		0.001		SW6020	08/02/18 18:21 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-005
Client Sample ID: TLN-1805-005

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 10:30
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	20.4	wt%		0.2		D2974	05/11/18 10:26 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	3.8	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	18.0	meq/L		0.05		SW6010B	05/16/18 18:54 / rjh
Magnesium, sat. paste	38.6	meq/L		0.08		SW6010B	05/16/18 18:54 / rjh
Potassium, sat. paste	0.37	meq/L		0.03		SW6010B	05/16/18 18:54 / rjh
Sodium, sat. paste	5.78	meq/L		0.04		SW6010B	05/16/18 18:54 / rjh
Sodium Adsorption Ratio (SAR)	1.09	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	171	mg/L		4		ASA10-3	05/16/18 10:25 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 10:25 / rco
Bromide	ND	mg/L	D	2		E300.0	05/16/18 19:05 / ens
Chloride	246	mg/L		1		E300.0	05/16/18 19:05 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/16/18 19:05 / ens
Sulfate	2910	mg/L	D	5		E300.0	05/16/18 19:05 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/12/18 11:00 / rlh
Arsenic	18	mg/kg	D	2		SW6020	05/12/18 11:00 / rlh
Barium	143	mg/kg		1		SW6020	05/12/18 11:00 / rlh
Beryllium	ND	mg/kg		1		SW6010B	05/15/18 21:33 / rjh
Boron	10	mg/kg		1		SW6010B	05/15/18 21:33 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 11:00 / rlh
Chromium	11	mg/kg		1		SW6020	05/12/18 11:00 / rlh
Cobalt	6	mg/kg		1		SW6020	05/12/18 11:00 / rlh
Lead	7	mg/kg		1		SW6020	05/15/18 08:34 / rlh
Lithium	7	mg/kg	D	5		SW6010B	05/15/18 21:33 / rjh
Manganese	313	mg/kg		1		SW6020	05/12/18 11:00 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 13:27 / jag
Molybdenum	6	mg/kg		1		SW6020	05/12/18 11:00 / rlh
Selenium	ND	mg/kg		1		SW6020	05/15/18 08:34 / rlh
Thallium	ND	mg/kg		1		SW6020	05/12/18 11:00 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-005
Client Sample ID: TLN-1805-005

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 10:30
DateReceived: 05/08/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Arsenic	0.001	mg/L		0.001		SW6020	08/02/18 18:26 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-006
Client Sample ID: TLN-1805-006

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 10:45
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	20.2	wt%		0.2		D2974	05/11/18 10:27 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	2.7	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	11.7	meq/L		0.05		SW6010B	05/16/18 18:58 / rjh
Magnesium, sat. paste	23.2	meq/L		0.08		SW6010B	05/16/18 18:58 / rjh
Potassium, sat. paste	0.50	meq/L		0.03		SW6010B	05/16/18 18:58 / rjh
Sodium, sat. paste	5.08	meq/L		0.04		SW6010B	05/16/18 18:58 / rjh
Sodium Adsorption Ratio (SAR)	1.22	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	163	mg/L		4		ASA10-3	05/16/18 10:33 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 10:33 / rco
Bromide	4	mg/L	D	1		E300.0	05/16/18 19:24 / ens
Chloride	47	mg/L		1		E300.0	05/16/18 19:24 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/16/18 19:24 / ens
Sulfate	1830	mg/L	D	5		E300.0	05/17/18 21:23 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/12/18 11:05 / rlh
Arsenic	5	mg/kg	D	2		SW6020	05/12/18 11:05 / rlh
Barium	259	mg/kg		1		SW6020	05/12/18 11:05 / rlh
Beryllium	ND	mg/kg		1		SW6010B	05/15/18 21:37 / rjh
Boron	22	mg/kg		1		SW6010B	05/15/18 21:37 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 11:05 / rlh
Chromium	9	mg/kg		1		SW6020	05/12/18 11:05 / rlh
Cobalt	4	mg/kg		1		SW6020	05/12/18 11:05 / rlh
Lead	8	mg/kg		1		SW6020	05/15/18 08:39 / rlh
Lithium	8	mg/kg	D	5		SW6010B	05/15/18 21:37 / rjh
Manganese	226	mg/kg		1		SW6020	05/12/18 11:05 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 13:29 / jag
Molybdenum	2	mg/kg		1		SW6020	05/12/18 11:05 / rlh
Selenium	ND	mg/kg		1		SW6020	05/15/18 08:39 / rlh
Thallium	ND	mg/kg		1		SW6020	05/12/18 11:05 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-007
Client Sample ID: TLN-1805-007

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 10:50
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.6	wt%		0.2		D2974	05/11/18 10:30 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	5.4	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	21.6	meq/L		0.05		SW6010B	05/16/18 19:02 / rjh
Magnesium, sat. paste	68.6	meq/L		0.08		SW6010B	05/16/18 19:02 / rjh
Potassium, sat. paste	0.17	meq/L	D	0.04		SW6010B	05/16/18 19:02 / rjh
Sodium, sat. paste	13.1	meq/L	D	0.09		SW6010B	05/16/18 19:02 / rjh
Sodium Adsorption Ratio (SAR)	1.95	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	175	mg/L		4		ASA10-3	05/16/18 10:37 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 10:37 / rco
Bromide	21	mg/L	D	5		E300.0	05/16/18 19:44 / ens
Chloride	315	mg/L	D	2		E300.0	05/16/18 19:44 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/16/18 19:44 / ens
Sulfate	4850	mg/L	D	10		E300.0	05/16/18 19:44 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/12/18 11:09 / rlh
Arsenic	11	mg/kg	D	2		SW6020	05/12/18 11:09 / rlh
Barium	787	mg/kg		1		SW6020	05/12/18 11:09 / rlh
Beryllium	ND	mg/kg		1		SW6010B	05/15/18 21:41 / rjh
Boron	12	mg/kg		1		SW6010B	05/15/18 21:41 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 11:09 / rlh
Chromium	14	mg/kg		1		SW6020	05/12/18 11:09 / rlh
Cobalt	6	mg/kg		1		SW6020	05/12/18 11:09 / rlh
Lead	10	mg/kg		1		SW6020	05/15/18 08:44 / rlh
Lithium	7	mg/kg	D	5		SW6010B	05/15/18 21:41 / rjh
Manganese	619	mg/kg		1		SW6020	05/12/18 11:09 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 13:31 / jag
Molybdenum	3	mg/kg		1		SW6020	05/12/18 11:09 / rlh
Selenium	ND	mg/kg		1		SW6020	05/15/18 08:44 / rlh
Thallium	ND	mg/kg		1		SW6020	05/12/18 11:09 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 228	0.3	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-007
Client Sample ID: TLN-1805-007

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 10:50
DateReceived: 05/08/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Barium	ND	mg/L		0.05		SW6010B	08/01/18 18:17 / rjh

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-008
Client Sample ID: TLN-1805-008

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 10:55
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	41.1	wt%		0.2		D2974	05/11/18 10:32 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	4.8	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	16.4	meq/L		0.05		SW6010B	05/16/18 19:06 / rjh
Magnesium, sat. paste	59.5	meq/L		0.08		SW6010B	05/16/18 19:06 / rjh
Potassium, sat. paste	0.08	meq/L		0.03		SW6010B	05/16/18 19:06 / rjh
Sodium, sat. paste	12.8	meq/L		0.04		SW6010B	05/16/18 19:06 / rjh
Sodium Adsorption Ratio (SAR)	2.08	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	127	mg/L		4		ASA10-3	05/16/18 10:41 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 10:41 / rco
Bromide	4	mg/L	D	2		E300.0	05/16/18 20:03 / ens
Chloride	133	mg/L		1		E300.0	05/16/18 20:03 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/16/18 20:03 / ens
Sulfate	4340	mg/L	D	5		E300.0	05/16/18 20:03 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/12/18 11:14 / rlh
Arsenic	4	mg/kg		1		SW6020	05/12/18 11:14 / rlh
Barium	153	mg/kg		1		SW6020	05/12/18 11:14 / rlh
Beryllium	ND	mg/kg		1		SW6010B	05/15/18 21:46 / rjh
Boron	17	mg/kg		1		SW6010B	05/15/18 21:46 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 11:14 / rlh
Chromium	6	mg/kg		1		SW6020	05/12/18 11:14 / rlh
Cobalt	3	mg/kg		1		SW6020	05/12/18 11:14 / rlh
Lead	6	mg/kg		1		SW6020	05/15/18 08:57 / rlh
Lithium	5.0	mg/kg	D	5		SW6010B	05/15/18 21:46 / rjh
Manganese	141	mg/kg		1		SW6020	05/12/18 11:14 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 13:33 / jag
Molybdenum	5	mg/kg		1		SW6020	05/12/18 11:14 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/12/18 11:14 / rlh
Thallium	ND	mg/kg		1		SW6020	05/12/18 11:14 / rlh
RADIONUCLIDES							
Radium 226	0.7	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 226 precision (±)	0.2	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-009
Client Sample ID: TLN-1805-009

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 11:10
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.3	wt%		0.2		D2974	05/11/18 10:34 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.7	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	0.5	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	2.98	meq/L		0.05		SW6010B	05/16/18 19:10 / rjh
Magnesium, sat. paste	1.62	meq/L		0.08		SW6010B	05/16/18 19:10 / rjh
Potassium, sat. paste	0.73	meq/L		0.03		SW6010B	05/16/18 19:10 / rjh
Sodium, sat. paste	0.12	meq/L		0.04		SW6010B	05/16/18 19:10 / rjh
Sodium Adsorption Ratio (SAR)	0.08	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	166	mg/L		4		ASA10-3	05/16/18 10:45 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 10:45 / rco
Bromide	ND	mg/L		0.5		E300.0	05/16/18 20:23 / ens
Chloride	5	mg/L		1		E300.0	05/16/18 20:23 / ens
Fluoride	0.6	mg/L	D	0.5		E300.0	05/16/18 20:23 / ens
Sulfate	41	mg/L		1		E300.0	05/16/18 20:23 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/12/18 11:18 / rlh
Arsenic	7	mg/kg	D	2		SW6020	05/12/18 11:18 / rlh
Barium	345	mg/kg		1		SW6020	05/12/18 11:18 / rlh
Beryllium	ND	mg/kg		1		SW6010B	05/15/18 21:50 / rjh
Boron	14	mg/kg		1		SW6010B	05/15/18 21:50 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 11:18 / rlh
Chromium	12	mg/kg		1		SW6020	05/12/18 11:18 / rlh
Cobalt	6	mg/kg		1		SW6020	05/12/18 11:18 / rlh
Lead	12	mg/kg		1		SW6020	05/15/18 09:01 / rlh
Lithium	11	mg/kg	D	5		SW6010B	05/15/18 21:50 / rjh
Manganese	264	mg/kg		1		SW6020	05/12/18 11:18 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 13:35 / jag
Molybdenum	1	mg/kg		1		SW6020	05/12/18 11:18 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/12/18 11:18 / rlh
Thallium	ND	mg/kg		1		SW6020	05/12/18 11:18 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-010
Client Sample ID: TLN-1805-010

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 11:15
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	18.5	wt%		0.2		D2974	05/11/18 10:34 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.3	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	0.5	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	2.18	meq/L		0.05		SW6010B	05/16/18 19:14 / rjh
Magnesium, sat. paste	2.44	meq/L		0.08		SW6010B	05/16/18 19:14 / rjh
Potassium, sat. paste	0.30	meq/L		0.03		SW6010B	05/16/18 19:14 / rjh
Sodium, sat. paste	0.21	meq/L		0.04		SW6010B	05/16/18 19:14 / rjh
Sodium Adsorption Ratio (SAR)	0.14	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	189	mg/L		4		ASA10-3	05/16/18 10:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 10:47 / rco
Bromide	ND	mg/L		0.5		E300.0	05/16/18 21:21 / ens
Chloride	3	mg/L		1		E300.0	05/16/18 21:21 / ens
Fluoride	1.6	mg/L	D	0.5		E300.0	05/16/18 21:21 / ens
Sulfate	63	mg/L		1		E300.0	05/16/18 21:21 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/12/18 11:23 / rlh
Arsenic	5	mg/kg	D	2		SW6020	05/12/18 11:23 / rlh
Barium	170	mg/kg		1		SW6020	05/12/18 11:23 / rlh
Beryllium	ND	mg/kg		1		SW6010B	05/15/18 21:54 / rjh
Boron	11	mg/kg		1		SW6010B	05/15/18 21:54 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 11:23 / rlh
Chromium	12	mg/kg		1		SW6020	05/12/18 11:23 / rlh
Cobalt	5	mg/kg		1		SW6020	05/12/18 11:23 / rlh
Lead	9	mg/kg		1		SW6020	05/15/18 09:06 / rlh
Lithium	10	mg/kg	D	5		SW6010B	05/15/18 21:54 / rjh
Manganese	290	mg/kg		1		SW6020	05/12/18 11:23 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 13:36 / jag
Molybdenum	1	mg/kg		1		SW6020	05/12/18 11:23 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/12/18 11:23 / rlh
Thallium	ND	mg/kg		1		SW6020	05/12/18 11:23 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-011
Client Sample ID: TLN-1805-011

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 11:20
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.3	wt%		0.2		D2974	05/11/18 10:35 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.8	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	0.6	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	2.43	meq/L		0.05		SW6010B	05/16/18 19:25 / rjh
Magnesium, sat. paste	3.49	meq/L		0.08		SW6010B	05/16/18 19:25 / rjh
Potassium, sat. paste	0.28	meq/L		0.03		SW6010B	05/16/18 19:25 / rjh
Sodium, sat. paste	0.27	meq/L		0.04		SW6010B	05/16/18 19:25 / rjh
Sodium Adsorption Ratio (SAR)	0.16	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	162	mg/L		4		ASA10-3	05/16/18 12:30 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 12:30 / rco
Bromide	ND	mg/L		0.5		E300.0	05/16/18 22:00 / ens
Chloride	3	mg/L		1		E300.0	05/16/18 22:00 / ens
Fluoride	0.7	mg/L	D	0.5		E300.0	05/16/18 22:00 / ens
Sulfate	214	mg/L		1		E300.0	05/16/18 22:00 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/12/18 11:27 / rlh
Arsenic	5	mg/kg		1		SW6020	05/12/18 11:27 / rlh
Barium	171	mg/kg		1		SW6020	05/12/18 11:27 / rlh
Beryllium	ND	mg/kg		1		SW6010B	05/15/18 21:58 / rjh
Boron	11	mg/kg		1		SW6010B	05/15/18 21:58 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 11:27 / rlh
Chromium	14	mg/kg		1		SW6020	05/12/18 11:27 / rlh
Cobalt	6	mg/kg		1		SW6020	05/12/18 11:27 / rlh
Lead	10	mg/kg		1		SW6020	05/15/18 09:11 / rlh
Lithium	11	mg/kg	D	5		SW6010B	05/15/18 21:58 / rjh
Manganese	263	mg/kg		1		SW6020	05/12/18 11:27 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 13:41 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/12/18 11:27 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/12/18 11:27 / rlh
Thallium	ND	mg/kg		1		SW6020	05/12/18 11:27 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	05/29/18 14:43 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-012
Client Sample ID: TLN-1805-012

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 11:30
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	13.7	wt%		0.2		D2974	05/11/18 10:36 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	2.8	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	27.1	meq/L		0.05		SW6010B	05/16/18 19:33 / rjh
Magnesium, sat. paste	16.3	meq/L		0.08		SW6010B	05/16/18 19:33 / rjh
Potassium, sat. paste	0.34	meq/L		0.03		SW6010B	05/16/18 19:33 / rjh
Sodium, sat. paste	0.50	meq/L		0.04		SW6010B	05/16/18 19:33 / rjh
Sodium Adsorption Ratio (SAR)	0.11	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	121	mg/L		4		ASA10-3	05/16/18 12:42 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 12:42 / rco
Bromide	ND	mg/L	D	2		E300.0	05/16/18 22:40 / ens
Chloride	6	mg/L		1		E300.0	05/16/18 22:40 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/16/18 22:40 / ens
Sulfate	2270	mg/L	D	5		E300.0	05/16/18 22:40 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/12/18 11:32 / rlh
Arsenic	6	mg/kg		1		SW6020	05/12/18 11:32 / rlh
Barium	489	mg/kg		1		SW6020	05/12/18 11:32 / rlh
Beryllium	ND	mg/kg		1		SW6010B	05/15/18 22:03 / rjh
Boron	30	mg/kg		1		SW6010B	05/15/18 22:03 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 11:32 / rlh
Chromium	13	mg/kg		1		SW6020	05/12/18 11:32 / rlh
Cobalt	6	mg/kg		1		SW6020	05/12/18 11:32 / rlh
Lead	11	mg/kg		1		SW6020	05/15/18 09:15 / rlh
Lithium	14	mg/kg	D	5		SW6010B	05/15/18 22:03 / rjh
Manganese	259	mg/kg		1		SW6020	05/12/18 11:32 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 13:43 / jag
Molybdenum	1	mg/kg		1		SW6020	05/12/18 11:32 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/12/18 11:32 / rlh
Thallium	ND	mg/kg		1		SW6020	05/12/18 11:32 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 228	1.1	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-012
Client Sample ID: TLN-1805-012

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 11:30
DateReceived: 05/08/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Barium	ND	mg/L		0.05		SW6010B	08/01/18 18:25 / rjh

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-013
Client Sample ID: TLN-1805-013

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 11:35
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.6	wt%		0.2		D2974	05/11/18 10:37 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.7	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	4.3	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	24.5	meq/L		0.05		SW6010B	05/16/18 19:41 / rjh
Magnesium, sat. paste	44.8	meq/L		0.08		SW6010B	05/16/18 19:41 / rjh
Potassium, sat. paste	0.54	meq/L		0.03		SW6010B	05/16/18 19:41 / rjh
Sodium, sat. paste	9.45	meq/L		0.04		SW6010B	05/16/18 19:41 / rjh
Sodium Adsorption Ratio (SAR)	1.61	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	354	mg/L		4		ASA10-3	05/16/18 12:49 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 12:49 / rco
Bromide	ND	mg/L	D	2		E300.0	05/16/18 22:59 / ens
Chloride	18	mg/L		1		E300.0	05/16/18 22:59 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/16/18 22:59 / ens
Sulfate	3910	mg/L	D	5		E300.0	05/16/18 22:59 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/12/18 11:46 / rlh
Arsenic	5	mg/kg	D	2		SW6020	05/12/18 11:46 / rlh
Barium	498	mg/kg		1		SW6020	05/12/18 11:46 / rlh
Beryllium	ND	mg/kg		1		SW6010B	05/15/18 22:07 / rjh
Boron	62	mg/kg		1		SW6010B	05/15/18 22:07 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 11:46 / rlh
Chromium	13	mg/kg		1		SW6020	05/12/18 11:46 / rlh
Cobalt	5	mg/kg		1		SW6020	05/12/18 11:46 / rlh
Lead	10	mg/kg		1		SW6020	05/15/18 09:20 / rlh
Lithium	17	mg/kg	D	5		SW6010B	05/15/18 22:07 / rjh
Manganese	276	mg/kg		1		SW6020	05/12/18 11:46 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 13:45 / jag
Molybdenum	2	mg/kg		1		SW6020	05/12/18 11:46 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/12/18 11:46 / rlh
Thallium	ND	mg/kg		1		SW6020	05/12/18 11:46 / rlh
RADIONUCLIDES							
Radium 226	0.1	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 226 precision (±)	0.04	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-013
Client Sample ID: TLN-1805-013

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 11:35
DateReceived: 05/08/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Barium	0.06	mg/L		0.05		SW6010B	08/01/18 18:40 / rjh

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-014
Client Sample ID: TLN-1805-014

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 11:40
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.4	wt%		0.2		D2974	05/11/18 10:38 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.8	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	4.5	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	23.6	meq/L		0.05		SW6010B	05/16/18 19:45 / rjh
Magnesium, sat. paste	57.0	meq/L		0.08		SW6010B	05/16/18 19:45 / rjh
Potassium, sat. paste	0.17	meq/L		0.03		SW6010B	05/16/18 19:45 / rjh
Sodium, sat. paste	7.03	meq/L		0.04		SW6010B	05/16/18 19:45 / rjh
Sodium Adsorption Ratio (SAR)	1.11	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	40	mg/L		4		ASA10-3	05/16/18 12:57 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 12:57 / rco
Bromide	ND	mg/L	D	2		E300.0	05/16/18 23:19 / ens
Chloride	103	mg/L		1		E300.0	05/16/18 23:19 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/16/18 23:19 / ens
Sulfate	4280	mg/L	D	5		E300.0	05/16/18 23:19 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/12/18 11:50 / rlh
Arsenic	ND	mg/kg	D	2		SW6020	05/12/18 11:50 / rlh
Barium	35	mg/kg		1		SW6020	05/12/18 11:50 / rlh
Beryllium	ND	mg/kg		1		SW6010B	05/15/18 22:19 / rjh
Boron	9	mg/kg		1		SW6010B	05/15/18 22:19 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 11:50 / rlh
Chromium	14	mg/kg		1		SW6020	05/12/18 11:50 / rlh
Cobalt	9	mg/kg		1		SW6020	05/12/18 11:50 / rlh
Lead	17	mg/kg		1		SW6020	05/15/18 09:24 / rlh
Lithium	13	mg/kg	D	5		SW6010B	05/17/18 14:07 / rjh
Manganese	211	mg/kg		1		SW6020	05/12/18 11:50 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 13:47 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/12/18 11:50 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/12/18 11:50 / rlh
Thallium	ND	mg/kg		1		SW6020	05/12/18 11:50 / rlh
RADIONUCLIDES							
Radium 226	0.7	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 228	1.2	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/24/18 12:25 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-015
Client Sample ID: TLN-1805-015

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 13:05
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	12.2	wt%		0.2		D2974	05/11/18 10:39 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.7	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	0.6	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	3.55	meq/L		0.05		SW6010B	05/16/18 19:49 / rjh
Magnesium, sat. paste	1.40	meq/L		0.08		SW6010B	05/16/18 19:49 / rjh
Potassium, sat. paste	0.31	meq/L		0.03		SW6010B	05/16/18 19:49 / rjh
Sodium, sat. paste	0.33	meq/L		0.04		SW6010B	05/16/18 19:49 / rjh
Sodium Adsorption Ratio (SAR)	0.21	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	174	mg/L		4		ASA10-3	05/16/18 13:02 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 13:02 / rco
Bromide	ND	mg/L		0.5		E300.0	05/16/18 23:38 / ens
Chloride	7	mg/L		1		E300.0	05/16/18 23:38 / ens
Fluoride	0.6	mg/L	D	0.5		E300.0	05/16/18 23:38 / ens
Sulfate	130	mg/L		1		E300.0	05/16/18 23:38 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/12/18 11:55 / rlh
Arsenic	6	mg/kg	D	2		SW6020	05/12/18 11:55 / rlh
Barium	772	mg/kg		1		SW6020	05/12/18 11:55 / rlh
Beryllium	ND	mg/kg		1		SW6010B	05/15/18 22:23 / rjh
Boron	31	mg/kg		1		SW6010B	05/15/18 22:23 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 11:55 / rlh
Chromium	11	mg/kg		1		SW6020	05/12/18 11:55 / rlh
Cobalt	6	mg/kg		1		SW6020	05/12/18 11:55 / rlh
Lead	10	mg/kg		1		SW6020	05/15/18 09:29 / rlh
Lithium	16	mg/kg	D	5		SW6010B	05/17/18 14:11 / rjh
Manganese	304	mg/kg		1		SW6020	05/12/18 11:55 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 13:48 / jag
Molybdenum	1	mg/kg		1		SW6020	05/12/18 11:55 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/12/18 11:55 / rlh
Thallium	ND	mg/kg		1		SW6020	05/12/18 11:55 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 228	0.3	pCi/g-dry				RA-05	05/24/18 13:57 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/24/18 13:57 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/24/18 13:57 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-015
Client Sample ID: TLN-1805-015

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 13:05
DateReceived: 05/08/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Barium	0.10	mg/L		0.05		SW6010B	08/01/18 18:48 / rjh

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-016
Client Sample ID: TLN-1805-016

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 13:10
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.1	wt%		0.2		D2974	05/11/18 10:41 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	2.4	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	26.4	meq/L		0.05		SW6010B	05/16/18 19:53 / rjh
Magnesium, sat. paste	7.74	meq/L		0.08		SW6010B	05/16/18 19:53 / rjh
Potassium, sat. paste	0.53	meq/L		0.03		SW6010B	05/16/18 19:53 / rjh
Sodium, sat. paste	1.13	meq/L		0.04		SW6010B	05/16/18 19:53 / rjh
Sodium Adsorption Ratio (SAR)	0.27	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	192	mg/L		4		ASA10-3	05/16/18 13:09 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 13:09 / rco
Bromide	ND	mg/L	D	1		E300.0	05/16/18 23:58 / ens
Chloride	4	mg/L		1		E300.0	05/16/18 23:58 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/16/18 23:58 / ens
Sulfate	1750	mg/L	D	2		E300.0	05/16/18 23:58 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/12/18 11:59 / rlh
Arsenic	8	mg/kg	D	2		SW6020	05/12/18 11:59 / rlh
Barium	340	mg/kg		1		SW6020	05/12/18 11:59 / rlh
Beryllium	ND	mg/kg		1		SW6010B	05/15/18 22:28 / rjh
Boron	20	mg/kg		1		SW6010B	05/15/18 22:28 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 11:59 / rlh
Chromium	14	mg/kg		1		SW6020	05/12/18 11:59 / rlh
Cobalt	7	mg/kg		1		SW6020	05/12/18 11:59 / rlh
Lead	13	mg/kg		1		SW6020	05/15/18 09:33 / rlh
Lithium	22	mg/kg	D	5		SW6010B	05/17/18 14:16 / rjh
Manganese	206	mg/kg		1		SW6020	05/12/18 11:59 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 13:50 / jag
Molybdenum	1	mg/kg		1		SW6020	05/12/18 11:59 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/12/18 11:59 / rlh
Thallium	ND	mg/kg		1		SW6020	05/12/18 11:59 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 228	0.8	pCi/g-dry				RA-05	05/24/18 13:57 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/24/18 13:57 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/24/18 13:57 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-017
Client Sample ID: TLN-1805-017

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 13:15
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	13.8	wt%		0.2		D2974	05/11/18 10:43 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	3.1	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	27.0	meq/L		0.05		SW6010B	05/16/18 19:57 / rjh
Magnesium, sat. paste	20.7	meq/L		0.08		SW6010B	05/16/18 19:57 / rjh
Potassium, sat. paste	0.55	meq/L		0.03		SW6010B	05/16/18 19:57 / rjh
Sodium, sat. paste	2.79	meq/L		0.04		SW6010B	05/16/18 19:57 / rjh
Sodium Adsorption Ratio (SAR)	0.57	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	85	mg/L		4		ASA10-3	05/16/18 13:14 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 13:14 / rco
Bromide	ND	mg/L	D	2		E300.0	05/17/18 00:17 / ens
Chloride	12	mg/L		1		E300.0	05/17/18 00:17 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/17/18 00:17 / ens
Sulfate	2550	mg/L	D	5		E300.0	05/17/18 00:17 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/12/18 12:04 / rlh
Arsenic	4	mg/kg	D	2		SW6020	05/12/18 12:04 / rlh
Barium	43	mg/kg		1		SW6020	05/12/18 12:04 / rlh
Beryllium	ND	mg/kg		1		SW6010B	05/15/18 22:32 / rjh
Boron	15	mg/kg		1		SW6010B	05/15/18 22:32 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 12:04 / rlh
Chromium	13	mg/kg		1		SW6020	05/12/18 12:04 / rlh
Cobalt	10	mg/kg		1		SW6020	05/12/18 12:04 / rlh
Lead	13	mg/kg		1		SW6020	05/15/18 09:38 / rlh
Lithium	12	mg/kg	D	5		SW6010B	05/17/18 14:20 / rjh
Manganese	489	mg/kg		1		SW6020	05/12/18 12:04 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 13:52 / jag
Molybdenum	1	mg/kg		1		SW6020	05/12/18 12:04 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/12/18 12:04 / rlh
Thallium	ND	mg/kg		1		SW6020	05/12/18 12:04 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 228	0.2	pCi/g-dry	U			RA-05	05/24/18 13:57 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/24/18 13:57 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/24/18 13:57 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-017
Client Sample ID: TLN-1805-017

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 13:15
DateReceived: 05/08/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Cobalt	ND	mg/L		0.005		SW6020	08/02/18 18:30 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-018
Client Sample ID: TLN-1805-018

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 13:45
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	6.9	wt%		0.2		D2974	05/11/18 10:44 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.9	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	0.8	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	4.58	meq/L		0.05		SW6010B	05/16/18 20:01 / rjh
Magnesium, sat. paste	3.13	meq/L		0.08		SW6010B	05/16/18 20:01 / rjh
Potassium, sat. paste	0.38	meq/L		0.03		SW6010B	05/16/18 20:01 / rjh
Sodium, sat. paste	0.66	meq/L		0.04		SW6010B	05/16/18 20:01 / rjh
Sodium Adsorption Ratio (SAR)	0.34	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	141	mg/L		4		ASA10-3	05/16/18 13:22 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 13:22 / rco
Bromide	ND	mg/L		0.5		E300.0	05/17/18 00:37 / ens
Chloride	6	mg/L		1		E300.0	05/17/18 00:37 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/17/18 00:37 / ens
Sulfate	321	mg/L		1		E300.0	05/17/18 00:37 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/12/18 12:09 / rlh
Arsenic	4	mg/kg	D	2		SW6020	05/12/18 12:09 / rlh
Barium	2530	mg/kg		1		SW6020	05/12/18 12:09 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/16/18 02:57 / rlh
Boron	93	mg/kg		1		SW6010B	05/17/18 14:32 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 12:09 / rlh
Chromium	11	mg/kg		1		SW6020	05/12/18 12:09 / rlh
Cobalt	5	mg/kg		1		SW6020	05/12/18 12:09 / rlh
Lead	9	mg/kg		1		SW6020	05/16/18 02:57 / rlh
Lithium	29	mg/kg	D	5		SW6010B	05/17/18 14:32 / rjh
Manganese	349	mg/kg		1		SW6020	05/12/18 12:09 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 13:53 / jag
Molybdenum	1	mg/kg		1		SW6020	05/12/18 12:09 / rlh
Selenium	ND	mg/kg	D	3		SW6020	05/12/18 12:09 / rlh
Thallium	ND	mg/kg		1		SW6020	05/12/18 12:09 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-018
Client Sample ID: TLN-1805-018

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 13:45
DateReceived: 05/08/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Barium	0.19	mg/L		0.05		SW6010B	08/01/18 19:04 / rjh

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-019
Client Sample ID: TLN-1805-019

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 13:50
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	8.8	wt%		0.2		D2974	05/11/18 10:46 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.8	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	2.8	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	12.6	meq/L		0.05		SW6010B	05/16/18 20:12 / rjh
Magnesium, sat. paste	20.3	meq/L		0.08		SW6010B	05/16/18 20:12 / rjh
Potassium, sat. paste	0.57	meq/L		0.03		SW6010B	05/16/18 20:12 / rjh
Sodium, sat. paste	7.57	meq/L		0.04		SW6010B	05/16/18 20:12 / rjh
Sodium Adsorption Ratio (SAR)	1.87	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	72	mg/L		4		ASA10-3	05/16/18 13:26 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 13:26 / rco
Bromide	ND	mg/L	D	2		E300.0	05/17/18 00:56 / ens
Chloride	41	mg/L		1		E300.0	05/17/18 00:56 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/17/18 00:56 / ens
Sulfate	1960	mg/L	D	5		E300.0	05/17/18 00:56 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/12/18 12:13 / rlh
Arsenic	7	mg/kg	D	2		SW6020	05/12/18 12:13 / rlh
Barium	183	mg/kg		1		SW6020	05/12/18 12:13 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/16/18 03:11 / rlh
Boron	9	mg/kg		1		SW6010B	05/17/18 14:36 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 12:13 / rlh
Chromium	12	mg/kg		1		SW6020	05/12/18 12:13 / rlh
Cobalt	7	mg/kg		1		SW6020	05/12/18 12:13 / rlh
Lead	10	mg/kg		1		SW6020	05/18/18 17:18 / rlh
Lithium	11	mg/kg	D	5		SW6010B	05/17/18 14:36 / rjh
Manganese	321	mg/kg		1		SW6020	05/12/18 12:13 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 13:55 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/12/18 12:13 / rlh
Selenium	ND	mg/kg	D	3		SW6020	05/12/18 12:13 / rlh
Thallium	ND	mg/kg		1		SW6020	05/12/18 12:13 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 228	0.3	pCi/g-dry	U			RA-05	05/24/18 13:57 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/24/18 13:57 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/24/18 13:57 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-020
Client Sample ID: TLN-1805-020

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 13:55
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	8.3	wt%		0.2		D2974	05/11/18 10:47 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	8.2	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	8.6	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	21.7	meq/L		0.05		SW6010B	05/16/18 20:16 / rjh
Magnesium, sat. paste	77.6	meq/L		0.08		SW6010B	05/16/18 20:16 / rjh
Potassium, sat. paste	0.94	meq/L	D	0.04		SW6010B	05/16/18 20:16 / rjh
Sodium, sat. paste	74.4	meq/L	D	0.06		SW6010B	05/16/18 20:16 / rjh
Sodium Adsorption Ratio (SAR)	10.6	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	29	mg/L		4		ASA10-3	05/16/18 13:30 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 13:30 / rco
Bromide	ND	mg/L	D	5		E300.0	05/17/18 01:55 / ens
Chloride	198	mg/L	D	2		E300.0	05/17/18 01:55 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/17/18 01:55 / ens
Sulfate	8680	mg/L	D	10		E300.0	05/17/18 01:55 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/12/18 12:18 / rlh
Arsenic	7	mg/kg	D	2		SW6020	05/12/18 12:18 / rlh
Barium	196	mg/kg		1		SW6020	05/12/18 12:18 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/16/18 03:15 / rlh
Boron	10	mg/kg		1		SW6010B	05/15/18 22:45 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 12:18 / rlh
Chromium	12	mg/kg		1		SW6020	05/12/18 12:18 / rlh
Cobalt	7	mg/kg		1		SW6020	05/12/18 12:18 / rlh
Lead	10	mg/kg		1		SW6020	05/18/18 17:23 / rlh
Lithium	10	mg/kg	D	5		SW6010B	05/17/18 14:41 / rjh
Manganese	874	mg/kg		1		SW6020	05/12/18 12:18 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 13:57 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/12/18 12:18 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/12/18 12:18 / rlh
Thallium	ND	mg/kg		1		SW6020	05/12/18 12:18 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	05/29/18 16:21 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	05/24/18 13:57 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/24/18 13:57 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/24/18 13:57 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-021
Client Sample ID: TLN-1805-021

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 14:05
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	12.9	wt%		0.2		D2974	05/11/18 10:48 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	0.6	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	4.28	meq/L		0.05		SW6010B	05/16/18 20:20 / rjh
Magnesium, sat. paste	2.31	meq/L		0.08		SW6010B	05/16/18 20:20 / rjh
Potassium, sat. paste	0.42	meq/L		0.03		SW6010B	05/16/18 20:20 / rjh
Sodium, sat. paste	0.21	meq/L		0.04		SW6010B	05/16/18 20:20 / rjh
Sodium Adsorption Ratio (SAR)	0.11	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	266	mg/L		4		ASA10-3	05/16/18 13:34 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 13:34 / rco
Bromide	ND	mg/L		0.5		E300.0	05/17/18 02:34 / ens
Chloride	5	mg/L		1		E300.0	05/17/18 02:34 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/17/18 02:34 / ens
Sulfate	124	mg/L		1		E300.0	05/17/18 02:34 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/12/18 12:22 / rlh
Arsenic	8	mg/kg	D	2		SW6020	05/12/18 12:22 / rlh
Barium	206	mg/kg		1		SW6020	05/12/18 12:22 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/16/18 03:20 / rlh
Boron	10	mg/kg		1		SW6010B	05/15/18 22:50 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 12:22 / rlh
Chromium	13	mg/kg		1		SW6020	05/12/18 12:22 / rlh
Cobalt	7	mg/kg		1		SW6020	05/12/18 12:22 / rlh
Lead	13	mg/kg		1		SW6020	05/18/18 17:28 / rlh
Lithium	11	mg/kg	D	5		SW6010B	05/17/18 14:45 / rjh
Manganese	376	mg/kg		1		SW6020	05/12/18 12:22 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 10:55 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/12/18 12:22 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/12/18 12:22 / rlh
Thallium	ND	mg/kg		1		SW6020	05/12/18 12:22 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 226 precision (±)	0.08	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-022
Client Sample ID: TLN-1805-022

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 14:15
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	7.9	wt%		0.2		D2974	05/11/18 10:49 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	0.4	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	2.49	meq/L		0.05		SW6010B	05/16/18 20:28 / rjh
Magnesium, sat. paste	2.08	meq/L		0.08		SW6010B	05/16/18 20:28 / rjh
Potassium, sat. paste	0.15	meq/L		0.03		SW6010B	05/16/18 20:28 / rjh
Sodium, sat. paste	0.31	meq/L		0.04		SW6010B	05/16/18 20:28 / rjh
Sodium Adsorption Ratio (SAR)	0.21	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	160	mg/L		4		ASA10-3	05/16/18 13:45 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 13:45 / rco
Bromide	ND	mg/L		0.5		E300.0	05/17/18 03:13 / ens
Chloride	4	mg/L		1		E300.0	05/17/18 03:13 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/17/18 03:13 / ens
Sulfate	72	mg/L		1		E300.0	05/17/18 03:13 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/12/18 12:27 / rlh
Arsenic	10	mg/kg	D	2		SW6020	05/12/18 12:27 / rlh
Barium	239	mg/kg		1		SW6020	05/12/18 12:27 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/16/18 03:24 / rlh
Boron	5	mg/kg		1		SW6010B	05/15/18 22:54 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 12:27 / rlh
Chromium	12	mg/kg		1		SW6020	05/12/18 12:27 / rlh
Cobalt	7	mg/kg		1		SW6020	05/12/18 12:27 / rlh
Lead	12	mg/kg		1		SW6020	05/18/18 17:32 / rlh
Lithium	9	mg/kg	D	5		SW6010B	05/17/18 14:49 / rjh
Manganese	377	mg/kg		1		SW6020	05/12/18 12:27 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 10:57 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/12/18 12:27 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/12/18 12:27 / rlh
Thallium	ND	mg/kg		1		SW6020	05/12/18 12:27 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 228	0.9	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-022
Client Sample ID: TLN-1805-022

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 14:15
DateReceived: 05/08/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Arsenic	0.005	mg/L		0.001		SW6020	08/02/18 18:34 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-023
Client Sample ID: TLN-1805-023

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 14:20
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	9.8	wt%		0.2		D2974	05/11/18 10:50 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.9	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	0.5	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	1.67	meq/L		0.05		SW6010B	05/16/18 20:36 / rjh
Magnesium, sat. paste	2.76	meq/L		0.08		SW6010B	05/16/18 20:36 / rjh
Potassium, sat. paste	0.13	meq/L		0.03		SW6010B	05/16/18 20:36 / rjh
Sodium, sat. paste	0.49	meq/L		0.04		SW6010B	05/16/18 20:36 / rjh
Sodium Adsorption Ratio (SAR)	0.33	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	126	mg/L		4		ASA10-3	05/16/18 13:48 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 13:48 / rco
Bromide	ND	mg/L		0.5		E300.0	05/17/18 03:32 / ens
Chloride	4	mg/L		1		E300.0	05/17/18 03:32 / ens
Fluoride	0.7	mg/L	D	0.5		E300.0	05/17/18 03:32 / ens
Sulfate	116	mg/L		1		E300.0	05/17/18 03:32 / ens
METALS, TOTAL - EPA SW846							
Antimony	1	mg/kg		1		SW6020	05/12/18 12:40 / rlh
Arsenic	47	mg/kg	D	2		SW6020	05/12/18 12:40 / rlh
Barium	449	mg/kg		1		SW6020	05/12/18 12:40 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/16/18 03:29 / rlh
Boron	6	mg/kg		1		SW6010B	05/15/18 22:58 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/12/18 12:40 / rlh
Chromium	14	mg/kg		1		SW6020	05/12/18 12:40 / rlh
Cobalt	15	mg/kg		1		SW6020	05/12/18 12:40 / rlh
Lead	25	mg/kg		1		SW6020	05/18/18 17:37 / rlh
Lithium	8	mg/kg	D	5		SW6010B	05/17/18 14:53 / rjh
Manganese	778	mg/kg		1		SW6020	05/12/18 12:40 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/15/18 10:59 / jag
Molybdenum	4	mg/kg		1		SW6020	05/12/18 12:40 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/12/18 12:40 / rlh
Thallium	ND	mg/kg		1		SW6020	05/12/18 12:40 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-023
Client Sample ID: TLN-1805-023

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 14:20
DateReceived: 05/08/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Arsenic	0.002	mg/L		0.001		SW6020	08/02/18 18:39 / car
Barium	0.05	mg/L		0.05		SW6010B	08/01/18 19:55 / rjh
Cobalt	ND	mg/L		0.005		SW6020	08/02/18 18:39 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-024
Client Sample ID: TLN-1805-024

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 14:10
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	12.5	wt%		0.2		D2974	05/11/18 11:50 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.1	s.u.		0.1		ASA10-3	05/16/18 17:51 / srm
Conductivity, sat. paste	0.6	mmhos/cm		0.1		ASA10-3	05/16/18 17:51 / srm
Calcium, sat. paste	4.44	meq/L		0.05		SW6010B	05/16/18 20:40 / rjh
Magnesium, sat. paste	2.25	meq/L		0.08		SW6010B	05/16/18 20:40 / rjh
Potassium, sat. paste	0.43	meq/L		0.03		SW6010B	05/16/18 20:40 / rjh
Sodium, sat. paste	0.17	meq/L		0.04		SW6010B	05/16/18 20:40 / rjh
Sodium Adsorption Ratio (SAR)	0.10	unitless		0.01		Calculation	05/17/18 10:11 / srm
Bicarbonate as HCO3	243	mg/L		4		ASA10-3	05/16/18 13:54 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 13:54 / rco
Bromide	ND	mg/L		0.5		E300.0	05/17/18 03:52 / ens
Chloride	5	mg/L		1		E300.0	05/17/18 03:52 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/17/18 03:52 / ens
Sulfate	102	mg/L		1		E300.0	05/17/18 03:52 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 21:58 / jcg
Arsenic	10	mg/kg		1		SW6020	05/14/18 21:58 / jcg
Barium	204	mg/kg		1		SW6020	05/14/18 21:58 / jcg
Beryllium	ND	mg/kg		1		SW6020	05/16/18 05:23 / rlh
Boron	11	mg/kg		1		SW6010B	05/15/18 23:36 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 21:58 / jcg
Chromium	15	mg/kg		1		SW6020	05/14/18 21:58 / jcg
Cobalt	7	mg/kg		1		SW6020	05/14/18 21:58 / jcg
Lead	14	mg/kg		1		SW6020	05/14/18 21:58 / jcg
Lithium	12	mg/kg	D	5		SW6010B	05/17/18 15:02 / rjh
Manganese	385	mg/kg		1		SW6020	05/14/18 21:58 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 11:01 / jag
Molybdenum	1	mg/kg		1		SW6020	05/16/18 05:23 / rlh
Selenium	2	mg/kg		1		SW6020	05/14/18 21:58 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 21:58 / jcg
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-025
Client Sample ID: TLN-1805-025

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 14:30
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.3	wt%		0.2		D2974	05/11/18 11:51 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	0.5	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	3.10	meq/L		0.05		SW6010B	05/18/18 13:48 / rjh
Magnesium, sat. paste	1.73	meq/L		0.08		SW6010B	05/18/18 13:48 / rjh
Potassium, sat. paste	0.47	meq/L		0.03		SW6010B	05/18/18 13:48 / rjh
Sodium, sat. paste	0.27	meq/L		0.04		SW6010B	05/18/18 13:48 / rjh
Sodium Adsorption Ratio (SAR)	0.17	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	228	mg/L		4		ASA10-3	05/16/18 14:57 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 14:57 / rco
Bromide	ND	mg/L		0.5		E300.0	05/17/18 23:20 / ens
Chloride	5	mg/L		1		E300.0	05/17/18 23:20 / ens
Fluoride	1.2	mg/L	D	0.5		E300.0	05/17/18 23:20 / ens
Sulfate	54	mg/L		1		E300.0	05/17/18 23:20 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 22:01 / jcg
Arsenic	9	mg/kg		1		SW6020	05/14/18 22:01 / jcg
Barium	210	mg/kg		1		SW6020	05/14/18 22:01 / jcg
Beryllium	ND	mg/kg		1		SW6020	05/16/18 05:28 / rlh
Boron	19	mg/kg		1		SW6010B	05/15/18 23:40 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 22:01 / jcg
Chromium	18	mg/kg		1		SW6020	05/14/18 22:01 / jcg
Cobalt	7	mg/kg		1		SW6020	05/14/18 22:01 / jcg
Lead	15	mg/kg		1		SW6020	05/14/18 22:01 / jcg
Lithium	15	mg/kg	D	5		SW6010B	05/17/18 15:06 / rjh
Manganese	412	mg/kg		1		SW6020	05/14/18 22:01 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 11:02 / jag
Molybdenum	1	mg/kg		1		SW6020	05/16/18 05:28 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 22:01 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 22:01 / jcg
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 228	0.8	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-026
Client Sample ID: TLN-1805-026

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 14:35
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.0	wt%		0.2		D2974	05/11/18 11:52 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	0.5	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	3.12	meq/L		0.05		SW6010B	05/18/18 13:56 / rjh
Magnesium, sat. paste	1.13	meq/L		0.08		SW6010B	05/18/18 13:56 / rjh
Potassium, sat. paste	0.27	meq/L		0.03		SW6010B	05/18/18 13:56 / rjh
Sodium, sat. paste	0.50	meq/L		0.04		SW6010B	05/18/18 13:56 / rjh
Sodium Adsorption Ratio (SAR)	0.34	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	132	mg/L		4		ASA10-3	05/16/18 15:06 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 15:06 / rco
Bromide	ND	mg/L		0.5		E300.0	05/17/18 23:59 / ens
Chloride	6	mg/L		1		E300.0	05/17/18 23:59 / ens
Fluoride	0.6	mg/L	D	0.5		E300.0	05/17/18 23:59 / ens
Sulfate	92	mg/L		1		E300.0	05/17/18 23:59 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 22:04 / jcg
Arsenic	10	mg/kg		1		SW6020	05/14/18 22:04 / jcg
Barium	241	mg/kg		1		SW6020	05/14/18 22:04 / jcg
Beryllium	ND	mg/kg		1		SW6020	05/16/18 05:32 / rlh
Boron	12	mg/kg		1		SW6010B	05/15/18 23:44 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 22:04 / jcg
Chromium	18	mg/kg		1		SW6020	05/14/18 22:04 / jcg
Cobalt	8	mg/kg		1		SW6020	05/14/18 22:04 / jcg
Lead	15	mg/kg		1		SW6020	05/14/18 22:04 / jcg
Lithium	13	mg/kg	D	5		SW6010B	05/17/18 15:10 / rjh
Manganese	482	mg/kg		1		SW6020	05/14/18 22:04 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 11:04 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 05:32 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 22:04 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 22:04 / jcg
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 228	0.8	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-026
Client Sample ID: TLN-1805-026

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 14:35
DateReceived: 05/08/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Arsenic	0.006	mg/L		0.001		SW6020	08/02/18 18:47 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-027
Client Sample ID: TLN-1805-027

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 14:45
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	19.0	wt%		0.2		D2974	05/11/18 11:54 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	3.6	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	26.7	meq/L		0.05		SW6010B	05/18/18 14:03 / rjh
Magnesium, sat. paste	24.6	meq/L		0.08		SW6010B	05/18/18 14:03 / rjh
Potassium, sat. paste	2.20	meq/L		0.03		SW6010B	05/18/18 14:03 / rjh
Sodium, sat. paste	5.36	meq/L		0.04		SW6010B	05/18/18 14:03 / rjh
Sodium Adsorption Ratio (SAR)	1.06	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	195	mg/L		4		ASA10-3	05/16/18 15:10 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 15:10 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 00:19 / ens
Chloride	32	mg/L		1		E300.0	05/18/18 00:19 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 00:19 / ens
Sulfate	2690	mg/L	D	5		E300.0	05/18/18 00:19 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 22:07 / jcg
Arsenic	8	mg/kg		1		SW6020	05/14/18 22:07 / jcg
Barium	249	mg/kg		1		SW6020	05/14/18 22:07 / jcg
Beryllium	ND	mg/kg		1		SW6020	05/16/18 05:37 / rlh
Boron	21	mg/kg		1		SW6010B	05/15/18 23:49 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 22:07 / jcg
Chromium	12	mg/kg		1		SW6020	05/14/18 22:07 / jcg
Cobalt	6	mg/kg		1		SW6020	05/14/18 22:07 / jcg
Lead	10	mg/kg		1		SW6020	05/14/18 22:07 / jcg
Lithium	12	mg/kg	D	5		SW6010B	05/17/18 15:22 / rjh
Manganese	295	mg/kg		1		SW6020	05/14/18 22:07 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 11:06 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 05:37 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 22:07 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 22:07 / jcg
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-028
Client Sample ID: TLN-1805-028

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 14:50
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	19.9	wt%		0.2		D2974	05/11/18 12:02 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	4.0	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	26.5	meq/L		0.05		SW6010B	05/18/18 14:15 / rjh
Magnesium, sat. paste	36.1	meq/L		0.08		SW6010B	05/18/18 14:15 / rjh
Potassium, sat. paste	1.05	meq/L		0.03		SW6010B	05/18/18 14:15 / rjh
Sodium, sat. paste	6.97	meq/L		0.04		SW6010B	05/18/18 14:15 / rjh
Sodium Adsorption Ratio (SAR)	1.25	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	181	mg/L		4		ASA10-3	05/16/18 15:14 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 15:14 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 00:58 / ens
Chloride	84	mg/L		1		E300.0	05/18/18 00:58 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 00:58 / ens
Sulfate	3250	mg/L	D	5		E300.0	05/18/18 00:58 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 22:10 / jcg
Arsenic	8	mg/kg		1		SW6020	05/14/18 22:10 / jcg
Barium	142	mg/kg		1		SW6020	05/14/18 22:10 / jcg
Beryllium	ND	mg/kg		1		SW6020	05/16/18 05:41 / rlh
Boron	10	mg/kg		1		SW6010B	05/16/18 00:29 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 22:10 / jcg
Chromium	12	mg/kg		1		SW6020	05/14/18 22:10 / jcg
Cobalt	6	mg/kg		1		SW6020	05/14/18 22:10 / jcg
Lead	11	mg/kg		1		SW6020	05/14/18 22:10 / jcg
Lithium	10	mg/kg	D	5		SW6010B	05/16/18 00:29 / rjh
Manganese	287	mg/kg		1		SW6020	05/14/18 22:10 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 11:08 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 05:41 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 22:10 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 22:10 / jcg
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 228	1.1	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-029
Client Sample ID: TLN-1805-029

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 14:55
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.9	wt%		0.2		D2974	05/11/18 12:03 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	4.8	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	23.5	meq/L		0.05		SW6010B	05/18/18 14:33 / rjh
Magnesium, sat. paste	54.9	meq/L		0.08		SW6010B	05/18/18 14:33 / rjh
Potassium, sat. paste	0.68	meq/L		0.03		SW6010B	05/18/18 14:33 / rjh
Sodium, sat. paste	11.0	meq/L		0.04		SW6010B	05/18/18 14:33 / rjh
Sodium Adsorption Ratio (SAR)	1.76	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	151	mg/L		4		ASA10-3	05/16/18 15:18 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 15:18 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 01:17 / ens
Chloride	72	mg/L		1		E300.0	05/18/18 01:17 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 01:17 / ens
Sulfate	4280	mg/L	D	5		E300.0	05/18/18 01:17 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 22:13 / jcg
Arsenic	9	mg/kg		1		SW6020	05/14/18 22:13 / jcg
Barium	121	mg/kg		1		SW6020	05/14/18 22:13 / jcg
Beryllium	ND	mg/kg		1		SW6020	05/16/18 05:46 / rlh
Boron	11	mg/kg		1		SW6010B	05/16/18 00:33 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 22:13 / jcg
Chromium	16	mg/kg		1		SW6020	05/14/18 22:13 / jcg
Cobalt	8	mg/kg		1		SW6020	05/14/18 22:13 / jcg
Lead	14	mg/kg		1		SW6020	05/14/18 22:13 / jcg
Lithium	12	mg/kg	D	5		SW6010B	05/16/18 00:33 / rjh
Manganese	346	mg/kg		1		SW6020	05/14/18 22:13 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 11:09 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 05:46 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 22:13 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 22:13 / jcg
RADIONUCLIDES							
Radium 226	0.3	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 226 precision (±)	0.07	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 228	1.5	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 precision (±)	0.4	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-029
Client Sample ID: TLN-1805-029

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 14:55
DateReceived: 05/08/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Cobalt	ND	mg/L		0.005		SW6020	08/02/18 19:04 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-030
Client Sample ID: TLN-1805-030

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 15:10
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	25.7	wt%		0.2		D2974	05/11/18 12:05 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	3.5	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	26.5	meq/L		0.05		SW6010B	05/18/18 14:45 / rjh
Magnesium, sat. paste	24.3	meq/L		0.08		SW6010B	05/18/18 14:45 / rjh
Potassium, sat. paste	1.60	meq/L		0.03		SW6010B	05/18/18 14:45 / rjh
Sodium, sat. paste	3.97	meq/L		0.04		SW6010B	05/18/18 14:45 / rjh
Sodium Adsorption Ratio (SAR)	0.79	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	188	mg/L		4		ASA10-3	05/16/18 15:23 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 15:23 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 01:37 / ens
Chloride	14	mg/L		1		E300.0	05/18/18 01:37 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 01:37 / ens
Sulfate	2610	mg/L	D	5		E300.0	05/18/18 01:37 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 22:15 / jcg
Arsenic	6	mg/kg		1		SW6020	05/14/18 22:15 / jcg
Barium	103	mg/kg		1		SW6020	05/14/18 22:15 / jcg
Beryllium	ND	mg/kg		1		SW6020	05/16/18 05:50 / rlh
Boron	10	mg/kg		1		SW6010B	05/16/18 00:37 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 22:15 / jcg
Chromium	12	mg/kg		1		SW6020	05/14/18 22:15 / jcg
Cobalt	5	mg/kg		1		SW6020	05/14/18 22:15 / jcg
Lead	10	mg/kg		1		SW6020	05/14/18 22:15 / jcg
Lithium	9	mg/kg	D	5		SW6010B	05/16/18 00:37 / rjh
Manganese	265	mg/kg		1		SW6020	05/14/18 22:15 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 11:14 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 05:50 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 22:15 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 22:15 / jcg
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-031
Client Sample ID: TLN-1805-031

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 15:15
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	23.7	wt%		0.2		D2974	05/11/18 12:07 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.8	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	4.2	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	25.7	meq/L		0.05		SW6010B	05/18/18 14:49 / rjh
Magnesium, sat. paste	38.9	meq/L		0.08		SW6010B	05/18/18 14:49 / rjh
Potassium, sat. paste	1.40	meq/L		0.03		SW6010B	05/18/18 14:49 / rjh
Sodium, sat. paste	7.30	meq/L		0.04		SW6010B	05/18/18 14:49 / rjh
Sodium Adsorption Ratio (SAR)	1.29	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	184	mg/L		4		ASA10-3	05/16/18 15:28 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 15:28 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 01:57 / ens
Chloride	37	mg/L		1		E300.0	05/18/18 01:57 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 01:57 / ens
Sulfate	3400	mg/L	D	5		E300.0	05/18/18 01:57 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 22:18 / jcg
Arsenic	6	mg/kg		1		SW6020	05/14/18 22:18 / jcg
Barium	114	mg/kg		1		SW6020	05/14/18 22:18 / jcg
Beryllium	ND	mg/kg		1		SW6020	05/16/18 05:55 / rlh
Boron	10	mg/kg		1		SW6010B	05/16/18 00:42 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 22:18 / jcg
Chromium	11	mg/kg		1		SW6020	05/14/18 22:18 / jcg
Cobalt	6	mg/kg		1		SW6020	05/14/18 22:18 / jcg
Lead	9	mg/kg		1		SW6020	05/14/18 22:18 / jcg
Lithium	9	mg/kg	D	5		SW6010B	05/16/18 00:42 / rjh
Manganese	270	mg/kg		1		SW6020	05/14/18 22:18 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 11:16 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 05:55 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 22:18 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 22:18 / jcg
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/04/18 13:32 / eli-ca
Radium 228	1.6	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 precision (±)	0.4	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-032
Client Sample ID: TLN-1805-032

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 15:25
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	18.7	wt%		0.2		D2974	05/11/18 12:43 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.7	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	2.6	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	11.4	meq/L		0.05		SW6010B	05/18/18 14:53 / rjh
Magnesium, sat. paste	16.5	meq/L		0.08		SW6010B	05/18/18 14:53 / rjh
Potassium, sat. paste	0.66	meq/L		0.03		SW6010B	05/18/18 14:53 / rjh
Sodium, sat. paste	3.94	meq/L		0.04		SW6010B	05/18/18 14:53 / rjh
Sodium Adsorption Ratio (SAR)	1.05	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	199	mg/L		4		ASA10-3	05/16/18 15:38 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 15:38 / rco
Bromide	ND	mg/L	D	1		E300.0	05/18/18 02:16 / ens
Chloride	27	mg/L		1		E300.0	05/18/18 02:16 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/18/18 02:16 / ens
Sulfate	1700	mg/L	D	2		E300.0	05/18/18 02:16 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 22:27 / jcg
Arsenic	6	mg/kg		1		SW6020	05/14/18 22:27 / jcg
Barium	112	mg/kg		1		SW6020	05/14/18 22:27 / jcg
Beryllium	ND	mg/kg		1		SW6020	05/16/18 06:09 / rlh
Boron	7	mg/kg		1		SW6010B	05/16/18 00:46 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 22:27 / jcg
Chromium	12	mg/kg		1		SW6020	05/14/18 22:27 / jcg
Cobalt	6	mg/kg		1		SW6020	05/14/18 22:27 / jcg
Lead	10	mg/kg		1		SW6020	05/14/18 22:27 / jcg
Lithium	10	mg/kg	D	5		SW6010B	05/16/18 00:46 / rjh
Manganese	278	mg/kg		1		SW6020	05/14/18 22:27 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 11:18 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 06:09 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 22:27 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 22:27 / jcg
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/04/18 15:57 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/04/18 15:57 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/04/18 15:57 / eli-ca
Radium 228	0.9	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-033
Client Sample ID: TLN-1805-033

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 15:30
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	18.5	wt%		0.2		D2974	05/11/18 12:47 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.7	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	3.3	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	19.9	meq/L		0.05		SW6010B	05/18/18 14:57 / rjh
Magnesium, sat. paste	27.0	meq/L		0.08		SW6010B	05/18/18 14:57 / rjh
Potassium, sat. paste	0.67	meq/L		0.03		SW6010B	05/18/18 14:57 / rjh
Sodium, sat. paste	6.57	meq/L		0.04		SW6010B	05/18/18 14:57 / rjh
Sodium Adsorption Ratio (SAR)	1.36	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	73	mg/L		4		ASA10-3	05/16/18 15:43 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 15:43 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 02:36 / ens
Chloride	37	mg/L		1		E300.0	05/18/18 02:36 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 02:36 / ens
Sulfate	2520	mg/L	D	5		E300.0	05/18/18 02:36 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 22:30 / jcg
Arsenic	6	mg/kg		1		SW6020	05/14/18 22:30 / jcg
Barium	146	mg/kg		1		SW6020	05/14/18 22:30 / jcg
Beryllium	ND	mg/kg		1		SW6020	05/16/18 06:13 / rlh
Boron	5	mg/kg		1		SW6010B	05/16/18 00:50 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 22:30 / jcg
Chromium	10	mg/kg		1		SW6020	05/14/18 22:30 / jcg
Cobalt	5	mg/kg		1		SW6020	05/14/18 22:30 / jcg
Lead	9	mg/kg		1		SW6020	05/14/18 22:30 / jcg
Lithium	8	mg/kg	D	5		SW6010B	05/16/18 00:50 / rjh
Manganese	227	mg/kg		1		SW6020	05/14/18 22:30 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 11:19 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 06:13 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 22:30 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 22:30 / jcg
RADIONUCLIDES							
Radium 226	0.3	pCi/g-dry				E903.0	06/04/18 15:57 / eli-ca
Radium 226 precision (±)	0.08	pCi/g-dry				E903.0	06/04/18 15:57 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/04/18 15:57 / eli-ca
Radium 228	1.1	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 precision (±)	0.4	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/29/18 10:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-034
Client Sample ID: TLN-1805-034

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 15:35
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	20.5	wt%		0.2		D2974	05/11/18 12:48 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.7	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	3.2	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	28.1	meq/L		0.05		SW6010B	05/18/18 15:01 / rjh
Magnesium, sat. paste	21.5	meq/L		0.08		SW6010B	05/18/18 15:01 / rjh
Potassium, sat. paste	1.73	meq/L		0.03		SW6010B	05/18/18 15:01 / rjh
Sodium, sat. paste	2.51	meq/L		0.04		SW6010B	05/18/18 15:01 / rjh
Sodium Adsorption Ratio (SAR)	0.50	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	214	mg/L		4		ASA10-3	05/16/18 15:46 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 15:46 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 02:55 / ens
Chloride	20	mg/L		1		E300.0	05/18/18 02:55 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 02:55 / ens
Sulfate	2430	mg/L	D	5		E300.0	05/18/18 02:55 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 22:33 / jcg
Arsenic	7	mg/kg		1		SW6020	05/14/18 22:33 / jcg
Barium	110	mg/kg		1		SW6020	05/14/18 22:33 / jcg
Beryllium	ND	mg/kg		1		SW6020	05/16/18 06:18 / rlh
Boron	7	mg/kg		1		SW6010B	05/16/18 00:54 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 22:33 / jcg
Chromium	13	mg/kg		1		SW6020	05/14/18 22:33 / jcg
Cobalt	6	mg/kg		1		SW6020	05/14/18 22:33 / jcg
Lead	11	mg/kg		1		SW6020	05/14/18 22:33 / jcg
Lithium	10	mg/kg	D	5		SW6010B	05/16/18 00:54 / rjh
Manganese	305	mg/kg		1		SW6020	05/14/18 22:33 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 11:21 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 06:18 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 22:33 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 22:33 / jcg
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-035
Client Sample ID: TLN-1805-035

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 15:40
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	18.9	wt%		0.2		D2974	05/11/18 12:49 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.8	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	3.9	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	26.3	meq/L		0.05		SW6010B	05/18/18 15:05 / rjh
Magnesium, sat. paste	31.9	meq/L		0.08		SW6010B	05/18/18 15:05 / rjh
Potassium, sat. paste	1.19	meq/L		0.03		SW6010B	05/18/18 15:05 / rjh
Sodium, sat. paste	7.53	meq/L		0.04		SW6010B	05/18/18 15:05 / rjh
Sodium Adsorption Ratio (SAR)	1.40	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	114	mg/L		4		ASA10-3	05/16/18 15:52 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 15:52 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 04:13 / ens
Chloride	47	mg/L		1		E300.0	05/18/18 04:13 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 04:13 / ens
Sulfate	3080	mg/L	D	5		E300.0	05/18/18 04:13 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 22:36 / jcg
Arsenic	7	mg/kg		1		SW6020	05/14/18 22:36 / jcg
Barium	177	mg/kg		1		SW6020	05/14/18 22:36 / jcg
Beryllium	ND	mg/kg		1		SW6020	05/16/18 06:22 / rlh
Boron	6	mg/kg		1		SW6010B	05/16/18 00:59 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 22:36 / jcg
Chromium	11	mg/kg		1		SW6020	05/14/18 22:36 / jcg
Cobalt	6	mg/kg		1		SW6020	05/14/18 22:36 / jcg
Lead	9	mg/kg		1		SW6020	05/14/18 22:36 / jcg
Lithium	8	mg/kg	D	5		SW6010B	05/16/18 00:59 / rjh
Manganese	305	mg/kg		1		SW6020	05/14/18 22:36 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 11:23 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 06:22 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 22:36 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 22:36 / jcg
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-036
Client Sample ID: TLN-1805-036

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 15:55
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	17.1	wt%		0.2		D2974	05/11/18 12:51 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.8	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	1.3	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	6.56	meq/L		0.05		SW6010B	05/18/18 15:48 / rjh
Magnesium, sat. paste	7.02	meq/L		0.08		SW6010B	05/18/18 15:48 / rjh
Potassium, sat. paste	0.77	meq/L		0.03		SW6010B	05/18/18 15:48 / rjh
Sodium, sat. paste	0.92	meq/L		0.04		SW6010B	05/18/18 15:48 / rjh
Sodium Adsorption Ratio (SAR)	0.35	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	105	mg/L		4		ASA10-3	05/16/18 15:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 15:59 / rco
Bromide	1.0	mg/L		0.5		E300.0	05/18/18 04:52 / ens
Chloride	9	mg/L		1		E300.0	05/18/18 04:52 / ens
Fluoride	5	mg/L	D	1		E300.0	05/18/18 04:52 / ens
Sulfate	607	mg/L		1		E300.0	05/18/18 04:52 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 22:39 / jcg
Arsenic	6	mg/kg		1		SW6020	05/14/18 22:39 / jcg
Barium	143	mg/kg		1		SW6020	05/14/18 22:39 / jcg
Beryllium	ND	mg/kg		1		SW6020	05/16/18 06:27 / rlh
Boron	26	mg/kg		1		SW6010B	05/16/18 01:03 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 22:39 / jcg
Chromium	17	mg/kg		1		SW6020	05/14/18 22:39 / jcg
Cobalt	7	mg/kg		1		SW6020	05/14/18 22:39 / jcg
Lead	11	mg/kg		1		SW6020	05/14/18 22:39 / jcg
Lithium	13	mg/kg	D	5		SW6010B	05/16/18 01:03 / rjh
Manganese	424	mg/kg		1		SW6020	05/14/18 22:39 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 11:25 / jag
Molybdenum	2	mg/kg		1		SW6020	05/16/18 06:27 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 22:39 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 22:39 / jcg
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-037
Client Sample ID: TLN-1805-037

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 16:00
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.6	wt%		0.2		D2974	05/11/18 12:52 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.9	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	5.4	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	21.7	meq/L		0.05		SW6010B	05/18/18 15:56 / rjh
Magnesium, sat. paste	74.2	meq/L		0.08		SW6010B	05/18/18 15:56 / rjh
Potassium, sat. paste	0.88	meq/L	D	0.04		SW6010B	05/18/18 15:56 / rjh
Sodium, sat. paste	11.9	meq/L	D	0.06		SW6010B	05/18/18 15:56 / rjh
Sodium Adsorption Ratio (SAR)	1.71	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	115	mg/L		4		ASA10-3	05/16/18 16:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 16:03 / rco
Bromide	22	mg/L	D	5		E300.0	05/18/18 05:12 / ens
Chloride	56	mg/L	D	2		E300.0	05/18/18 05:12 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/18/18 05:12 / ens
Sulfate	5310	mg/L	D	10		E300.0	05/18/18 05:12 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 22:41 / jcg
Arsenic	7	mg/kg		1		SW6020	05/14/18 22:41 / jcg
Barium	188	mg/kg		1		SW6020	05/14/18 22:41 / jcg
Beryllium	ND	mg/kg		1		SW6020	05/16/18 06:31 / rlh
Boron	64	mg/kg		1		SW6010B	05/16/18 01:07 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 22:41 / jcg
Chromium	14	mg/kg		1		SW6020	05/14/18 22:41 / jcg
Cobalt	7	mg/kg		1		SW6020	05/14/18 22:41 / jcg
Lead	11	mg/kg		1		SW6020	05/14/18 22:41 / jcg
Lithium	11	mg/kg	D	4		SW6010B	05/16/18 01:07 / rjh
Manganese	393	mg/kg		1		SW6020	05/14/18 22:41 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 11:26 / jag
Molybdenum	1	mg/kg		1		SW6020	05/16/18 06:31 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 22:41 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 22:41 / jcg
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-038
Client Sample ID: TLN-1805-038

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 16:15
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	22.3	wt%		0.2		D2974	05/11/18 12:53 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	8.0	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	5.9	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	22.2	meq/L		0.05		SW6010B	05/18/18 16:00 / rjh
Magnesium, sat. paste	81.5	meq/L		0.08		SW6010B	05/18/18 16:00 / rjh
Potassium, sat. paste	1.60	meq/L	D	0.04		SW6010B	05/18/18 16:00 / rjh
Sodium, sat. paste	16.2	meq/L	D	0.06		SW6010B	05/18/18 16:00 / rjh
Sodium Adsorption Ratio (SAR)	2.25	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	168	mg/L		4		ASA10-3	05/16/18 16:08 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 16:08 / rco
Bromide	ND	mg/L	D	5		E300.0	05/18/18 05:31 / ens
Chloride	29	mg/L	D	2		E300.0	05/18/18 05:31 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/18/18 05:31 / ens
Sulfate	5960	mg/L	D	10		E300.0	05/18/18 05:31 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 22:44 / jcg
Arsenic	5	mg/kg		1		SW6020	05/14/18 22:44 / jcg
Barium	258	mg/kg		1		SW6020	05/14/18 22:44 / jcg
Beryllium	ND	mg/kg		1		SW6020	05/16/18 06:36 / rlh
Boron	78	mg/kg		1		SW6010B	05/16/18 01:20 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 22:44 / jcg
Chromium	13	mg/kg		1		SW6020	05/14/18 22:44 / jcg
Cobalt	5	mg/kg		1		SW6020	05/14/18 22:44 / jcg
Lead	9	mg/kg		1		SW6020	05/14/18 22:44 / jcg
Lithium	12	mg/kg	D	5		SW6010B	05/16/18 01:20 / rjh
Manganese	234	mg/kg		1		SW6020	05/14/18 22:44 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 11:28 / jag
Molybdenum	1	mg/kg		1		SW6020	05/16/18 06:36 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 22:44 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 22:44 / jcg
RADIONUCLIDES							
Radium 226	0.2	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 226 precision (±)	0.05	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 228	0.05	pCi/g-dry	U			RA-05	05/31/18 11:33 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-039
Client Sample ID: TLN-1805-039

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 16:20
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	29.8	wt%		0.2		D2974	05/11/18 12:56 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	5.8	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	20.9	meq/L		0.05		SW6010B	05/18/18 16:04 / rjh
Magnesium, sat. paste	68.2	meq/L		0.08		SW6010B	05/18/18 16:04 / rjh
Potassium, sat. paste	0.75	meq/L	D	0.04		SW6010B	05/18/18 16:04 / rjh
Sodium, sat. paste	16.2	meq/L	D	0.06		SW6010B	05/18/18 16:04 / rjh
Sodium Adsorption Ratio (SAR)	2.43	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	133	mg/L		4		ASA10-3	05/16/18 16:12 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 16:12 / rco
Bromide	ND	mg/L	D	5		E300.0	05/18/18 05:51 / ens
Chloride	109	mg/L	D	2		E300.0	05/18/18 05:51 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/18/18 05:51 / ens
Sulfate	5470	mg/L	D	10		E300.0	05/18/18 05:51 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 22:47 / jcg
Arsenic	4	mg/kg		1		SW6020	05/14/18 22:47 / jcg
Barium	265	mg/kg		1		SW6020	05/14/18 22:47 / jcg
Beryllium	ND	mg/kg		1		SW6020	05/16/18 06:40 / rlh
Boron	72	mg/kg		1		SW6010B	05/16/18 01:24 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 22:47 / jcg
Chromium	11	mg/kg		1		SW6020	05/14/18 22:47 / jcg
Cobalt	4	mg/kg		1		SW6020	05/14/18 22:47 / jcg
Lead	8	mg/kg		1		SW6020	05/14/18 22:47 / jcg
Lithium	14	mg/kg	D	5		SW6010B	05/16/18 01:24 / rjh
Manganese	216	mg/kg		1		SW6020	05/14/18 22:47 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 11:30 / jag
Molybdenum	2	mg/kg		1		SW6020	05/16/18 06:40 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 22:47 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 22:47 / jcg
RADIONUCLIDES							
Radium 226	0.2	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 226 precision (±)	0.06	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 228	0.09	pCi/g-dry	U			RA-05	05/31/18 11:33 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-040
Client Sample ID: TLN-1805-040

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 07:20
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	41.5	wt%		0.2		D2974	05/11/18 13:09 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	5.1	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	22.4	meq/L		0.05		SW6010B	05/18/18 16:08 / rjh
Magnesium, sat. paste	56.2	meq/L		0.08		SW6010B	05/18/18 16:08 / rjh
Potassium, sat. paste	0.58	meq/L	D	0.04		SW6010B	05/18/18 16:08 / rjh
Sodium, sat. paste	13.5	meq/L	D	0.09		SW6010B	05/18/18 16:08 / rjh
Sodium Adsorption Ratio (SAR)	2.16	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	92	mg/L		4		ASA10-3	05/16/18 16:16 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 16:16 / rco
Bromide	ND	mg/L	D	5		E300.0	05/18/18 06:10 / ens
Chloride	125	mg/L	D	2		E300.0	05/18/18 06:10 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/18/18 06:10 / ens
Sulfate	4450	mg/L	D	10		E300.0	05/18/18 06:10 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 22:50 / jcg
Arsenic	5	mg/kg		1		SW6020	05/14/18 22:50 / jcg
Barium	246	mg/kg		1		SW6020	05/14/18 22:50 / jcg
Beryllium	ND	mg/kg		1		SW6020	05/16/18 06:45 / rlh
Boron	25	mg/kg		1		SW6010B	05/16/18 01:28 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 22:50 / jcg
Chromium	12	mg/kg		1		SW6020	05/14/18 22:50 / jcg
Cobalt	4	mg/kg		1		SW6020	05/14/18 22:50 / jcg
Lead	8	mg/kg		1		SW6020	05/14/18 22:50 / jcg
Lithium	9	mg/kg	D	5		SW6010B	05/16/18 01:28 / rjh
Manganese	215	mg/kg		1		SW6020	05/14/18 22:50 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 15:10 / jag
Molybdenum	1	mg/kg		1		SW6020	05/16/18 06:45 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 22:50 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 22:50 / jcg
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-041
Client Sample ID: TLN-1805-041

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/07/18 16:17
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	22.8	wt%		0.2		D2974	05/11/18 13:12 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	8.0	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	5.8	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	22.3	meq/L		0.05		SW6010B	05/18/18 16:12 / rjh
Magnesium, sat. paste	83.0	meq/L		0.08		SW6010B	05/18/18 16:12 / rjh
Potassium, sat. paste	1.69	meq/L	D	0.04		SW6010B	05/18/18 16:12 / rjh
Sodium, sat. paste	17.1	meq/L	D	0.09		SW6010B	05/18/18 16:12 / rjh
Sodium Adsorption Ratio (SAR)	2.35	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	210	mg/L		4		ASA10-3	05/16/18 16:19 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 16:19 / rco
Bromide	ND	mg/L	D	5		E300.0	05/18/18 06:30 / ens
Chloride	27	mg/L	D	2		E300.0	05/18/18 06:30 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/18/18 06:30 / ens
Sulfate	5740	mg/L	D	10		E300.0	05/18/18 06:30 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 22:53 / jcg
Arsenic	5	mg/kg		1		SW6020	05/14/18 22:53 / jcg
Barium	193	mg/kg		1		SW6020	05/14/18 22:53 / jcg
Beryllium	ND	mg/kg		1		SW6020	05/16/18 06:49 / rlh
Boron	72	mg/kg		1		SW6010B	05/16/18 01:33 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 22:53 / jcg
Chromium	13	mg/kg		1		SW6020	05/14/18 22:53 / jcg
Cobalt	5	mg/kg		1		SW6020	05/14/18 22:53 / jcg
Lead	9	mg/kg		1		SW6020	05/14/18 22:53 / jcg
Lithium	11	mg/kg	D	5		SW6010B	05/16/18 01:33 / rjh
Manganese	190	mg/kg		1		SW6020	05/14/18 22:53 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 15:11 / jag
Molybdenum	1	mg/kg		1		SW6020	05/16/18 06:49 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 22:53 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 22:53 / jcg
RADIONUCLIDES							
Radium 226	0.2	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 226 precision (±)	0.06	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-042
Client Sample ID: TLN-1805-042

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 07:30
DateReceived: 05/08/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	5.9	s.u.	H	0.1		A4500-H B	05/10/18 09:08 / pjw
pH Measurement Temp	16	°C				A4500-H B	05/10/18 09:08 / pjw
Conductivity @ 25 C	ND	umhos/cm		5		A2510 B	05/10/18 09:08 / pjw
INORGANICS							
Bicarbonate as HCO3	ND	mg/L		4		A2320 B	05/14/18 15:02 / rco
Carbonate as CO3	ND	mg/L		4		A2320 B	05/14/18 15:02 / rco
Chloride	ND	mg/L		1		E300.0	05/12/18 00:59 / ens
Sulfate	ND	mg/L		1		E300.0	05/12/18 00:59 / ens
Bromide	ND	mg/L		0.5		E300.0	05/12/18 00:59 / ens
Fluoride	ND	mg/L		0.1		A4500-F C	05/15/18 16:08 / rco
Sodium Adsorption Ratio (SAR)	ND	unitless		0.01		Calculation	05/14/18 17:21 / jbm
METALS, TOTAL							
Antimony	ND	mg/L		0.001		E200.8	05/11/18 01:17 / rlh
Arsenic	ND	mg/L		0.001		E200.8	05/11/18 17:21 / rlh
Barium	ND	mg/L		0.05		E200.8	05/11/18 01:17 / rlh
Beryllium	ND	mg/L		0.001		E200.8	05/11/18 01:17 / rlh
Boron	ND	mg/L		0.05		E200.7	05/14/18 17:21 / rjh
Cadmium	ND	mg/L		0.001		E200.8	05/11/18 01:17 / rlh
Calcium	ND	mg/L		1		E200.7	05/14/18 17:21 / rjh
Chromium	ND	mg/L		0.005		E200.8	05/11/18 01:17 / rlh
Cobalt	ND	mg/L		0.005		E200.8	05/11/18 01:17 / rlh
Lead	ND	mg/L		0.001		E200.8	05/11/18 01:17 / rlh
Lithium	ND	mg/L		0.1		E200.7	05/14/18 17:21 / rjh
Magnesium	ND	mg/L		1		E200.7	05/14/18 17:21 / rjh
Manganese	ND	mg/L		0.001		E200.8	05/11/18 01:17 / rlh
Mercury	ND	mg/L		0.0001		E245.1	05/14/18 14:55 / jag
Molybdenum	ND	mg/L		0.001		E200.8	05/11/18 17:21 / rlh
Potassium	ND	mg/L		1		E200.7	05/14/18 17:21 / rjh
Selenium	ND	mg/L		0.001		E200.8	05/11/18 17:21 / rlh
Sodium	ND	mg/L		1		E200.7	05/14/18 17:21 / rjh
Thallium	ND	mg/L		0.0005		E200.8	05/11/18 01:17 / rlh
RADIONUCLIDES - TOTAL							
Radium 226	0.1	pCi/L	U			E903.0	05/28/18 11:35 / eli-ca
Radium 226 precision (±)	0.2	pCi/L				E903.0	05/28/18 11:35 / eli-ca
Radium 226 MDC	0.2	pCi/L				E903.0	05/28/18 11:35 / eli-ca
Radium 228	1.9	pCi/L	U			RA-05	05/23/18 07:51 / eli-ca
Radium 228 precision (±)	0.8	pCi/L				RA-05	05/23/18 07:51 / eli-ca
Radium 228 MDC	2.0	pCi/L				RA-05	05/23/18 07:51 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
H - Analysis performed past recommended holding time.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-043
Client Sample ID: TLN-1805-043

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 07:55
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	17.4	wt%		0.2		D2974	05/11/18 13:13 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.9	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	4.8	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	16.0	meq/L		0.05		SW6010B	05/18/18 16:16 / rjh
Magnesium, sat. paste	53.7	meq/L		0.08		SW6010B	05/18/18 16:16 / rjh
Potassium, sat. paste	0.96	meq/L		0.03		SW6010B	05/18/18 16:16 / rjh
Sodium, sat. paste	15.9	meq/L		0.04		SW6010B	05/18/18 16:16 / rjh
Sodium Adsorption Ratio (SAR)	2.70	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	185	mg/L		4		ASA10-3	05/16/18 16:24 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/16/18 16:24 / rco
Bromide	3	mg/L	D	2		E300.0	05/18/18 06:49 / ens
Chloride	154	mg/L		1		E300.0	05/18/18 06:49 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 06:49 / ens
Sulfate	3800	mg/L	D	5		E300.0	05/18/18 06:49 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 23:02 / jcg
Arsenic	4	mg/kg		1		SW6020	05/14/18 23:02 / jcg
Barium	140	mg/kg		1		SW6020	05/14/18 23:02 / jcg
Beryllium	ND	mg/kg		1		SW6020	05/16/18 07:03 / rlh
Boron	18	mg/kg		1		SW6010B	05/16/18 01:37 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 23:02 / jcg
Chromium	14	mg/kg		1		SW6020	05/14/18 23:02 / jcg
Cobalt	6	mg/kg		1		SW6020	05/14/18 23:02 / jcg
Lead	9	mg/kg		1		SW6020	05/14/18 23:02 / jcg
Lithium	9	mg/kg	D	5		SW6010B	05/16/18 01:37 / rjh
Manganese	307	mg/kg		1		SW6020	05/14/18 23:02 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 15:13 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 07:03 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 23:02 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 23:02 / jcg
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 10:43 / eli-ca
Radium 228	0.9	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-044
Client Sample ID: TLN-1805-044

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 08:00
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	17.1	wt%		0.2		D2974	05/11/18 13:14 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	8.0	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	5.1	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	19.9	meq/L		0.05		SW6010B	05/18/18 16:20 / rjh
Magnesium, sat. paste	50.1	meq/L		0.08		SW6010B	05/18/18 16:20 / rjh
Potassium, sat. paste	0.34	meq/L	D	0.04		SW6010B	05/18/18 16:20 / rjh
Sodium, sat. paste	12.3	meq/L	D	0.09		SW6010B	05/18/18 16:20 / rjh
Sodium Adsorption Ratio (SAR)	2.08	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	133	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	5		E300.0	05/18/18 07:09 / ens
Chloride	128	mg/L	D	2		E300.0	05/18/18 07:09 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/18/18 07:09 / ens
Sulfate	4490	mg/L	D	10		E300.0	05/18/18 07:09 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 23:05 / jcg
Arsenic	3	mg/kg		1		SW6020	05/14/18 23:05 / jcg
Barium	189	mg/kg		1		SW6020	05/14/18 23:05 / jcg
Beryllium	ND	mg/kg		1		SW6020	05/16/18 07:08 / rlh
Boron	17	mg/kg		1		SW6010B	05/16/18 01:42 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 23:05 / jcg
Chromium	13	mg/kg		1		SW6020	05/14/18 23:05 / jcg
Cobalt	4	mg/kg		1		SW6020	05/14/18 23:05 / jcg
Lead	8	mg/kg		1		SW6020	05/14/18 23:05 / jcg
Lithium	10	mg/kg	D	5		SW6010B	05/16/18 01:42 / rjh
Manganese	122	mg/kg		1		SW6020	05/14/18 23:05 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 15:15 / jag
Molybdenum	1	mg/kg		1		SW6020	05/16/18 07:08 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 23:05 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 23:05 / jcg
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 228	0.9	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-045
Client Sample ID: TLN-1805-045

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 08:05
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	18.9	wt%		0.2		D2974	05/11/18 13:16 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.7	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	3.8	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	19.8	meq/L		0.05		SW6010B	05/18/18 16:31 / rjh
Magnesium, sat. paste	23.1	meq/L		0.08		SW6010B	05/18/18 16:31 / rjh
Potassium, sat. paste	0.56	meq/L		0.03		SW6010B	05/18/18 16:31 / rjh
Sodium, sat. paste	2.70	meq/L		0.04		SW6010B	05/18/18 16:31 / rjh
Sodium Adsorption Ratio (SAR)	0.58	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	254	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 08:27 / ens
Chloride	64	mg/L		1		E300.0	05/18/18 08:27 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 08:27 / ens
Sulfate	2900	mg/L	D	5		E300.0	05/18/18 08:27 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 23:24 / jcg
Arsenic	5	mg/kg		1		SW6020	05/14/18 23:24 / jcg
Barium	101	mg/kg		1		SW6020	05/14/18 23:24 / jcg
Beryllium	ND	mg/kg		1		SW6010B	05/16/18 02:18 / rjh
Boron	13	mg/kg		1		SW6010B	05/16/18 02:18 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 23:24 / jcg
Chromium	13	mg/kg		1		SW6020	05/14/18 23:24 / jcg
Cobalt	7	mg/kg		1		SW6020	05/14/18 23:24 / jcg
Lead	11	mg/kg		1		SW6020	05/14/18 23:24 / jcg
Lithium	9	mg/kg	D	4		SW6010B	05/16/18 02:18 / rjh
Manganese	311	mg/kg		1		SW6020	05/14/18 23:24 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 15:17 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 07:39 / rlh
Selenium	2	mg/kg		1		SW6020	05/14/18 23:24 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 23:24 / jcg
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-046
Client Sample ID: TLN-1805-046

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 08:10
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.1	wt%		0.2		D2974	05/11/18 13:17 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.9	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	4.5	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	23.6	meq/L		0.05		SW6010B	05/18/18 16:35 / rjh
Magnesium, sat. paste	49.5	meq/L		0.08		SW6010B	05/18/18 16:35 / rjh
Potassium, sat. paste	1.11	meq/L		0.03		SW6010B	05/18/18 16:35 / rjh
Sodium, sat. paste	6.71	meq/L		0.04		SW6010B	05/18/18 16:35 / rjh
Sodium Adsorption Ratio (SAR)	1.11	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	145	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 08:46 / ens
Chloride	81	mg/L		1		E300.0	05/18/18 08:46 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 08:46 / ens
Sulfate	3940	mg/L	D	5		E300.0	05/18/18 08:46 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 23:27 / jcg
Arsenic	5	mg/kg		1		SW6020	05/14/18 23:27 / jcg
Barium	125	mg/kg		1		SW6020	05/14/18 23:27 / jcg
Beryllium	ND	mg/kg		1		SW6010B	05/16/18 02:22 / rjh
Boron	17	mg/kg		1		SW6010B	05/16/18 02:22 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 23:27 / jcg
Chromium	14	mg/kg		1		SW6020	05/14/18 23:27 / jcg
Cobalt	6	mg/kg		1		SW6020	05/14/18 23:27 / jcg
Lead	11	mg/kg		1		SW6020	05/14/18 23:27 / jcg
Lithium	10	mg/kg	D	5		SW6010B	05/16/18 02:22 / rjh
Manganese	323	mg/kg		1		SW6020	05/14/18 23:27 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 15:18 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 07:43 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 23:27 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 23:27 / jcg
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 228	0.9	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	05/31/18 11:33 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-047
Client Sample ID: TLN-1805-047

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 08:20
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	27.1	wt%		0.2		D2974	05/11/18 13:24 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	4.0	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	19.0	meq/L		0.05		SW6010B	05/18/18 16:43 / rjh
Magnesium, sat. paste	41.3	meq/L		0.08		SW6010B	05/18/18 16:43 / rjh
Potassium, sat. paste	0.65	meq/L		0.03		SW6010B	05/18/18 16:43 / rjh
Sodium, sat. paste	7.25	meq/L		0.04		SW6010B	05/18/18 16:43 / rjh
Sodium Adsorption Ratio (SAR)	1.32	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	300	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 09:25 / ens
Chloride	131	mg/L		1		E300.0	05/18/18 09:25 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 09:25 / ens
Sulfate	2840	mg/L	D	5		E300.0	05/18/18 09:25 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 23:36 / jcg
Arsenic	5	mg/kg		1		SW6020	05/14/18 23:36 / jcg
Barium	104	mg/kg		1		SW6020	05/14/18 23:36 / jcg
Beryllium	ND	mg/kg		1		SW6010B	05/16/18 02:27 / rjh
Boron	16	mg/kg		1		SW6010B	05/16/18 02:27 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 23:36 / jcg
Chromium	12	mg/kg		1		SW6020	05/14/18 23:36 / jcg
Cobalt	4	mg/kg		1		SW6020	05/14/18 23:36 / jcg
Lead	8	mg/kg		1		SW6020	05/14/18 23:36 / jcg
Lithium	9	mg/kg	D	5		SW6010B	05/16/18 02:27 / rjh
Manganese	102	mg/kg		1		SW6020	05/14/18 23:36 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 15:20 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 07:57 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 23:36 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 23:36 / jcg
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 228	0.4	pCi/g-dry	U			RA-05	05/31/18 13:12 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/31/18 13:12 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	05/31/18 13:12 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-048
Client Sample ID: TLN-1805-048

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 08:25
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	20.2	wt%		0.2		D2974	05/11/18 13:26 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.7	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	3.5	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	17.0	meq/L		0.05		SW6010B	05/18/18 16:59 / rjh
Magnesium, sat. paste	34.0	meq/L		0.08		SW6010B	05/18/18 16:59 / rjh
Potassium, sat. paste	0.47	meq/L		0.03		SW6010B	05/18/18 16:59 / rjh
Sodium, sat. paste	6.49	meq/L		0.04		SW6010B	05/18/18 16:59 / rjh
Sodium Adsorption Ratio (SAR)	1.28	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	111	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 09:45 / ens
Chloride	109	mg/L		1		E300.0	05/18/18 09:45 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 09:45 / ens
Sulfate	2520	mg/L	D	5		E300.0	05/18/18 09:45 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 23:38 / jcg
Arsenic	6	mg/kg		1		SW6020	05/14/18 23:38 / jcg
Barium	101	mg/kg		1		SW6020	05/14/18 23:38 / jcg
Beryllium	ND	mg/kg		1		SW6010B	05/16/18 02:31 / rjh
Boron	10	mg/kg		1		SW6010B	05/16/18 02:31 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 23:38 / jcg
Chromium	16	mg/kg		1		SW6020	05/14/18 23:38 / jcg
Cobalt	7	mg/kg		1		SW6020	05/14/18 23:38 / jcg
Lead	10	mg/kg		1		SW6020	05/14/18 23:38 / jcg
Lithium	10	mg/kg	D	5		SW6010B	05/16/18 02:31 / rjh
Manganese	443	mg/kg		1		SW6020	05/14/18 23:38 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 15:22 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 08:01 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 23:38 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 23:38 / jcg
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	05/31/18 13:12 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/31/18 13:12 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	05/31/18 13:12 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-049
Client Sample ID: TLN-1805-049

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 08:35
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	17.9	wt%		0.2		D2974	05/11/18 13:29 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	3.2	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	17.9	meq/L		0.05		SW6010B	05/18/18 17:03 / rjh
Magnesium, sat. paste	26.3	meq/L		0.08		SW6010B	05/18/18 17:03 / rjh
Potassium, sat. paste	1.02	meq/L		0.03		SW6010B	05/18/18 17:03 / rjh
Sodium, sat. paste	3.67	meq/L		0.04		SW6010B	05/18/18 17:03 / rjh
Sodium Adsorption Ratio (SAR)	0.78	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	252	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 10:04 / ens
Chloride	64	mg/L		1		E300.0	05/18/18 10:04 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 10:04 / ens
Sulfate	2180	mg/L	D	5		E300.0	05/18/18 10:04 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 23:41 / jcg
Arsenic	7	mg/kg		1		SW6020	05/14/18 23:41 / jcg
Barium	177	mg/kg		1		SW6020	05/14/18 23:41 / jcg
Beryllium	ND	mg/kg		1		SW6010B	05/16/18 02:35 / rjh
Boron	12	mg/kg		1		SW6010B	05/16/18 02:35 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 23:41 / jcg
Chromium	14	mg/kg		1		SW6020	05/14/18 23:41 / jcg
Cobalt	5	mg/kg		1		SW6020	05/14/18 23:41 / jcg
Lead	10	mg/kg		1		SW6020	05/14/18 23:41 / jcg
Lithium	10	mg/kg	D	5		SW6010B	05/16/18 02:35 / rjh
Manganese	260	mg/kg		1		SW6020	05/14/18 23:41 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 15:24 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 08:06 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 23:41 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 23:41 / jcg
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 228	0.4	pCi/g-dry	U			RA-05	05/31/18 13:12 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/31/18 13:12 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	05/31/18 13:12 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-050
Client Sample ID: TLN-1805-050

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 08:40
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	18.9	wt%		0.2		D2974	05/11/18 13:31 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	4.9	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	22.1	meq/L		0.05		SW6010B	05/18/18 17:06 / rjh
Magnesium, sat. paste	55.4	meq/L		0.08		SW6010B	05/18/18 17:06 / rjh
Potassium, sat. paste	0.50	meq/L		0.03		SW6010B	05/18/18 17:06 / rjh
Sodium, sat. paste	10.2	meq/L		0.04		SW6010B	05/18/18 17:06 / rjh
Sodium Adsorption Ratio (SAR)	1.64	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	181	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 10:23 / ens
Chloride	121	mg/L		1		E300.0	05/18/18 10:23 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 10:23 / ens
Sulfate	4330	mg/L	D	5		E300.0	05/18/18 10:23 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 23:44 / jcg
Arsenic	6	mg/kg		1		SW6020	05/14/18 23:44 / jcg
Barium	125	mg/kg		1		SW6020	05/14/18 23:44 / jcg
Beryllium	ND	mg/kg		1		SW6010B	05/16/18 02:39 / rjh
Boron	16	mg/kg		1		SW6010B	05/16/18 02:39 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 23:44 / jcg
Chromium	19	mg/kg		1		SW6020	05/14/18 23:44 / jcg
Cobalt	7	mg/kg		1		SW6020	05/14/18 23:44 / jcg
Lead	14	mg/kg		1		SW6020	05/14/18 23:44 / jcg
Lithium	13	mg/kg	D	5		SW6010B	05/16/18 02:39 / rjh
Manganese	277	mg/kg		1		SW6020	05/14/18 23:44 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 15:25 / jag
Molybdenum	1	mg/kg		1		SW6020	05/16/18 08:10 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 23:44 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 23:44 / jcg
RADIONUCLIDES							
Radium 226	0.7	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 228	0.8	pCi/g-dry				RA-05	05/31/18 13:12 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/31/18 13:12 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	05/31/18 13:12 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-051
Client Sample ID: TLN-1805-051

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 08:45
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	22.6	wt%		0.2		D2974	05/11/18 13:32 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.3	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	4.2	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	24.0	meq/L		0.05		SW6010B	05/18/18 17:18 / rjh
Magnesium, sat. paste	41.2	meq/L		0.08		SW6010B	05/18/18 17:18 / rjh
Potassium, sat. paste	0.84	meq/L		0.03		SW6010B	05/18/18 17:18 / rjh
Sodium, sat. paste	6.86	meq/L		0.04		SW6010B	05/18/18 17:18 / rjh
Sodium Adsorption Ratio (SAR)	1.20	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	432	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 10:43 / ens
Chloride	105	mg/L		1		E300.0	05/18/18 10:43 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 10:43 / ens
Sulfate	3220	mg/L	D	5		E300.0	05/18/18 10:43 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 23:47 / jcg
Arsenic	5	mg/kg		1		SW6020	05/14/18 23:47 / jcg
Barium	134	mg/kg		1		SW6020	05/14/18 23:47 / jcg
Beryllium	ND	mg/kg		1		SW6010B	05/16/18 02:44 / rjh
Boron	17	mg/kg		1		SW6010B	05/16/18 02:44 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 23:47 / jcg
Chromium	17	mg/kg		1		SW6020	05/14/18 23:47 / jcg
Cobalt	6	mg/kg		1		SW6020	05/14/18 23:47 / jcg
Lead	12	mg/kg		1		SW6020	05/14/18 23:47 / jcg
Lithium	12	mg/kg	D	5		SW6010B	05/16/18 02:44 / rjh
Manganese	249	mg/kg		1		SW6020	05/14/18 23:47 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 15:42 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 08:15 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 23:47 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 23:47 / jcg
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	05/31/18 13:12 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/31/18 13:12 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	05/31/18 13:12 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-052
Client Sample ID: TLN-1805-052

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 08:47
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	23.7	wt%		0.2		D2974	05/11/18 13:34 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.3	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	4.4	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	25.7	meq/L		0.05		SW6010B	05/18/18 17:22 / rjh
Magnesium, sat. paste	44.9	meq/L		0.08		SW6010B	05/18/18 17:22 / rjh
Potassium, sat. paste	0.80	meq/L		0.03		SW6010B	05/18/18 17:22 / rjh
Sodium, sat. paste	7.20	meq/L		0.04		SW6010B	05/18/18 17:22 / rjh
Sodium Adsorption Ratio (SAR)	1.21	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	459	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 11:02 / ens
Chloride	109	mg/L		1		E300.0	05/18/18 11:02 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 11:02 / ens
Sulfate	3290	mg/L	D	5		E300.0	05/18/18 11:02 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 23:50 / jcg
Arsenic	5	mg/kg		1		SW6020	05/14/18 23:50 / jcg
Barium	114	mg/kg		1		SW6020	05/14/18 23:50 / jcg
Beryllium	ND	mg/kg		1		SW6010B	05/16/18 02:48 / rjh
Boron	15	mg/kg		1		SW6010B	05/16/18 02:48 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 23:50 / jcg
Chromium	15	mg/kg		1		SW6020	05/14/18 23:50 / jcg
Cobalt	6	mg/kg		1		SW6020	05/14/18 23:50 / jcg
Lead	10	mg/kg		1		SW6020	05/14/18 23:50 / jcg
Lithium	11	mg/kg	D	5		SW6010B	05/16/18 02:48 / rjh
Manganese	266	mg/kg		1		SW6020	05/14/18 23:50 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 15:44 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 08:19 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 23:50 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 23:50 / jcg
RADIONUCLIDES							
Radium 226	0.7	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 226 precision (±)	0.2	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	05/31/18 13:12 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/31/18 13:12 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	05/31/18 13:12 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-053
Client Sample ID: TLN-1805-053

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 08:50
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	20.5	wt%		0.2		D2974	05/11/18 13:35 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	5.2	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	22.1	meq/L		0.05		SW6010B	05/18/18 17:26 / rjh
Magnesium, sat. paste	60.3	meq/L		0.08		SW6010B	05/18/18 17:26 / rjh
Potassium, sat. paste	0.56	meq/L	D	0.04		SW6010B	05/18/18 17:26 / rjh
Sodium, sat. paste	12.1	meq/L	D	0.09		SW6010B	05/18/18 17:26 / rjh
Sodium Adsorption Ratio (SAR)	1.89	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	173	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	5		E300.0	05/18/18 11:22 / ens
Chloride	122	mg/L	D	2		E300.0	05/18/18 11:22 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/18/18 11:22 / ens
Sulfate	4730	mg/L	D	10		E300.0	05/18/18 11:22 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 23:53 / jcg
Arsenic	6	mg/kg		1		SW6020	05/14/18 23:53 / jcg
Barium	128	mg/kg		1		SW6020	05/14/18 23:53 / jcg
Beryllium	ND	mg/kg		1		SW6010B	05/16/18 03:01 / rjh
Boron	18	mg/kg		1		SW6010B	05/16/18 03:01 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 23:53 / jcg
Chromium	21	mg/kg		1		SW6020	05/14/18 23:53 / jcg
Cobalt	7	mg/kg		1		SW6020	05/14/18 23:53 / jcg
Lead	16	mg/kg		1		SW6020	05/14/18 23:53 / jcg
Lithium	13	mg/kg	D	5		SW6010B	05/17/18 13:11 / rjh
Manganese	247	mg/kg		1		SW6020	05/14/18 23:53 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 15:46 / jag
Molybdenum	1	mg/kg		1		SW6020	05/16/18 08:24 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 23:53 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 23:53 / jcg
RADIONUCLIDES							
Radium 226	0.8	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 226 precision (±)	0.2	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 12:42 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	05/31/18 13:12 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/31/18 13:12 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	05/31/18 13:12 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-054
Client Sample ID: TLN-1805-054

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 09:00
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	27.3	wt%		0.2		D2974	05/11/18 13:37 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	5.9	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	24.4	meq/L		0.05		SW6010B	05/18/18 17:30 / rjh
Magnesium, sat. paste	73.9	meq/L		0.08		SW6010B	05/18/18 17:30 / rjh
Potassium, sat. paste	0.68	meq/L	D	0.04		SW6010B	05/18/18 17:30 / rjh
Sodium, sat. paste	22.2	meq/L	D	0.09		SW6010B	05/18/18 17:30 / rjh
Sodium Adsorption Ratio (SAR)	3.16	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	317	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	5		E300.0	05/18/18 12:01 / ens
Chloride	155	mg/L	D	2		E300.0	05/18/18 12:01 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/18/18 12:01 / ens
Sulfate	5230	mg/L	D	10		E300.0	05/18/18 12:01 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 23:56 / jcg
Arsenic	5	mg/kg		1		SW6020	05/14/18 23:56 / jcg
Barium	115	mg/kg		1		SW6020	05/14/18 23:56 / jcg
Beryllium	ND	mg/kg		1		SW6010B	05/16/18 03:05 / rjh
Boron	30	mg/kg		1		SW6010B	05/16/18 03:05 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 23:56 / jcg
Chromium	10	mg/kg		1		SW6020	05/14/18 23:56 / jcg
Cobalt	4	mg/kg		1		SW6020	05/14/18 23:56 / jcg
Lead	8	mg/kg		1		SW6020	05/14/18 23:56 / jcg
Lithium	8	mg/kg	D	5		SW6010B	05/17/18 13:15 / rjh
Manganese	197	mg/kg		1		SW6020	05/14/18 23:56 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 15:48 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 08:28 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 23:56 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 23:56 / jcg
RADIONUCLIDES							
Radium 226	0.3	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 226 precision (±)	0.08	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 228	0.2	pCi/g-dry	U			RA-05	05/31/18 14:47 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-055
Client Sample ID: TLN-1805-055

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 09:05
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.2	wt%		0.2		D2974	05/11/18 13:38 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	5.1	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	20.9	meq/L		0.05		SW6010B	05/18/18 17:34 / rjh
Magnesium, sat. paste	51.0	meq/L		0.08		SW6010B	05/18/18 17:34 / rjh
Potassium, sat. paste	0.28	meq/L	D	0.04		SW6010B	05/18/18 17:34 / rjh
Sodium, sat. paste	14.8	meq/L	D	0.09		SW6010B	05/18/18 17:34 / rjh
Sodium Adsorption Ratio (SAR)	2.47	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	89	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	5		E300.0	05/18/18 12:59 / ens
Chloride	114	mg/L	D	2		E300.0	05/18/18 12:59 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/18/18 12:59 / ens
Sulfate	4580	mg/L	D	10		E300.0	05/18/18 12:59 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/14/18 23:59 / jcg
Arsenic	4	mg/kg		1		SW6020	05/14/18 23:59 / jcg
Barium	105	mg/kg		1		SW6020	05/14/18 23:59 / jcg
Beryllium	ND	mg/kg		1		SW6010B	05/16/18 03:09 / rjh
Boron	11	mg/kg		1		SW6010B	05/16/18 03:09 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/14/18 23:59 / jcg
Chromium	14	mg/kg		1		SW6020	05/14/18 23:59 / jcg
Cobalt	5	mg/kg		1		SW6020	05/14/18 23:59 / jcg
Lead	8	mg/kg		1		SW6020	05/14/18 23:59 / jcg
Lithium	9	mg/kg	D	5		SW6010B	05/17/18 13:19 / rjh
Manganese	149	mg/kg		1		SW6020	05/14/18 23:59 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 15:49 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 08:33 / rlh
Selenium	ND	mg/kg		1		SW6020	05/14/18 23:59 / jcg
Thallium	ND	mg/kg		1		SW6020	05/14/18 23:59 / jcg
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 228	0.9	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-056
Client Sample ID: TLN-1805-056

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 09:20
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	25.1	wt%		0.2		D2974	05/11/18 13:39 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	4.1	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	26.2	meq/L		0.05		SW6010B	05/18/18 17:38 / rjh
Magnesium, sat. paste	33.6	meq/L		0.08		SW6010B	05/18/18 17:38 / rjh
Potassium, sat. paste	0.85	meq/L		0.03		SW6010B	05/18/18 17:38 / rjh
Sodium, sat. paste	7.78	meq/L		0.04		SW6010B	05/18/18 17:38 / rjh
Sodium Adsorption Ratio (SAR)	1.42	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	221	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 13:19 / ens
Chloride	127	mg/L		1		E300.0	05/18/18 13:19 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 13:19 / ens
Sulfate	3130	mg/L	D	5		E300.0	05/18/18 13:19 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/15/18 00:02 / jcg
Arsenic	6	mg/kg		1		SW6020	05/15/18 00:02 / jcg
Barium	116	mg/kg		1		SW6020	05/15/18 00:02 / jcg
Beryllium	ND	mg/kg		1		SW6010B	05/16/18 03:14 / rjh
Boron	16	mg/kg		1		SW6010B	05/16/18 03:14 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/15/18 00:02 / jcg
Chromium	14	mg/kg		1		SW6020	05/15/18 00:02 / jcg
Cobalt	6	mg/kg		1		SW6020	05/15/18 00:02 / jcg
Lead	11	mg/kg		1		SW6020	05/15/18 00:02 / jcg
Lithium	10	mg/kg	D	5		SW6010B	05/17/18 13:23 / rjh
Manganese	419	mg/kg		1		SW6020	05/15/18 00:02 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 15:51 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 08:38 / rlh
Selenium	ND	mg/kg		1		SW6020	05/15/18 00:02 / jcg
Thallium	ND	mg/kg		1		SW6020	05/15/18 00:02 / jcg
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-057
Client Sample ID: TLN-1805-057

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 09:25
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	21.7	wt%		0.2		D2974	05/11/18 15:10 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.8	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	5.2	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	26.7	meq/L		0.05		SW6010B	05/18/18 17:46 / rjh
Magnesium, sat. paste	68.1	meq/L		0.08		SW6010B	05/18/18 17:46 / rjh
Potassium, sat. paste	0.77	meq/L	D	0.04		SW6010B	05/18/18 17:46 / rjh
Sodium, sat. paste	17.9	meq/L	D	0.09		SW6010B	05/18/18 17:46 / rjh
Sodium Adsorption Ratio (SAR)	2.60	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	144	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	5		E300.0	05/18/18 13:58 / ens
Chloride	154	mg/L	D	2		E300.0	05/18/18 13:58 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/18/18 13:58 / ens
Sulfate	4530	mg/L	D	10		E300.0	05/18/18 13:58 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/15/18 00:11 / jcg
Arsenic	4	mg/kg	D	2		SW6020	05/16/18 08:51 / rlh
Barium	98	mg/kg		1		SW6020	05/15/18 00:11 / jcg
Beryllium	ND	mg/kg		1		SW6010B	05/16/18 03:18 / rjh
Boron	10	mg/kg	D	5		SW6010B	05/16/18 03:18 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/15/18 00:11 / jcg
Chromium	12	mg/kg		1		SW6020	05/15/18 00:11 / jcg
Cobalt	5	mg/kg		1		SW6020	05/15/18 00:11 / jcg
Lead	7	mg/kg		1		SW6020	05/15/18 00:11 / jcg
Lithium	ND	mg/kg	D	20		SW6010B	05/17/18 13:27 / rjh
Manganese	239	mg/kg		1		SW6020	05/15/18 00:11 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 15:53 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 08:51 / rlh
Selenium	ND	mg/kg	D	3		SW6020	05/16/18 08:51 / rlh
Thallium	ND	mg/kg		1		SW6020	05/15/18 00:11 / jcg
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-058
Client Sample ID: TLN-1805-058

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 09:40
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	24.6	wt%		0.2		D2974	05/11/18 15:11 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	4.1	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	16.4	meq/L		0.05		SW6010B	05/18/18 17:54 / rjh
Magnesium, sat. paste	30.5	meq/L		0.08		SW6010B	05/18/18 17:54 / rjh
Potassium, sat. paste	0.97	meq/L		0.03		SW6010B	05/18/18 17:54 / rjh
Sodium, sat. paste	9.74	meq/L		0.04		SW6010B	05/18/18 17:54 / rjh
Sodium Adsorption Ratio (SAR)	2.01	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	266	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 14:17 / ens
Chloride	122	mg/L		1		E300.0	05/18/18 14:17 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 14:17 / ens
Sulfate	2900	mg/L	D	5		E300.0	05/18/18 14:17 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/15/18 00:14 / jcg
Arsenic	4	mg/kg		1		SW6020	05/16/18 08:56 / rlh
Barium	105	mg/kg		1		SW6020	05/15/18 00:14 / jcg
Beryllium	ND	mg/kg		1		SW6010B	05/16/18 03:22 / rjh
Boron	14	mg/kg		1		SW6010B	05/16/18 03:22 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/15/18 00:14 / jcg
Chromium	13	mg/kg		1		SW6020	05/15/18 00:14 / jcg
Cobalt	5	mg/kg		1		SW6020	05/15/18 00:14 / jcg
Lead	10	mg/kg		1		SW6020	05/15/18 00:14 / jcg
Lithium	9	mg/kg	D	5		SW6010B	05/17/18 13:31 / rjh
Manganese	281	mg/kg		1		SW6020	05/15/18 00:14 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 15:54 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 08:56 / rlh
Selenium	ND	mg/kg		1		SW6020	05/16/18 08:56 / rlh
Thallium	ND	mg/kg		1		SW6020	05/15/18 00:14 / jcg
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 228	0.4	pCi/g-dry	U			RA-05	05/31/18 14:47 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-059
Client Sample ID: TLN-1805-059

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 09:45
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.5	wt%		0.2		D2974	05/11/18 15:12 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.8	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	3.8	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	14.4	meq/L		0.05		SW6010B	05/18/18 18:05 / rjh
Magnesium, sat. paste	30.1	meq/L		0.08		SW6010B	05/18/18 18:05 / rjh
Potassium, sat. paste	0.99	meq/L		0.03		SW6010B	05/18/18 18:05 / rjh
Sodium, sat. paste	9.13	meq/L		0.04		SW6010B	05/18/18 18:05 / rjh
Sodium Adsorption Ratio (SAR)	1.93	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	180	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 14:37 / ens
Chloride	113	mg/L		1		E300.0	05/18/18 14:37 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 14:37 / ens
Sulfate	2690	mg/L	D	5		E300.0	05/18/18 14:37 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/15/18 00:16 / jcg
Arsenic	4	mg/kg		1		SW6020	05/16/18 09:00 / rlh
Barium	106	mg/kg		1		SW6020	05/15/18 00:16 / jcg
Beryllium	ND	mg/kg		1		SW6010B	05/16/18 03:26 / rjh
Boron	8	mg/kg		1		SW6010B	05/16/18 03:26 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/15/18 00:16 / jcg
Chromium	15	mg/kg		1		SW6020	05/15/18 00:16 / jcg
Cobalt	6	mg/kg		1		SW6020	05/15/18 00:16 / jcg
Lead	9	mg/kg		1		SW6020	05/15/18 00:16 / jcg
Lithium	10	mg/kg	D	5		SW6010B	05/17/18 13:43 / rjh
Manganese	328	mg/kg		1		SW6020	05/15/18 00:16 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 15:56 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 09:00 / rlh
Selenium	ND	mg/kg		1		SW6020	05/16/18 09:00 / rlh
Thallium	ND	mg/kg		1		SW6020	05/15/18 00:16 / jcg
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-060
Client Sample ID: TLN-1805-060

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 10:05
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	18.3	wt%		0.2		D2974	05/11/18 15:15 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	0.7	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	3.23	meq/L		0.05		SW6010B	05/18/18 18:09 / rjh
Magnesium, sat. paste	1.32	meq/L		0.08		SW6010B	05/18/18 18:09 / rjh
Potassium, sat. paste	2.88	meq/L		0.03		SW6010B	05/18/18 18:09 / rjh
Sodium, sat. paste	0.13	meq/L		0.04		SW6010B	05/18/18 18:09 / rjh
Sodium Adsorption Ratio (SAR)	0.09	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	274	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L		0.5		E300.0	05/18/18 14:56 / ens
Chloride	8	mg/L		1		E300.0	05/18/18 14:56 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/18/18 14:56 / ens
Sulfate	44	mg/L		1		E300.0	05/18/18 14:56 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/15/18 00:19 / jcg
Arsenic	6	mg/kg		1		SW6020	05/16/18 09:05 / rlh
Barium	158	mg/kg		1		SW6020	05/15/18 00:19 / jcg
Beryllium	ND	mg/kg		1		SW6010B	05/16/18 03:30 / rjh
Boron	9	mg/kg		1		SW6010B	05/16/18 03:30 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/15/18 00:19 / jcg
Chromium	14	mg/kg		1		SW6020	05/15/18 00:19 / jcg
Cobalt	6	mg/kg		1		SW6020	05/15/18 00:19 / jcg
Lead	12	mg/kg		1		SW6020	05/15/18 00:19 / jcg
Lithium	9	mg/kg	D	5		SW6010B	05/17/18 13:47 / rjh
Manganese	302	mg/kg		1		SW6020	05/15/18 00:19 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/15/18 15:58 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 09:05 / rlh
Selenium	ND	mg/kg		1		SW6020	05/16/18 09:05 / rlh
Thallium	ND	mg/kg		1		SW6020	05/15/18 00:19 / jcg
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-061
Client Sample ID: TLN-1805-061

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 10:10
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.7	wt%		0.2		D2974	05/11/18 15:16 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	0.5	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	2.48	meq/L		0.05		SW6010B	05/18/18 18:13 / rjh
Magnesium, sat. paste	1.17	meq/L		0.08		SW6010B	05/18/18 18:13 / rjh
Potassium, sat. paste	1.73	meq/L		0.03		SW6010B	05/18/18 18:13 / rjh
Sodium, sat. paste	0.47	meq/L		0.04		SW6010B	05/18/18 18:13 / rjh
Sodium Adsorption Ratio (SAR)	0.35	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	227	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L		0.5		E300.0	05/18/18 15:16 / ens
Chloride	4	mg/L		1		E300.0	05/18/18 15:16 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/18/18 15:16 / ens
Sulfate	50	mg/L		1		E300.0	05/18/18 15:16 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/15/18 00:22 / jcg
Arsenic	5	mg/kg		1		SW6020	05/16/18 09:10 / rlh
Barium	156	mg/kg		1		SW6020	05/15/18 00:22 / jcg
Beryllium	ND	mg/kg		1		SW6010B	05/16/18 03:34 / rjh
Boron	7	mg/kg		1		SW6010B	05/16/18 03:34 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/15/18 00:22 / jcg
Chromium	16	mg/kg		1		SW6020	05/15/18 00:22 / jcg
Cobalt	7	mg/kg		1		SW6020	05/15/18 00:22 / jcg
Lead	12	mg/kg		1		SW6020	05/15/18 00:22 / jcg
Lithium	10	mg/kg	D	5		SW6010B	05/17/18 13:51 / rjh
Manganese	337	mg/kg		1		SW6020	05/15/18 00:22 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/17/18 13:12 / by
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 09:10 / rlh
Selenium	ND	mg/kg		1		SW6020	05/16/18 09:10 / rlh
Thallium	ND	mg/kg		1		SW6020	05/15/18 00:22 / jcg
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-062
Client Sample ID: TLN-1805-062

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 10:35
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.4	wt%		0.2		D2974	05/11/18 15:17 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	8.4	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	11.8	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	22.6	meq/L	D	0.09		SW6010B	05/18/18 18:17 / rjh
Magnesium, sat. paste	324	meq/L		0.08		SW6010B	05/18/18 18:17 / rjh
Potassium, sat. paste	1.28	meq/L	D	0.09		SW6010B	05/18/18 18:17 / rjh
Sodium, sat. paste	83.5	meq/L	D	0.2		SW6010B	05/18/18 18:17 / rjh
Sodium Adsorption Ratio (SAR)	6.34	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	242	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	38	mg/L	D	10		E300.0	05/18/18 15:35 / ens
Chloride	568	mg/L	D	5		E300.0	05/18/18 15:35 / ens
Fluoride	ND	mg/L	D	20		E300.0	05/18/18 15:35 / ens
Sulfate	20400	mg/L	D	50		E300.0	05/22/18 04:19 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/15/18 00:25 / jcg
Arsenic	2	mg/kg		1		SW6020	05/16/18 09:14 / rlh
Barium	65	mg/kg		1		SW6020	05/15/18 00:25 / jcg
Beryllium	ND	mg/kg		1		SW6010B	05/16/18 03:38 / rjh
Boron	29	mg/kg		1		SW6010B	05/16/18 03:38 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/15/18 00:25 / jcg
Chromium	15	mg/kg		1		SW6020	05/15/18 00:25 / jcg
Cobalt	5	mg/kg		1		SW6020	05/15/18 00:25 / jcg
Lead	9	mg/kg		1		SW6020	05/15/18 00:25 / jcg
Lithium	8	mg/kg	D	5		SW6010B	05/17/18 13:55 / rjh
Manganese	169	mg/kg		1		SW6020	05/15/18 00:25 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/17/18 13:14 / by
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 09:14 / rlh
Selenium	ND	mg/kg		1		SW6020	05/16/18 09:14 / rlh
Thallium	ND	mg/kg		1		SW6020	05/15/18 00:25 / jcg
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 228	1.0	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18050864-063
Client Sample ID: TLN-1805-063

Revised Date: 08/27/18
Report Date: 06/13/18
Collection Date: 05/08/18 10:40
DateReceived: 05/08/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.2	wt%		0.2		D2974	05/11/18 15:18 / dah
SATURATED PASTE EXTRACT							
pH, sat. paste	8.4	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	12.4	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	22.7	meq/L	D	0.09		SW6010B	05/18/18 18:21 / rjh
Magnesium, sat. paste	349	meq/L		0.08		SW6010B	05/18/18 18:21 / rjh
Potassium, sat. paste	1.31	meq/L	D	0.09		SW6010B	05/18/18 18:21 / rjh
Sodium, sat. paste	96.3	meq/L	D	0.2		SW6010B	05/18/18 18:21 / rjh
Sodium Adsorption Ratio (SAR)	7.06	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	247	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	42	mg/L	D	10		E300.0	05/18/18 16:15 / ens
Chloride	764	mg/L	D	5		E300.0	05/18/18 16:15 / ens
Fluoride	ND	mg/L	D	20		E300.0	05/18/18 16:15 / ens
Sulfate	21700	mg/L	D	50		E300.0	05/22/18 04:58 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/15/18 00:28 / jcg
Arsenic	3	mg/kg		1		SW6020	05/16/18 09:19 / rlh
Barium	46	mg/kg		1		SW6020	05/15/18 00:28 / jcg
Beryllium	ND	mg/kg		1		SW6010B	05/16/18 03:50 / rjh
Boron	26	mg/kg		1		SW6010B	05/16/18 03:50 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/15/18 00:28 / jcg
Chromium	17	mg/kg		1		SW6020	05/15/18 00:28 / jcg
Cobalt	7	mg/kg		1		SW6020	05/15/18 00:28 / jcg
Lead	12	mg/kg		1		SW6020	05/15/18 00:28 / jcg
Lithium	12	mg/kg	D	5		SW6010B	05/17/18 13:59 / rjh
Manganese	143	mg/kg		1		SW6020	05/15/18 00:28 / jcg
Mercury	ND	mg/kg		1		SW7471B	05/17/18 13:16 / by
Molybdenum	ND	mg/kg		1		SW6020	05/16/18 09:19 / rlh
Selenium	ND	mg/kg		1		SW6020	05/16/18 09:19 / rlh
Thallium	ND	mg/kg		1		SW6020	05/15/18 00:28 / jcg
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/30/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Batch: R300102
Lab ID: MBLK		Method Blank				Run: Metrohm 2_180514A				05/14/18 11:47
Alkalinity, Total as CaCO3		3	mg/L	0.7						
Lab ID: LCS		Laboratory Control Sample				Run: Metrohm 2_180514A				05/14/18 11:53
Alkalinity, Total as CaCO3		105	mg/L	4.0	102	90	110			
Lab ID: B18050308-002ADUP	3	Sample Duplicate				Run: Metrohm 2_180514A				05/14/18 12:13
Alkalinity, Total as CaCO3		295	mg/L	4.0				0.1	10	
Bicarbonate as HCO3		358	mg/L	4.0				0.3	10	
Carbonate as CO3		ND	mg/L	4.0					10	
Lab ID: B18050409-003AMS		Sample Matrix Spike				Run: Metrohm 2_180514A				05/14/18 12:29
Alkalinity, Total as CaCO3		182	mg/L	4.0	104	80	120			
Lab ID: B18050842-001ADUP	3	Sample Duplicate				Run: Metrohm 2_180514A				05/14/18 14:15
Alkalinity, Total as CaCO3		274	mg/L	4.0				0.6	10	
Bicarbonate as HCO3		335	mg/L	4.0				0.6	10	
Carbonate as CO3		ND	mg/L	4.0					10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/30/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2510 B									Analytical Run: PHSC _101-B_180510A	
Lab ID: SC 150		Continuing Calibration Verification Standard							05/10/18 08:35	
Conductivity @ 25 C		152	umhos/cm	5.0	101	90	110			
Lab ID: SC 5000		Continuing Calibration Verification Standard							05/10/18 08:37	
Conductivity @ 25 C		4970	umhos/cm	5.0	99	90	110			
Lab ID: SC 20000		Continuing Calibration Verification Standard							05/10/18 08:40	
Conductivity @ 25 C		19500	umhos/cm	5.0	98	90	110			
Method: A2510 B									Batch: R299915	
Lab ID: SC 50000		Continuing Calibration Verification Standard				Run: PHSC _101-B_180510A			05/10/18 08:42	
Conductivity @ 25 C		48800	umhos/cm	5.0	98	90	110			
Lab ID: SC 2nd 1413		Laboratory Control Sample				Run: PHSC _101-B_180510A			05/10/18 08:45	
Conductivity @ 25 C		1400	umhos/cm	5.0	99	90	110			
Lab ID: MBLK		Method Blank				Run: PHSC _101-B_180510A			05/10/18 09:04	
Conductivity @ 25 C		ND	umhos/cm	5						
Lab ID: B18050864-042ADUP		Sample Duplicate				Run: PHSC _101-B_180510A			05/10/18 09:11	
Conductivity @ 25 C		ND	umhos/cm	5.0					10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **A4500-F C**									Analytical Run: Metrohm 3_180515A	
Lab ID: **ICV**		Initial Calibration Verification Standard							05/15/18 15:44	
Fluoride		1.08	mg/L	0.10	108	90	110			
Method: **A4500-F C**									Batch: R300254	
Lab ID: **MBLK**		Method Blank				Run: Metrohm 3_180515A			05/15/18 15:47	
Fluoride		ND	mg/L	0.05						
Lab ID: **LFB**		Laboratory Fortified Blank				Run: Metrohm 3_180515A			05/15/18 15:49	
Fluoride		1.31	mg/L	0.10	105	90	110			
Lab ID: **B18050778-001AMS**		Sample Matrix Spike				Run: Metrohm 3_180515A			05/15/18 15:56	
Fluoride		1.59	mg/L	0.10	99	80	120			
Lab ID: **B18050778-001AMSD**		Sample Matrix Spike Duplicate				Run: Metrohm 3_180515A			05/15/18 15:59	
Fluoride		1.59	mg/L	0.10	99	80	120	0.0	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/30/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B									Analytical Run: PHSC _101-B_180510A	
Lab ID: pH 8	2	Initial Calibration Verification Standard							05/10/18 08:32	
pH		8.00	s.u.	0.10	100	98	102			
pH Measurement Temp		20.5	°C			0	0			
Method: A4500-H B									Batch: R299915	
Lab ID: B18050864-042ADUP	2	Sample Duplicate				Run: PHSC _101-B_180510A			05/10/18 09:11	
pH		6.06	s.u.	0.10				2.0	3	
pH Measurement Temp		15.6	°C							

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/30/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: D2974										Batch: R300066
Lab ID: B18050864-008ADUP	Sample Duplicate					Run: BAL HZW1_180511A				05/11/18 10:32
Moisture		40.1	wt%	0.20				2.6	30	
Lab ID: B18050864-018ADUP	Sample Duplicate					Run: BAL HZW1_180511A				05/11/18 10:45
Moisture		6.93	wt%	0.20				0.1	30	
Lab ID: B18050864-028ADUP	Sample Duplicate					Run: BAL HZW1_180511A				05/11/18 12:03
Moisture		19.8	wt%	0.20				0.9	30	
Lab ID: B18050864-038ADUP	Sample Duplicate					Run: BAL HZW1_180511A				05/11/18 12:55
Moisture		23.3	wt%	0.20				4.5	30	
Lab ID: B18050864-049ADUP	Sample Duplicate					Run: BAL HZW1_180511A				05/11/18 13:30
Moisture		17.4	wt%	0.20				2.6	30	
Lab ID: B18050864-059ADUP	Sample Duplicate					Run: BAL HZW1_180511A				05/11/18 15:14
Moisture		15.2	wt%	0.20				1.4	30	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/30/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Analytical Run: IC METROHM 1_180510A	
Lab ID: ICV	3	Initial Calibration Verification Standard							05/11/18 16:14	
Chloride		2.21	mg/L	1.0	98	90	110			
Sulfate		8.83	mg/L	1.0	98	90	110			
Bromide		1.11	mg/L	0.50	99	90	110			
Method: E300.0									Batch: R300087	
Lab ID: ICB	3	Method Blank				Run: IC METROHM 1_180510A			05/11/18 16:33	
Chloride		ND	mg/L	0.007						
Sulfate		ND	mg/L	0.02						
Bromide		ND	mg/L	0.002						
Lab ID: LFB	3	Laboratory Fortified Blank				Run: IC METROHM 1_180510A			05/11/18 16:53	
Chloride		10.5	mg/L	1.0	105	90	110			
Sulfate		31.1	mg/L	1.0	104	90	110			
Bromide		3.13	mg/L	0.50	104	90	110			
Lab ID: B18050830-001AMS	3	Sample Matrix Spike				Run: IC METROHM 1_180510A			05/11/18 23:03	
Chloride		64.1	mg/L	1.0	106	90	110			
Sulfate		206	mg/L	1.0	104	90	110			
Bromide		15.7	mg/L	0.50	104	90	110			
Lab ID: B18050830-001AMSD	3	Sample Matrix Spike Duplicate				Run: IC METROHM 1_180510A			05/11/18 23:22	
Chloride		64.0	mg/L	1.0	106	90	110	0.1	20	
Sulfate		206	mg/L	1.0	104	90	110	0.1	20	
Bromide		15.7	mg/L	0.50	104	90	110	0.2	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte		Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**E300.0**									Analytical Run: IC METROHM 1_180517A	
Lab ID:	**ICV**	4	Initial Calibration Verification Standard							05/17/18 17:29	
Chloride			2.16	mg/L	1.0	96	90	110			
Sulfate			8.68	mg/L	1.0	96	90	110			
Bromide			1.09	mg/L	0.50	97	90	110			
Fluoride			1.12	mg/L	0.20	100	90	110			
Method:	**E300.0**									Batch: 121432	
Lab ID:	**MB-121432**	4	Method Blank				Run: IC METROHM 1_180517A			05/17/18 21:03	
Bromide			ND	mg/L	0.002						
Chloride			ND	mg/L	0.007						
Fluoride			ND	mg/L	0.004						
Sulfate			ND	mg/L	0.02						
Lab ID:	**B18050864-006AMS**	4	Sample Matrix Spike				Run: IC METROHM 1_180517A			05/17/18 21:42	
Bromide			159	mg/L	2.6	103	70	130			
Chloride			570	mg/L	1.3	106	70	130			
Fluoride			157	mg/L	5.1	104	70	130			
Sulfate			3340	mg/L	5.1	101	70	130			
Method:	**E300.0**									Batch: 121470	
Lab ID:	**MB-121470**	4	Method Blank				Run: IC METROHM 1_180517A			05/17/18 22:02	
Bromide			ND	mg/L	0.002						
Chloride			ND	mg/L	0.007						
Fluoride			ND	mg/L	0.004						
Sulfate			ND	mg/L	0.02						
Lab ID:	**LCS-121470**	3	Laboratory Control Sample				Run: IC METROHM 1_180517A			05/17/18 22:21	
Chloride			265	mg/L	1.2	110	70	130			
Fluoride			0.850	mg/L	5.0	91	70	130			
Sulfate			1910	mg/L	5.0	96	70	130			
Lab ID:	**B18050864-025A DUP**	4	Sample Duplicate				Run: IC METROHM 1_180517A			05/17/18 23:39	
Bromide			0.105	mg/L	0.50					30	
Chloride			5.88	mg/L	1.0				8.5	30	
Fluoride			1.10	mg/L	0.50				12	30	
Sulfate			57.0	mg/L	1.0				5.5	30	
Lab ID:	**B18050864-027AMS**	4	Sample Matrix Spike				Run: IC METROHM 1_180517A			05/18/18 00:38	
Bromide			155	mg/L	2.6	103	70	130			
Chloride			558	mg/L	1.3	105	70	130			
Fluoride			160	mg/L	5.1	106	70	130			
Sulfate			4230	mg/L	5.1	102	70	130			
Lab ID:	**B18050864-034AMS**	4	Sample Matrix Spike				Run: IC METROHM 1_180517A			05/18/18 03:54	
Bromide			154	mg/L	2.6	103	70	130			
Chloride			542	mg/L	1.3	105	70	130			
Fluoride			157	mg/L	5.1	104	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0										Batch: 121470
Lab ID: B18050864-034AMS	4	Sample Matrix Spike				Run: IC METROHM 1_180517A				05/18/18 03:54
Sulfate		3880	mg/L	5.1	96	70	130			
Lab ID: B18050864-035A DUP	4	Sample Duplicate				Run: IC METROHM 1_180517A				05/18/18 04:33
Bromide		ND	mg/L	2.5					30	
Chloride		47.0	mg/L	1.2				0.7	30	
Fluoride		0.700	mg/L	5.0					30	
Sulfate		3080	mg/L	5.0				0.1	30	
Lab ID: B18050864-044AMS	4	Sample Matrix Spike				Run: IC METROHM 1_180517A				05/18/18 07:28
Bromide		313	mg/L	5.1	103	70	130			
Chloride		1190	mg/L	2.6	106	70	130			
Fluoride		316	mg/L	10	105	70	130			
Sulfate		7540	mg/L	10	102	70	130			
Lab ID: B18050864-046A DUP	4	Sample Duplicate				Run: IC METROHM 1_180517A				05/18/18 09:06
Bromide		1.20	mg/L	2.5					30	
Chloride		81.4	mg/L	1.2				0.7	30	
Fluoride		0.900	mg/L	5.0					30	
Sulfate		3920	mg/L	5.0				0.4	30	
Lab ID: B18050864-053AMS	4	Sample Matrix Spike				Run: IC METROHM 1_180517A				05/18/18 11:41
Bromide		307	mg/L	5.1	102	70	130			
Chloride		1170	mg/L	2.6	105	70	130			
Fluoride		314	mg/L	10	104	70	130			
Sulfate		7720	mg/L	10	100	70	130			
Lab ID: B18050864-056A DUP	4	Sample Duplicate				Run: IC METROHM 1_180517A				05/18/18 13:38
Bromide		1.65	mg/L	2.5					30	
Chloride		120	mg/L	1.2				5.5	30	
Fluoride		0.850	mg/L	5.0					30	
Sulfate		2990	mg/L	5.0				4.6	30	
Method: E300.0										Analytical Run: IC METROHM 1_180521A
Lab ID: ICV	4	Initial Calibration Verification Standard								05/21/18 15:18
Chloride		2.17	mg/L	1.0	96	90	110			
Sulfate		8.90	mg/L	1.0	99	90	110			
Bromide		1.09	mg/L	0.50	97	90	110			
Fluoride		1.13	mg/L	0.20	101	90	110			
Method: E300.0										Batch: 121470
Lab ID: B18050864-062AMS	4	Sample Matrix Spike				Run: IC METROHM 1_180521A				05/22/18 04:39
Bromide		1590	mg/L	26	104	70	130			
Chloride		5820	mg/L	13	106	70	130			
Fluoride		1570	mg/L	51	105	70	130			
Sulfate		35500	mg/L	51	100	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/30/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Analytical Run: IC METROHM 2_180516A	
Lab ID: ICV	4	Initial Calibration Verification Standard							05/16/18 10:57	
Chloride		2.20	mg/L	1.0	98	90	110			
Sulfate		9.15	mg/L	1.0	102	90	110			
Bromide		1.12	mg/L	0.50	100	90	110			
Fluoride		1.14	mg/L	0.20	101	90	110			
Method: E300.0									Batch: 121432	
Lab ID: MB-121432	4	Method Blank				Run: IC METROHM 2_180516A			05/16/18 15:49	
Bromide		ND	mg/L	0.002						
Chloride		ND	mg/L	0.05						
Fluoride		ND	mg/L	0.02						
Sulfate		ND	mg/L	0.03						
Lab ID: LCS-121432	3	Laboratory Control Sample				Run: IC METROHM 2_180516A			05/16/18 16:48	
Chloride		257	mg/L	1.2	106	70	130			
Fluoride		0.900	mg/L	5.0	97	70	130			
Sulfate		1900	mg/L	5.0	95	70	130			
Lab ID: B18050864-001AMS	4	Sample Matrix Spike				Run: IC METROHM 2_180516A			05/16/18 17:27	
Bromide		31.6	mg/L	0.51	104	70	130			
Chloride		161	mg/L	1.0	106	70	130			
Fluoride		34.1	mg/L	1.0	114	70	130			
Sulfate		415	mg/L	1.0	106	70	130			
Lab ID: B18050864-001A DUP	4	Sample Duplicate				Run: IC METROHM 2_180516A			05/16/18 17:46	
Bromide		0.440	mg/L	0.50					30	
Chloride		54.7	mg/L	1.0				0.3	30	
Fluoride		ND	mg/L	1.0					30	
Sulfate		95.8	mg/L	1.0				0.4	30	
Lab ID: B18050864-010AMS	4	Sample Matrix Spike				Run: IC METROHM 2_180516A			05/16/18 21:41	
Bromide		15.8	mg/L	0.50	105	70	130			
Chloride		56.1	mg/L	1.0	106	70	130			
Fluoride		17.6	mg/L	0.51	107	70	130			
Sulfate		222	mg/L	1.0	106	70	130			
Lab ID: B18050864-011A DUP	4	Sample Duplicate				Run: IC METROHM 2_180516A			05/16/18 22:20	
Bromide		0.0550	mg/L	0.50					30	
Chloride		3.15	mg/L	1.0				4.0	30	
Fluoride		0.690	mg/L	0.50				1.5	30	
Sulfate		213	mg/L	1.0				0.5	30	
Lab ID: B18050864-020AMS	4	Sample Matrix Spike				Run: IC METROHM 2_180516A			05/17/18 02:14	
Bromide		319	mg/L	5.1	106	70	130			
Chloride		1280	mg/L	2.6	108	70	130			
Fluoride		324	mg/L	10	108	70	130			
Sulfate		11600	mg/L	10	96	70	130			E

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

E - Estimated value. Result exceeds the instrument upper quantitation limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/30/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **E300.0**										Batch: 121432
Lab ID: **B18050864-020AMS**	4	Sample Matrix Spike				Run: IC METROHM 2_180516A				05/17/18 02:14
Lab ID: **B18050864-021A DUP**	4	Sample Duplicate				Run: IC METROHM 2_180516A				05/17/18 02:53
Bromide		0.280	mg/L	0.50					30	
Chloride		5.10	mg/L	1.0				4.4	30	
Fluoride		0.175	mg/L	0.50					30	
Sulfate		116	mg/L	1.0				6.6	30	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Revised Date: 08/03/18

Client: Talen Energy Supply LLC

Report Date: 06/13/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill

Work Order: B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **SW6010B**									Analytical Run: ICP203-B_180801A	
Lab ID: **QCS**	Initial Calibration Verification Standard								08/01/18 12:15	
Barium		0.770	mg/L	0.10	96	90	110			
Lab ID: **ICSA**	Interference Check Sample A								08/01/18 12:19	
Barium		0.000410	mg/L	0.10						
Lab ID: **ICSAB**	Interference Check Sample AB								08/01/18 12:23	
Barium		0.443	mg/L	0.10	89	80	120			
Method: **SW6010B**									Batch: 124000	
Lab ID: **MB-124000**	Method Blank					Run: ICP203-B_180801A			08/01/18 17:30	
Barium		ND	mg/L	0.005						
Lab ID: **LCS-124000**	Laboratory Control Sample					Run: ICP203-B_180801A			08/01/18 17:34	
Barium		5.02	mg/L	0.050	91	80	120			
Lab ID: **LCSD-124000**	Laboratory Control Sample Duplicate					Run: ICP203-B_180801A			08/01/18 17:38	
Barium		5.06	mg/L	0.050	92	80	120	0.8	20	
Lab ID: **B18050864-003BDIL**	Serial Dilution					Run: ICP203-B_180801A			08/01/18 17:53	
Barium		0.186	mg/L	0.12					10	N
Lab ID: **B18050864-007BMS3**	Sample Matrix Spike					Run: ICP203-B_180801A			08/01/18 18:21	
Barium		25.0	mg/L	0.050	91	75	125			
Lab ID: **B18050864-012BMS3**	Sample Matrix Spike					Run: ICP203-B_180801A			08/01/18 18:36	
Barium		4.73	mg/L	0.050	85	75	125			
Lab ID: **B18050864-013BMS3**	Sample Matrix Spike					Run: ICP203-B_180801A			08/01/18 18:44	
Barium		4.78	mg/L	0.050	86	75	125			
Lab ID: **B18050864-015BMS3**	Sample Matrix Spike					Run: ICP203-B_180801A			08/01/18 18:52	
Barium		10.0	mg/L	0.050	90	75	125			
Lab ID: **B18050864-018BMS3**	Sample Matrix Spike					Run: ICP203-B_180801A			08/01/18 19:08	
Barium		10.2	mg/L	0.050	91	75	125			
Lab ID: **B18050864-023BMS3**	Sample Matrix Spike					Run: ICP203-B_180801A			08/01/18 19:59	
Barium		10.2	mg/L	0.050	93	75	125			

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Revised Date: 08/03/18
Report Date: 06/13/18
Work Order: B18050864

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Analytical Run: ICPMS206-B_180802A	
Lab ID: QCS	2	Initial Calibration Verification Standard							08/02/18 11:42	
Arsenic		0.0508	mg/L	0.0010	102	90	110			
Cobalt		0.0516	mg/L	0.0010	103	90	110			
Lab ID: ICSA	2	Interference Check Sample A							08/02/18 12:11	
Arsenic		0.0000296	mg/L	0.0010						
Cobalt		0.000127	mg/L	0.0010						
Lab ID: ICSAB	2	Interference Check Sample AB							08/02/18 12:16	
Arsenic		0.0100	mg/L	0.0010	100	70	130			
Cobalt		0.0190	mg/L	0.0010	95	70	130			
Method: SW6020									Batch: 124000	
Lab ID: MB-124000	2	Method Blank				Run: ICPMS206-B_180802A			08/02/18 14:46	
Arsenic		ND	mg/L	0.0003						
Cobalt		0.0003	mg/L	0.00007						
Lab ID: LCS-124000	2	Laboratory Control Sample				Run: ICPMS206-B_180802A			08/02/18 18:01	
Arsenic		0.543	mg/L	0.0010	109	80	120			
Cobalt		0.508	mg/L	0.0050	102	80	120			
Lab ID: LCSD-124000	2	Laboratory Control Sample Duplicate				Run: ICPMS206-B_180802A			08/02/18 18:05	
Arsenic		0.550	mg/L	0.0010	110	80	120	1.3	20	
Cobalt		0.508	mg/L	0.0050	101	80	120	0.2	20	
Lab ID: B18050864-003BDIL	2	Serial Dilution				Run: ICPMS206-B_180802A			08/02/18 18:17	
Arsenic		ND	mg/L	0.0067					10	
Cobalt		0.00719	mg/L	0.0050					10	N
Lab ID: B18050864-003BMS3	2	Sample Matrix Spike				Run: ICPMS206-B_180802A			08/02/18 19:08	
Arsenic		2.73	mg/L	0.0013	109	75	125			
Cobalt		2.54	mg/L	0.0050	101	75	125			
Lab ID: B18050864-004BMS3	2	Sample Matrix Spike				Run: ICPMS206-B_180802A			08/02/18 19:12	
Arsenic		2.74	mg/L	0.0013	109	75	125			
Cobalt		2.60	mg/L	0.0050	104	75	125			
Lab ID: B18050864-005BMS3	2	Sample Matrix Spike				Run: ICPMS206-B_180802A			08/02/18 19:16	
Arsenic		1.06	mg/L	0.0010	106	75	125			
Cobalt		0.981	mg/L	0.0050	98	75	125			
Lab ID: B18050864-017BMS3	2	Sample Matrix Spike				Run: ICPMS206-B_180802A			08/02/18 19:24	
Arsenic		0.544	mg/L	0.0010	109	75	125			
Cobalt		0.487	mg/L	0.0050	97	75	125			
Lab ID: B18050864-022BMS3	2	Sample Matrix Spike				Run: ICPMS206-B_180802A			08/02/18 19:28	
Arsenic		2.72	mg/L	0.0013	108	75	125			
Cobalt		2.45	mg/L	0.0050	98	75	125			

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.
N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Revised Date: 08/03/18
Report Date: 06/13/18
Work Order: B18050864

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **SW6020**										Batch: 124000
Lab ID: **B18050864-023BMS3**	2	Sample Matrix Spike				Run: ICPMS206-B_180802A				08/02/18 19:32
Arsenic		1.07	mg/L	0.0010	107	75	125			
Cobalt		0.977	mg/L	0.0050	98	75	125			
Lab ID: **B18050864-026BMS3**	2	Sample Matrix Spike				Run: ICPMS206-B_180802A				08/02/18 19:36
Arsenic		2.73	mg/L	0.0013	109	75	125			
Cobalt		2.53	mg/L	0.0050	101	75	125			
Lab ID: **B18050864-029BMS3**	2	Sample Matrix Spike				Run: ICPMS206-B_180802A				08/02/18 19:41
Arsenic		0.538	mg/L	0.0010	107	75	125			
Cobalt		0.502	mg/L	0.0050	100	75	125			

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/22/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18050864

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: ASA10-3									Batch: ALK180516
Lab ID: LCS-121432	Laboratory Control Sample				Run: AR50_180516A				05/16/18 09:21
Bicarbonate as HCO3	513	mg/L	4.0	99	70	130			
Lab ID: B18050864-001A DUP	Sample Duplicate				Run: AR50_180516A				05/16/18 09:41
Bicarbonate as HCO3	404	mg/L	4.0				1.4	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: B18050864-011A DUP	Sample Duplicate				Run: AR50_180516A				05/16/18 12:38
Bicarbonate as HCO3	159	mg/L	4.0				1.8	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: B18050864-021A DUP	Sample Duplicate				Run: AR50_180516A				05/16/18 13:40
Bicarbonate as HCO3	275	mg/L	4.0				3.5	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: B18050864-025A DUP	Sample Duplicate				Run: AR50_180516A				05/16/18 15:02
Bicarbonate as HCO3	207	mg/L	4.0				9.8	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: B18050864-035A DUP	Sample Duplicate				Run: AR50_180516A				05/16/18 15:56
Bicarbonate as HCO3	133	mg/L	4.0				15	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Method: ASA10-3									Batch: 121432
Lab ID: B18050864-001A DUP	Sample Duplicate				Run: MISC-SOIL_180516A				05/16/18 17:51
Conductivity, sat. paste	1.05	mmhos/cm	0.10				1.9	30	
Lab ID: B18050864-011A DUP	Sample Duplicate				Run: MISC-SOIL_180516A				05/16/18 17:51
Conductivity, sat. paste	0.620	mmhos/cm	0.10				0.0	30	
Lab ID: B18050864-021A DUP	Sample Duplicate				Run: MISC-SOIL_180516A				05/16/18 17:51
Conductivity, sat. paste	0.620	mmhos/cm	0.10				1.6	30	
Lab ID: LCS-1805161751	Laboratory Control Sample				Run: MISC-SOIL_180516A				05/16/18 17:51
Conductivity, sat. paste	4.00	mmhos/cm	0.10	97	70	130			
Lab ID: B18050864-011A DUP	Sample Duplicate				Run: MISC-SOIL_180516A				05/16/18 17:51
pH, sat. paste	7.80	s.u.	0.10				0.0	10	
Lab ID: B18050864-021A DUP	Sample Duplicate				Run: MISC-SOIL_180516A				05/16/18 17:51
pH, sat. paste	7.30	s.u.	0.10				1.4	10	
Lab ID: LCS-1805161751	Laboratory Control Sample				Run: MISC-SOIL_180516A				05/16/18 17:51
pH, sat. paste	7.20	s.u.	0.10	96	90	110			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/22/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18050864

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: ASA10-3									Batch: 121470
Lab ID: B18050864-025A DUP	Sample Duplicate				Run: MISC-SOIL_180518A			05/18/18 12:08	
Conductivity, sat. paste	0.500	mmhos/cm	0.10				2.0	30	
Lab ID: B18050864-035A DUP	Sample Duplicate				Run: MISC-SOIL_180518A			05/18/18 12:08	
Conductivity, sat. paste	3.85	mmhos/cm	0.10				0.3	30	
Lab ID: B18050864-046A DUP	Sample Duplicate				Run: MISC-SOIL_180518A			05/18/18 12:08	
Conductivity, sat. paste	4.46	mmhos/cm	0.10				1.1	30	
Lab ID: B18050864-056A DUP	Sample Duplicate				Run: MISC-SOIL_180518A			05/18/18 12:08	
Conductivity, sat. paste	3.99	mmhos/cm	0.10				2.5	30	
Lab ID: LCS-1805181208	Laboratory Control Sample				Run: MISC-SOIL_180518A			05/18/18 12:08	
Conductivity, sat. paste	4.12	mmhos/cm	0.10	100	70	130			
Lab ID: B18050864-025A DUP	Sample Duplicate				Run: MISC-SOIL_180518A			05/18/18 12:08	
pH, sat. paste	7.40	s.u.	0.10				0.0	10	
Lab ID: B18050864-035A DUP	Sample Duplicate				Run: MISC-SOIL_180518A			05/18/18 12:08	
pH, sat. paste	7.70	s.u.	0.10				1.3	10	
Lab ID: B18050864-046A DUP	Sample Duplicate				Run: MISC-SOIL_180518A			05/18/18 12:08	
pH, sat. paste	7.90	s.u.	0.10				0.0	10	
Lab ID: B18050864-056A DUP	Sample Duplicate				Run: MISC-SOIL_180518A			05/18/18 12:08	
pH, sat. paste	7.60	s.u.	0.10				0.0	10	
Lab ID: LCS-1805181208	Laboratory Control Sample				Run: MISC-SOIL_180518A			05/18/18 12:08	
pH, sat. paste	7.30	s.u.	0.10	97	90	110			
Method: ASA10-3									Batch: ALK180517
Lab ID: B18050864-046A DUP	Sample Duplicate				Run: SOIL PH METER 1_180517A			05/17/18 08:47	
Bicarbonate as HCO3	131	mg/L	4.0				10	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: B18050864-056A DUP	Sample Duplicate				Run: SOIL PH METER 1_180517A			05/17/18 08:47	
Bicarbonate as HCO3	219	mg/L	4.0				1.0	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: LCS-121470	Laboratory Control Sample				Run: SOIL PH METER 1_180517A			05/17/18 08:47	
Bicarbonate as HCO3	528	mg/L	4.0	101	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/22/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18050864

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: Calculation									Batch: R300364
Lab ID: B18050864-001A DUP	Sample Duplicate				Run: MISC-SOIL_180517A			05/17/18 10:11	
Sodium Adsorption Ratio (SAR)	0.120	unitless	0.010				8.0	30	
Lab ID: B18050864-011A DUP	Sample Duplicate				Run: MISC-SOIL_180517A			05/17/18 10:11	
Sodium Adsorption Ratio (SAR)	0.160	unitless	0.010				0.0	30	
Lab ID: B18050864-021A DUP	Sample Duplicate				Run: MISC-SOIL_180517A			05/17/18 10:11	
Sodium Adsorption Ratio (SAR)	0.110	unitless	0.010				0.0	30	
Lab ID: LCS-1805171011	Laboratory Control Sample				Run: MISC-SOIL_180517A			05/17/18 10:11	
Sodium Adsorption Ratio (SAR)	8.80	unitless	0.010	94	70	130			
Method: Calculation									Batch: R300535
Lab ID: B18050864-025A DUP	Sample Duplicate				Run: MISC-SOIL_180521A			05/21/18 10:28	
Sodium Adsorption Ratio (SAR)	0.170	unitless	0.010				0.0	30	
Lab ID: B18050864-035A DUP	Sample Duplicate				Run: MISC-SOIL_180521A			05/21/18 10:28	
Sodium Adsorption Ratio (SAR)	1.38	unitless	0.010				1.4	30	
Lab ID: B18050864-046A DUP	Sample Duplicate				Run: MISC-SOIL_180521A			05/21/18 10:28	
Sodium Adsorption Ratio (SAR)	1.14	unitless	0.010				2.7	30	
Lab ID: B18050864-056A DUP	Sample Duplicate				Run: MISC-SOIL_180521A			05/21/18 10:28	
Sodium Adsorption Ratio (SAR)	1.34	unitless	0.010				5.8	30	
Lab ID: LCS-1805211028	Laboratory Control Sample				Run: MISC-SOIL_180521A			05/21/18 10:28	
Sodium Adsorption Ratio (SAR)	7.94	unitless	0.010	85	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7									Analytical Run: ICP203-B_180514A	
Lab ID: ICV	6	Continuing Calibration Verification Standard							05/14/18 10:32	
Boron		2.54	mg/L	0.10	102	95	105			
Calcium		24.4	mg/L	1.0	98	95	105			
Lithium		1.28	mg/L	0.10	102	95	105			
Magnesium		25.0	mg/L	1.0	100	95	105			
Potassium		25.8	mg/L	1.0	103	95	105			
Sodium		26.0	mg/L	1.0	104	95	105			
Method: E200.7									Batch: 121258	
Lab ID: MB-121258	6	Method Blank				Run: ICP203-B_180514A			05/14/18 16:34	
Boron		ND	mg/L	0.02						
Calcium		ND	mg/L	0.09						
Lithium		ND	mg/L	0.007						
Magnesium		ND	mg/L	0.03						
Potassium		ND	mg/L	0.05						
Sodium		ND	mg/L	0.8						
Lab ID: LCS-121258	6	Laboratory Control Sample				Run: ICP203-B_180514A			05/14/18 16:38	
Boron		0.528	mg/L	0.10	106	85	115			
Calcium		26.0	mg/L	1.0	104	85	115			
Lithium		0.540	mg/L	0.10	108	85	115			
Magnesium		25.6	mg/L	1.0	103	85	115			
Potassium		27.7	mg/L	1.0	111	85	115			
Sodium		26.1	mg/L	1.0	104	85	115			
Lab ID: B18050775-001AMS3	6	Sample Matrix Spike				Run: ICP203-B_180514A			05/14/18 16:54	
Boron		0.716	mg/L	0.050	103	70	130			
Calcium		67.4	mg/L	1.0	103	70	130			
Lithium		0.587	mg/L	0.10	110	70	130			
Magnesium		38.3	mg/L	1.0	102	70	130			
Potassium		42.1	mg/L	1.0	112	70	130			
Sodium		141	mg/L	1.6		70	130			A
Lab ID: B18050775-001AMSD	6	Sample Matrix Spike Duplicate				Run: ICP203-B_180514A			05/14/18 16:58	
Boron		0.708	mg/L	0.050	101	70	130	1.2	20	
Calcium		68.3	mg/L	1.0	106	70	130	1.3	20	
Lithium		0.575	mg/L	0.10	108	70	130	2.1	20	
Magnesium		37.6	mg/L	1.0	99	70	130	1.6	20	
Potassium		41.5	mg/L	1.0	109	70	130	1.4	20	
Sodium		140	mg/L	1.6		70	130	0.6	20	A

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/30/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8										Analytical Run: ICPMS206-B_180511A
Lab ID: QCS	3	Initial Calibration Verification Standard								05/11/18 12:11
Arsenic		0.0512	mg/L	0.0050	102	90	110			
Molybdenum		0.0474	mg/L	0.0050	95	90	110			
Selenium		0.0516	mg/L	0.0050	103	90	110			
Method: E200.8										Batch: 121258
Lab ID: MB-121258	3	Method Blank				Run: ICPMS206-B_180511A				05/11/18 16:31
Arsenic		ND	mg/L	0.0001						
Molybdenum		ND	mg/L	0.00006						
Selenium		ND	mg/L	0.0002						
Lab ID: LCS-121258	3	Laboratory Control Sample				Run: ICPMS206-B_180511A				05/11/18 16:36
Arsenic		0.540	mg/L	0.0010	108	85	115			
Molybdenum		0.509	mg/L	0.0050	102	85	115			
Selenium		0.535	mg/L	0.0050	107	85	115			
Lab ID: B18050775-001AMS3	3	Sample Matrix Spike				Run: ICPMS206-B_180511A				05/11/18 16:45
Arsenic		0.553	mg/L	0.0010	109	70	130			
Molybdenum		0.492	mg/L	0.0010	97	70	130			
Selenium		0.544	mg/L	0.0011	104	70	130			
Lab ID: B18050775-001AMSD	3	Sample Matrix Spike Duplicate				Run: ICPMS206-B_180511A				05/11/18 16:49
Arsenic		0.559	mg/L	0.0010	110	70	130	1.0	20	
Molybdenum		0.512	mg/L	0.0010	100	70	130	3.8	20	
Selenium		0.552	mg/L	0.0011	106	70	130	1.6	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8									Analytical Run: ICPMS207-B_180510A	
Lab ID: QCS	9	Initial Calibration Verification Standard							05/10/18 15:38	
Antimony		0.0472	mg/L	0.050	94	90	110			
Barium		0.0494	mg/L	0.10	99	90	110			
Beryllium		0.0247	mg/L	0.0010	99	90	110			
Cadmium		0.0247	mg/L	0.0010	99	90	110			
Chromium		0.0494	mg/L	0.010	99	90	110			
Cobalt		0.0499	mg/L	0.010	100	90	110			
Lead		0.0488	mg/L	0.010	98	90	110			
Manganese		0.249	mg/L	0.010	100	90	110			
Thallium		0.0484	mg/L	0.10	97	90	110			
Method: E200.8									Batch: 121258	
Lab ID: MB-121258	9	Method Blank				Run: ICPMS207-B_180510A			05/11/18 00:19	
Antimony		0.002	mg/L	0.0004						
Barium		0.0003	mg/L	0.00009						
Beryllium		ND	mg/L	0.0001						
Cadmium		ND	mg/L	0.00005						
Chromium		ND	mg/L	0.0002						
Cobalt		0.0003	mg/L	0.00004						
Lead		0.0004	mg/L	0.00008						
Manganese		0.0002	mg/L	0.0001						
Thallium		0.0005	mg/L	0.00005						
Lab ID: LCS-121258	9	Laboratory Control Sample				Run: ICPMS207-B_180510A			05/11/18 00:22	
Antimony		0.501	mg/L	0.0010	100	85	115			
Barium		0.476	mg/L	0.050	95	85	115			
Beryllium		0.248	mg/L	0.0010	99	85	115			
Cadmium		0.233	mg/L	0.0010	93	85	115			
Chromium		0.530	mg/L	0.0050	106	85	115			
Cobalt		0.489	mg/L	0.0050	98	85	115			
Lead		0.519	mg/L	0.0010	104	85	115			
Manganese		2.55	mg/L	0.0010	102	85	115			
Thallium		0.526	mg/L	0.00050	105	85	115			
Lab ID: B18050906-002AMS3	9	Sample Matrix Spike				Run: ICPMS207-B_180510A			05/11/18 01:32	
Antimony		0.462	mg/L	0.0010	92	70	130			
Barium		0.496	mg/L	0.050	89	70	130			
Beryllium		0.229	mg/L	0.0010	92	70	130			
Cadmium		0.215	mg/L	0.0010	86	70	130			
Chromium		0.482	mg/L	0.0050	96	70	130			
Cobalt		0.447	mg/L	0.0050	89	70	130			
Lead		0.488	mg/L	0.0010	96	70	130			
Manganese		2.48	mg/L	0.0010	93	70	130			
Thallium		0.487	mg/L	0.00050	97	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **E200.8**										Batch: 121258
Lab ID: **B18050906-002AMSD**	9	Sample Matrix Spike Duplicate				Run: ICPMS207-B_180510A				05/11/18 01:34
Antimony		0.452	mg/L	0.0010	90	70	130	2.0	20	
Barium		0.484	mg/L	0.050	86	70	130	2.5	20	
Beryllium		0.228	mg/L	0.0010	91	70	130	0.4	20	
Cadmium		0.213	mg/L	0.0010	85	70	130	1.1	20	
Chromium		0.517	mg/L	0.0050	103	70	130	7.0	20	
Cobalt		0.441	mg/L	0.0050	88	70	130	1.4	20	
Lead		0.480	mg/L	0.0010	95	70	130	1.7	20	
Manganese		2.68	mg/L	0.0010	101	70	130	7.6	20	
Thallium		0.478	mg/L	0.00050	96	70	130	1.8	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **E245.1**									Analytical Run: HGCV202-B_180514A	
Lab ID: **ICV**		Initial Calibration Verification Standard							05/14/18 13:30	
Mercury		0.00218	mg/L	0.00010	109	90	110			
Method: **E245.1**									Batch: 121308	
Lab ID: **MB-121308**		Method Blank				Run: HGCV202-B_180514A			05/14/18 14:21	
Mercury		ND	mg/L	0.00005						
Lab ID: **LCS-121308**		Laboratory Control Sample				Run: HGCV202-B_180514A			05/14/18 14:22	
Mercury		0.00223	mg/L	0.00010	112	85	115			
Lab ID: **B18050902-005CMS**		Sample Matrix Spike				Run: HGCV202-B_180514A			05/14/18 15:05	
Mercury		0.00215	mg/L	0.00010	107	70	130			
Lab ID: **B18050902-005CMSD**		Sample Matrix Spike Duplicate				Run: HGCV202-B_180514A			05/14/18 15:06	
Mercury		0.00214	mg/L	0.00010	107	70	130	0.1	30	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Analytical Run: ICP203-B_180515A	
Lab ID: ICSA	3	Interference Check Sample A							05/15/18 10:32	
Beryllium		0.0000500	mg/L	0.010						
Boron		0.0541	mg/L	0.10						
Lithium		0.00541	mg/L	0.10						
Lab ID: QCS	3	Initial Calibration Verification Standard							05/15/18 11:04	
Beryllium		0.397	mg/L	0.010	99	90	110			
Boron		0.820	mg/L	0.10	103	90	110			
Lithium		0.797	mg/L	0.10	100	90	110			
Lab ID: ICSAB	3	Interference Check Sample AB							05/15/18 11:08	
Beryllium		0.428	mg/L	0.010	86	80	120			
Boron		1.02	mg/L	0.10	102	80	120			
Lithium		0.921	mg/L	0.10	92	80	120			
Method: SW6010B									Batch: 121273	
Lab ID: MB-121273	3	Method Blank				Run: ICP203-B_180515A			05/15/18 21:13	
Beryllium		ND	mg/kg	0.03						
Boron		ND	mg/kg	1						
Lithium		ND	mg/kg	0.8						
Lab ID: SRM3-121273	3	Standard Reference Material				Run: ICP203-B_180515A			05/15/18 21:17	
Beryllium		73.2	mg/kg	1.0	88	76	108			
Boron		104	mg/kg	1.0	80	59	106			
Lithium		94.3	mg/kg	5.0	94	80	120			
Lab ID: B18050864-023ADIL	3	Serial Dilution				Run: ICP203-B_180515A			05/15/18 23:10	
Beryllium		0.969	mg/kg	1.0					10	N
Boron		5.60	mg/kg	4.9					10	N
Lithium		10.2	mg/kg	24					10	N
Lab ID: B18050864-023APDS	3	Post Digestion/Distillation Spike				Run: ICP203-B_180515A			05/15/18 23:14	
Beryllium		23.1	mg/kg	1.0	89	75	125			
Boron		43.5	mg/kg	1.0	75	75	125			
Lithium		67.7	mg/kg	5.0	118	75	125			
Lab ID: B18050864-023AMS3	3	Sample Matrix Spike				Run: ICP203-B_180515A			05/15/18 23:19	
Beryllium		19.9	mg/kg	1.0	77	75	125			
Boron		48.4	mg/kg	1.0	87	75	125			
Lithium		58.2	mg/kg	4.9	100	75	125			
Lab ID: B18050864-023AMSD	3	Sample Matrix Spike Duplicate				Run: ICP203-B_180515A			05/15/18 23:23	
Beryllium		19.4	mg/kg	1.0	75	75	125	2.5	20	
Boron		47.7	mg/kg	1.0	85	75	125	1.4	20	
Lithium		55.6	mg/kg	4.9	95	75	125	4.5	20	
Method: SW6010B									Batch: 121328	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Batch: 121328	
Lab ID: MB-121328	2	Method Blank				Run: ICP203-B_180515A			05/15/18 23:28	
Boron		ND	mg/kg	1						
Lithium		ND	mg/kg	0.8						
Lab ID: SRM3-121328	2	Standard Reference Material				Run: ICP203-B_180515A			05/15/18 23:32	
Boron		99.7	mg/kg	1.0	77	59	106			
Lithium		95.6	mg/kg	4.9	96	80	120			
Lab ID: B18050864-044ADIL	2	Serial Dilution				Run: ICP203-B_180515A			05/16/18 01:46	
Boron		17.7	mg/kg	5.0					10	N
Lithium		10.9	mg/kg	24					10	N
Lab ID: B18050864-044APDS	2	Post Digestion/Distillation Spike				Run: ICP203-B_180515A			05/16/18 01:49	
Boron		63.6	mg/kg	1.0	92	75	125			
Lithium		58.0	mg/kg	5.0	96	75	125			
Lab ID: B18050864-044AMS3	2	Sample Matrix Spike				Run: ICP203-B_180515A			05/16/18 01:54	
Boron		53.9	mg/kg	1.0	75	75	125			
Lithium		49.7	mg/kg	4.9	81	75	125			
Lab ID: B18050864-044AMSD	2	Sample Matrix Spike Duplicate				Run: ICP203-B_180515A			05/16/18 01:58	
Boron		60.3	mg/kg	1.0	88	75	125	11	20	
Lithium		54.5	mg/kg	4.9	91	75	125	9.2	20	
Method: SW6010B									Batch: 121329	
Lab ID: MB-121329	3	Method Blank				Run: ICP203-B_180515A			05/16/18 02:10	
Beryllium		ND	mg/kg	0.03						
Boron		ND	mg/kg	1						
Lithium		ND	mg/kg	0.8						
Lab ID: SRM3-121329	3	Standard Reference Material				Run: ICP203-B_180515A			05/16/18 02:14	
Beryllium		70.3	mg/kg	1.0	84	76	108			
Boron		102	mg/kg	1.0	79	59	106			
Lithium		87.3	mg/kg	4.9	87	80	120			
Lab ID: B18050864-063ADIL	3	Serial Dilution				Run: ICP203-B_180515A			05/16/18 03:54	
Beryllium		0.458	mg/kg	1.0					10	N
Boron		27.1	mg/kg	4.9					10	N
Lithium		13.7	mg/kg	24					10	N
Lab ID: B18050864-063APDS	3	Post Digestion/Distillation Spike				Run: ICP203-B_180515A			05/16/18 03:58	
Beryllium		18.7	mg/kg	1.0	74	75	125			S
Boron		69.3	mg/kg	1.0	87	75	125			
Lithium		58.7	mg/kg	5.0	93	75	125			
Lab ID: B18050864-063AMS3	3	Sample Matrix Spike				Run: ICP203-B_180515A			05/16/18 04:02	
Beryllium		18.8	mg/kg	1.0	76	75	125			
Boron		72.7	mg/kg	1.0	96	75	125			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/30/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **SW6010B**										Batch: 121329
Lab ID: **B18050864-063AMS3**	3	Sample Matrix Spike				Run: ICP203-B_180515A				05/16/18 04:02
Lithium		59.6	mg/kg	4.8	98	75	125			
Lab ID: **B18050864-063AMSD**	3	Sample Matrix Spike Duplicate				Run: ICP203-B_180515A				05/16/18 04:07
Beryllium		18.6	mg/kg	1.0	75	75	125	1.0	20	
Boron		73.5	mg/kg	1.0	98	75	125	1.0	20	
Lithium		59.5	mg/kg	4.8	98	75	125	0.2	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Analytical Run: ICP203-B_180516A	
Lab ID: QCS	4	Initial Calibration Verification Standard							05/16/18 11:00	
Calcium		38.9	mg/L	1.0	97	90	110			
Magnesium		38.9	mg/L	1.0	97	90	110			
Potassium		39.7	mg/L	1.0	99	90	110			
Sodium		39.8	mg/L	1.0	99	90	110			
Lab ID: ICSA	4	Interference Check Sample A							05/16/18 11:03	
Calcium		466	mg/L	1.0	93	80	120			
Magnesium		443	mg/L	1.0	89	80	120			
Potassium		-0.0265	mg/L	1.0						
Sodium		-0.103	mg/L	1.0						
Lab ID: ICSAB	4	Interference Check Sample AB							05/16/18 11:08	
Calcium		458	mg/L	1.0	92	80	120			
Magnesium		437	mg/L	1.0	87	80	120			
Potassium		18.8	mg/L	1.0	94	80	120			
Sodium		18.8	mg/L	1.0	94	80	120			
Method: SW6010B									Batch: 121432	
Lab ID: MB-121432	4	Method Blank				Run: ICP203-B_180516A			05/16/18 18:15	
Calcium, sat. paste		ND	meq/L	0.004						
Magnesium, sat. paste		ND	meq/L	0.003						
Potassium, sat. paste		ND	meq/L	0.004						
Sodium, sat. paste		ND	meq/L	0.006						
Lab ID: LCS-121432	4	Laboratory Control Sample				Run: ICP203-B_180516A			05/16/18 18:19	
Calcium, sat. paste		12.0	meq/L	0.050	103	70	130			
Magnesium, sat. paste		7.77	meq/L	0.082	107	70	130			
Potassium, sat. paste		2.13	meq/L	0.026	89	70	130			
Sodium, sat. paste		27.4	meq/L	0.043	94	70	130			
Lab ID: B18050864-001A DUP	4	Sample Duplicate				Run: ICP203-B_180516A			05/16/18 18:26	
Calcium, sat. paste		6.08	meq/L	0.050				5.3	30	
Magnesium, sat. paste		4.11	meq/L	0.082				4.9	30	
Potassium, sat. paste		1.10	meq/L	0.026				4.7	30	
Sodium, sat. paste		0.280	meq/L	0.043				2.6	30	
Lab ID: B18050864-002AMS2	4	Sample Matrix Spike				Run: ICP203-B_180516A			05/16/18 18:42	
Calcium, sat. paste		41.0	meq/L	0.050	90	70	130			
Magnesium, sat. paste		45.6	meq/L	0.082	95	70	130			
Potassium, sat. paste		6.96	meq/L	0.026	103	70	130			
Sodium, sat. paste		13.7	meq/L	0.043	104	70	130			
Lab ID: B18050864-011A DUP	4	Sample Duplicate				Run: ICP203-B_180516A			05/16/18 19:29	
Calcium, sat. paste		2.46	meq/L	0.050				1.0	30	
Magnesium, sat. paste		3.48	meq/L	0.082				0.2	30	
Potassium, sat. paste		0.287	meq/L	0.026				1.3	30	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/30/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B										Batch: 121432
Lab ID: B18050864-011A DUP	4	Sample Duplicate				Run: ICP203-B_180516A				05/16/18 19:29
Sodium, sat. paste		0.274	meq/L	0.043				1.6	30	
Lab ID: B18050864-012AMS2	4	Sample Matrix Spike				Run: ICP203-B_180516A				05/16/18 19:37
Calcium, sat. paste		41.9	meq/L	0.050	118	70	130			
Magnesium, sat. paste		39.5	meq/L	0.082	113	70	130			
Potassium, sat. paste		7.22	meq/L	0.026	108	70	130			
Sodium, sat. paste		12.9	meq/L	0.043	114	70	130			
Lab ID: B18050864-021A DUP	4	Sample Duplicate				Run: ICP203-B_180516A				05/16/18 20:24
Calcium, sat. paste		4.20	meq/L	0.050				2.0	30	
Magnesium, sat. paste		2.26	meq/L	0.082				2.5	30	
Potassium, sat. paste		0.408	meq/L	0.026				2.7	30	
Sodium, sat. paste		0.193	meq/L	0.043				6.7	30	
Lab ID: B18050864-022AMS2	4	Sample Matrix Spike				Run: ICP203-B_180516A				05/16/18 20:32
Calcium, sat. paste		7.96	meq/L	0.050	109	70	130			
Magnesium, sat. paste		10.4	meq/L	0.082	101	70	130			
Potassium, sat. paste		2.56	meq/L	0.026	94	70	130			
Sodium, sat. paste		4.32	meq/L	0.043	92	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Analytical Run: ICP203-B_180517A	
Lab ID: QCS	3	Initial Calibration Verification Standard							05/17/18 11:46	
Beryllium		0.385	mg/L	0.010	96	90	110			
Boron		0.803	mg/L	0.10	100	90	110			
Lithium		0.775	mg/L	0.10	97	90	110			
Lab ID: ICSA	3	Interference Check Sample A							05/17/18 11:50	
Beryllium		0.0000300	mg/L	0.010						
Boron		0.0344	mg/L	0.10						
Lithium		0.00518	mg/L	0.10						
Lab ID: ICSAB	3	Interference Check Sample AB							05/17/18 12:08	
Beryllium		0.411	mg/L	0.010	82	80	120			
Boron		1.01	mg/L	0.10	101	80	120			
Lithium		0.930	mg/L	0.10	93	80	120			
Method: SW6010B									Batch: 121260	
Lab ID: MB-121260	3	Method Blank				Run: ICP203-B_180517A			05/17/18 15:27	
Beryllium		ND	mg/kg	0.03						
Boron		ND	mg/kg	1						
Lithium		ND	mg/kg	0.8						
Lab ID: SRM3-121260	3	Standard Reference Material				Run: ICP203-B_180517A			05/17/18 15:31	
Beryllium		67.4	mg/kg	1.0	81	76	108			
Boron		101	mg/kg	1.0	78	59	106			
Lithium		85.3	mg/kg	4.9	85	80	120			
Lab ID: B18050721-017ADIL	3	Serial Dilution				Run: ICP203-B_180517A			05/17/18 15:39	
Beryllium		0.626	mg/kg-dry	1.0					10	N
Boron		9.97	mg/kg-dry	6.7					10	N
Lithium		12.7	mg/kg-dry	33					10	N
Lab ID: B18050721-017APDS	3	Post Digestion/Distillation Spike				Run: ICP203-B_180517A			05/17/18 15:43	
Beryllium		26.6	mg/kg-dry	1.0	77	75	125			
Boron		67.3	mg/kg-dry	1.4	85	75	125			
Lithium		74.0	mg/kg-dry	6.8	92	75	125			
Lab ID: B18050721-017MS3	3	Sample Matrix Spike				Run: ICP203-B_180517A			05/17/18 15:47	
Beryllium		26.4	mg/kg-dry	1.7	80	75	125			
Boron		72.3	mg/kg-dry	66	96	75	125			
Lithium		75.6	mg/kg-dry	330	98	75	125			
Lab ID: B18050721-017MSD3	3	Sample Matrix Spike Duplicate				Run: ICP203-B_180517A			05/17/18 15:51	
Beryllium		26.5	mg/kg-dry	1.7	79	75	125	0.3	20	
Boron		73.2	mg/kg-dry	67	96	75	125	1.3	20	
Lithium		77.2	mg/kg-dry	330	100	75	125		20	
Method: SW6010B									Batch: 121273	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/30/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B										Batch: 121273
Lab ID: MB-121273	2	Method Blank				Run: ICP203-B_180517A				05/17/18 14:03
Boron		ND	mg/kg	1						
Lithium		ND	mg/kg	0.8						
Method: SW6010B										Batch: 121328
Lab ID: MB-121328	2	Method Blank				Run: ICP203-B_180517A				05/17/18 14:58
Boron		ND	mg/kg	1						
Lithium		ND	mg/kg	0.8						
Method: SW6010B										Batch: 121329
Lab ID: MB-121329	3	Method Blank				Run: ICP203-B_180517A				05/17/18 13:07
Beryllium		ND	mg/kg	0.03						
Boron		ND	mg/kg	1						
Lithium		ND	mg/kg	0.8						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Analytical Run: ICP203-B_180518A	
Lab ID: QCS	4	Initial Calibration Verification Standard							05/18/18 11:18	
Calcium		38.6	mg/L	1.0	97	90	110			
Magnesium		39.5	mg/L	1.0	99	90	110			
Potassium		39.9	mg/L	1.0	100	90	110			
Sodium		40.2	mg/L	1.0	101	90	110			
Lab ID: ICSA	4	Interference Check Sample A							05/18/18 11:22	
Calcium		480	mg/L	1.0	96	80	120			
Magnesium		448	mg/L	1.0	90	80	120			
Potassium		0.00888	mg/L	1.0						
Sodium		-0.0365	mg/L	1.0						
Lab ID: ICSAB	4	Interference Check Sample AB							05/18/18 11:26	
Calcium		469	mg/L	1.0	94	80	120			
Magnesium		442	mg/L	1.0	88	80	120			
Potassium		19.4	mg/L	1.0	97	80	120			
Sodium		19.3	mg/L	1.0	97	80	120			
Method: SW6010B									Batch: 121470	
Lab ID: MB-121470	4	Method Blank				Run: ICP203-B_180518A			05/18/18 13:40	
Calcium, sat. paste		0.007	meq/L	0.004						
Magnesium, sat. paste		ND	meq/L	0.003						
Potassium, sat. paste		ND	meq/L	0.004						
Sodium, sat. paste		ND	meq/L	0.006						
Lab ID: LCS-121470	4	Laboratory Control Sample				Run: ICP203-B_180518A			05/18/18 13:44	
Calcium, sat. paste		14.1	meq/L	0.050	122	70	130			
Magnesium, sat. paste		7.89	meq/L	0.082	108	70	130			
Potassium, sat. paste		2.07	meq/L	0.026	86	70	130			
Sodium, sat. paste		26.3	meq/L	0.043	91	70	130			
Lab ID: B18050864-025A DUP	4	Sample Duplicate				Run: ICP203-B_180518A			05/18/18 13:52	
Calcium, sat. paste		3.14	meq/L	0.050				1.4	30	
Magnesium, sat. paste		1.71	meq/L	0.082				1.2	30	
Potassium, sat. paste		0.459	meq/L	0.026				2.8	30	
Sodium, sat. paste		0.272	meq/L	0.043				2.0	30	
Lab ID: B18050864-026AMS2	4	Sample Matrix Spike				Run: ICP203-B_180518A			05/18/18 13:59	
Calcium, sat. paste		9.54	meq/L	0.050	107	70	130			
Magnesium, sat. paste		11.2	meq/L	0.082	123	70	130			
Potassium, sat. paste		3.36	meq/L	0.026	121	70	130			
Sodium, sat. paste		6.24	meq/L	0.043	130	70	130			
Lab ID: B18050864-035A DUP	4	Sample Duplicate				Run: ICP203-B_180518A			05/18/18 15:44	
Calcium, sat. paste		25.4	meq/L	0.050				3.5	30	
Magnesium, sat. paste		31.2	meq/L	0.082				2.3	30	
Potassium, sat. paste		1.21	meq/L	0.026				2.0	30	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B										Batch: 121470
Lab ID: B18050864-035A DUP	4	Sample Duplicate				Run: ICP203-B_180518A				05/18/18 15:44
Sodium, sat. paste		7.37	meq/L	0.043				2.2	30	
Lab ID: B18050864-036AMS2	4	Sample Matrix Spike				Run: ICP203-B_180518A				05/18/18 15:52
Calcium, sat. paste		11.2	meq/L	0.050	93	70	130			
Magnesium, sat. paste		14.8	meq/L	0.082	95	70	130			
Potassium, sat. paste		3.39	meq/L	0.026	103	70	130			
Sodium, sat. paste		5.32	meq/L	0.043	101	70	130			
Lab ID: B18050864-046A DUP	4	Sample Duplicate				Run: ICP203-B_180518A				05/18/18 16:39
Calcium, sat. paste		23.1	meq/L	0.050				2.0	30	
Magnesium, sat. paste		48.1	meq/L	0.082				3.0	30	
Potassium, sat. paste		1.08	meq/L	0.026				2.4	30	
Sodium, sat. paste		6.79	meq/L	0.043				1.2	30	
Lab ID: B18050864-047AMS2	4	Sample Matrix Spike				Run: ICP203-B_180518A				05/18/18 16:47
Calcium, sat. paste		31.7	meq/L	0.050	102	70	130			
Magnesium, sat. paste		61.2	meq/L	0.082	97	70	130			
Potassium, sat. paste		7.60	meq/L	0.026	109	70	130			
Sodium, sat. paste		18.6	meq/L	0.044	104	70	130			
Lab ID: B18050864-026AMS2	4	Sample Matrix Spike				Run: ICP203-B_180518A				05/18/18 16:55
Calcium		163	mg/L	1.0	101	70	130			
Magnesium		113	mg/L	1.0	99	70	130			
Potassium		115	mg/L	1.0	103	70	130			
Sodium		115	mg/L	1.0	103	70	130			
Lab ID: B18050864-056A DUP	4	Sample Duplicate				Run: ICP203-B_180518A				05/18/18 17:42
Calcium, sat. paste		21.3	meq/L	0.050				20	30	
Magnesium, sat. paste		27.4	meq/L	0.082				21	30	
Potassium, sat. paste		0.698	meq/L	0.026				19	30	
Sodium, sat. paste		6.62	meq/L	0.043				16	30	
Lab ID: B18050864-057AMS2	4	Sample Matrix Spike				Run: ICP203-B_180518A				05/18/18 17:50
Calcium, sat. paste		60.3	meq/L	0.050	112	70	130			
Magnesium, sat. paste		119	meq/L	0.082	125	70	130			
Potassium, sat. paste		18.0	meq/L	0.038	123	70	130			
Sodium, sat. paste		46.5	meq/L	0.088	130	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Analytical Run: ICPMS206-B_180511A	
Lab ID: QCS	10	Initial Calibration Verification Standard								05/11/18 12:11
Antimony		0.0513	mg/L	0.0010	103	90	110			
Arsenic		0.0512	mg/L	0.0010	102	90	110			
Barium		0.0538	mg/L	0.0010	108	90	110			
Cadmium		0.0264	mg/L	0.0010	106	90	110			
Chromium		0.0515	mg/L	0.0010	103	90	110			
Cobalt		0.0535	mg/L	0.0010	107	90	110			
Manganese		0.260	mg/L	0.0010	104	90	110			
Molybdenum		0.0474	mg/L	0.0010	95	90	110			
Selenium		0.0516	mg/L	0.0010	103	90	110			
Thallium		0.0507	mg/L	0.0010	101	90	110			
Lab ID: ICSA	10	Interference Check Sample A								05/11/18 12:38
Antimony		0.000351	mg/L	0.0010						
Arsenic		6.41E-06	mg/L	0.0010						
Barium		0.000102	mg/L	0.0010						
Cadmium		0.0000647	mg/L	0.0010						
Chromium		0.000996	mg/L	0.0010						
Cobalt		0.000145	mg/L	0.0010						
Manganese		0.000245	mg/L	0.0010						
Molybdenum		0.763	mg/L	0.0010	95	80	120			
Selenium		0.000176	mg/L	0.0010						
Thallium		0.000249	mg/L	0.0010						
Lab ID: ICSAB	10	Interference Check Sample AB								05/11/18 12:42
Antimony		0.000127	mg/L	0.0010						
Arsenic		0.0101	mg/L	0.0010	101	70	130			
Barium		0.0000770	mg/L	0.0010						
Cadmium		0.0102	mg/L	0.0010	102	70	130			
Chromium		0.0210	mg/L	0.0010	105	70	130			
Cobalt		0.0204	mg/L	0.0010	102	70	130			
Manganese		0.0203	mg/L	0.0010	101	70	130			
Molybdenum		0.755	mg/L	0.0010	94	70	130			
Selenium		0.00994	mg/L	0.0010	99	70	130			
Thallium		0.0000941	mg/L	0.0010						
Method: SW6020										Batch: 121260
Lab ID: MB-121260	9	Method Blank				Run: ICPMS206-B_180511A				05/12/18 08:21
Antimony		ND	mg/kg	0.08						
Arsenic		ND	mg/kg	0.6						
Barium		ND	mg/kg	0.1						
Cadmium		ND	mg/kg	0.03						
Chromium		ND	mg/kg	0.2						
Cobalt		ND	mg/kg	0.03						
Manganese		ND	mg/kg	0.4						
Molybdenum		0.04	mg/kg	0.04						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Batch: 121260	
Lab ID: MB-121260	9	Method Blank				Run: ICPMS206-B_180511A			05/12/18 08:21	
Thallium		ND	mg/kg	0.01						
Lab ID: SRM3-121260	9	Standard Reference Material				Run: ICPMS206-B_180511A			05/12/18 08:26	
Antimony		82.3	mg/kg	1.0	34	0	120			
Arsenic		161	mg/kg	1.6	82	71	120			
Barium		176	mg/kg	1.0	94	78	120			
Cadmium		93.7	mg/kg	1.0	95	73.2	120			
Chromium		103	mg/kg	1.0	88	73	120			
Cobalt		108	mg/kg	1.0	100	74	120			
Manganese		397	mg/kg	1.0	92	80	120			
Molybdenum		103	mg/kg	1.0	81	66	120			
Thallium		100	mg/kg	1.0	101	71	120			
Lab ID: B18050721-017ADIL	9	Serial Dilution				Run: ICPMS206-B_180511A			05/12/18 09:38	
Antimony		ND	mg/kg	1.0					10	
Arsenic		ND	mg/kg	8.0					10	
Barium		144	mg/kg	1.6				25	10	R
Cadmium		ND	mg/kg	1.0					10	
Chromium		13.5	mg/kg	2.4					10	N
Cobalt		5.90	mg/kg	1.0				25	10	R
Manganese		315	mg/kg	5.2				25	10	R
Molybdenum		0.601	mg/kg	1.0					10	N
Thallium		0.198	mg/kg	1.0					10	N
Lab ID: B18050721-017APDS1	9	Post Digestion/Distillation Spike				Run: ICPMS206-B_180511A			05/12/18 09:43	
Antimony		11.9	mg/kg	1.0	94	75	125			
Arsenic		17.4	mg/kg	1.6	81	75	125			
Barium		149	mg/kg	1.0		75	125			A
Cadmium		12.5	mg/kg	1.0	97	75	125			
Chromium		24.9	mg/kg	1.0	57	75	125			S
Cobalt		17.7	mg/kg	1.0	80	75	125			
Manganese		309	mg/kg	1.1		75	125			A
Molybdenum		12.3	mg/kg	1.0	92	75	125			
Thallium		14.2	mg/kg	1.0	111	75	125			
Lab ID: B18050721-017AMS3	9	Sample Matrix Spike				Run: ICPMS206-B_180511A			05/12/18 09:56	
Antimony		17.7	mg/kg	1.0	36	75	125			S
Arsenic		50.9	mg/kg	1.6	89	75	125			
Barium		198	mg/kg	1.0	26	75	125			S
Cadmium		23.7	mg/kg	1.0	96	75	125			
Chromium		62.4	mg/kg	1.0	91	75	125			
Cobalt		51.0	mg/kg	1.0	88	75	125			
Manganese		508	mg/kg	1.0	42	75	125			S
Molybdenum		39.2	mg/kg	1.0	78	75	125			
Thallium		49.6	mg/kg	1.0	100	75	125			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **SW6020**									Batch: 121260	
Lab ID: **B18050721-017AMSD**	9	Sample Matrix Spike Duplicate				Run: ICPMS206-B_180511A			05/12/18 10:01	
Antimony		20.7	mg/kg	1.0	42	75	125	16	20	S
Arsenic		53.3	mg/kg	1.6	93	75	125	4.5	20	
Barium		225	mg/kg	1.0	80	75	125	13	20	
Cadmium		24.8	mg/kg	1.0	99	75	125	4.6	20	
Chromium		65.9	mg/kg	1.0	97	75	125	5.4	20	
Cobalt		54.0	mg/kg	1.0	93	75	125	5.8	20	
Manganese		560	mg/kg	1.0	62	75	125	9.7	20	S
Molybdenum		45.3	mg/kg	1.0	90	75	125	14	20	
Thallium		54.6	mg/kg	1.0	109	75	125	9.6	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Analytical Run: ICPMS206-B_180514A	
Lab ID: QCS	3	Initial Calibration Verification Standard							05/14/18 12:25	
Lead		0.0500	mg/L	0.0010	100	90	110			
Selenium		0.0511	mg/L	0.0010	102	90	110			
Thallium		0.0513	mg/L	0.0010	103	90	110			
Lab ID: ICSA	3	Interference Check Sample A							05/14/18 12:52	
Lead		0.000202	mg/L	0.0010						
Selenium		0.000254	mg/L	0.0010						
Thallium		0.000159	mg/L	0.0010						
Lab ID: ICSAB	3	Interference Check Sample AB							05/14/18 12:57	
Lead		0.000193	mg/L	0.0010						
Selenium		0.00966	mg/L	0.0010	97	70	130			
Thallium		0.0000706	mg/L	0.0010						
Method: SW6020									Batch: 121260	
Lab ID: MB-121260	3	Method Blank				Run: ICPMS206-B_180514A			05/15/18 07:09	
Lead		ND	mg/kg	0.2						
Selenium		ND	mg/kg	0.5						
Thallium		0.02	mg/kg	0.006						
Lab ID: SRM3-121260	3	Standard Reference Material				Run: ICPMS206-B_180514A			05/15/18 07:14	
Lead		109	mg/kg	1.0	104	74	120			
Selenium		198	mg/kg	1.0	97	71	120			
Thallium		104	mg/kg	1.0	105	71	120			
Lab ID: B18050721-017ADIL	3	Serial Dilution				Run: ICPMS206-B_180514A			05/15/18 07:23	
Lead		9.43	mg/kg-dry	1.4					10	N
Selenium		ND	mg/kg-dry	3.4					10	
Thallium		0.609	mg/kg-dry	1.0					10	
Lab ID: B18050721-017APDS1	3	Post Digestion/Distillation Spike				Run: ICPMS206-B_180514A			05/15/18 07:27	
Lead		12.8	mg/kg-dry	1.0	100	75	125			
Selenium		3.68	mg/kg-dry	1.0	110	75	125			
Thallium		3.75	mg/kg-dry	1.0	95	75	125			
Lab ID: B18050721-017AMS3	3	Sample Matrix Spike				Run: ICPMS206-B_180514A			05/15/18 07:32	
Lead		79.4	mg/kg-dry	1.0	107	75	125			
Selenium		65.6	mg/kg-dry	1.0	101	75	125			
Thallium		71.1	mg/kg-dry	1.0	108	75	125			
Lab ID: B18050721-017AMSD	3	Sample Matrix Spike Duplicate				Run: ICPMS206-B_180514A			05/15/18 07:36	
Lead		83.3	mg/kg-dry	1.0	112	75	125	4.8	20	
Selenium		68.6	mg/kg-dry	1.0	104	75	125	4.4	20	
Thallium		73.7	mg/kg-dry	1.0	111	75	125	3.5	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Analytical Run: ICPMS206-B_180515A	
Lab ID: QCS	5	Initial Calibration Verification Standard							05/15/18 12:44	
Arsenic		0.0495	mg/L	0.0010	99	90	110			
Beryllium		0.0254	mg/L	0.0010	102	90	110			
Lead		0.0503	mg/L	0.0010	101	90	110			
Molybdenum		0.0459	mg/L	0.0010	92	90	110			
Selenium		0.0508	mg/L	0.0010	102	90	110			
Lab ID: ICSA	5	Interference Check Sample A							05/15/18 13:11	
Arsenic		-0.000119	mg/L	0.0010						
Beryllium		-0.000141	mg/L	0.0010						
Lead		0.000189	mg/L	0.0010						
Molybdenum		0.724	mg/L	0.0010	91	80	120			
Selenium		0.0000936	mg/L	0.0010						
Lab ID: ICSAB	5	Interference Check Sample AB							05/15/18 13:16	
Arsenic		0.00961	mg/L	0.0010	96	70	130			
Beryllium		-0.000155	mg/L	0.0010						
Lead		0.000180	mg/L	0.0010						
Molybdenum		0.713	mg/L	0.0010	89	70	130			
Selenium		0.00981	mg/L	0.0010	98	70	130			
Method: SW6020									Batch: 121273	
Lab ID: MB-121273	2	Method Blank				Run: ICPMS206-B_180515A			05/16/18 02:53	
Beryllium		ND	mg/kg	0.01						
Lead		ND	mg/kg	0.2						
Lab ID: B18050864-023ADIL	2	Serial Dilution				Run: ICPMS206-B_180515A			05/16/18 03:33	
Beryllium		20.3	mg/kg	1.0					10	
Lead		72.6	mg/kg	1.1				90	10	R
Lab ID: B18050864-023APDS1	2	Post Digestion/Distillation Spike				Run: ICPMS206-B_180515A			05/16/18 03:38	
Beryllium		1.88	mg/kg	1.0	56	75	125			S
Lead		29.9	mg/kg	1.0		75	125			A
Lab ID: B18050864-023AMS3	2	Sample Matrix Spike				Run: ICPMS206-B_180515A			05/16/18 03:42	
Beryllium		14.3	mg/kg	1.0	56	75	125			S
Lead		73.8	mg/kg	1.0	94	75	125			
Lab ID: B18050864-023AMSD	2	Sample Matrix Spike Duplicate				Run: ICPMS206-B_180515A			05/16/18 03:46	
Beryllium		13.5	mg/kg	1.0	53	75	125	5.7	20	S
Lead		70.1	mg/kg	1.0	86	75	125	5.2	20	
Method: SW6020									Batch: 121328	
Lab ID: MB-121328	2	Method Blank				Run: ICPMS206-B_180515A			05/16/18 05:14	
Beryllium		ND	mg/kg	0.02						
Molybdenum		ND	mg/kg	0.04						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

R - RPD exceeds advisory limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020										Batch: 121328
Lab ID: SRM3-121328	2	Standard Reference Material				Run: ICPMS206-B_180515A			05/16/18 05:19	
Beryllium		69.4	mg/kg	1.0	83	76	108			
Molybdenum		114	mg/kg	1.0	90	66	104			
Lab ID: B18050864-044ADIL	2	Serial Dilution				Run: ICPMS206-B_180515A			05/16/18 07:12	
Beryllium		0.352	mg/kg	1.0					10	N
Molybdenum		1.34	mg/kg	1.0					10	N
Lab ID: B18050864-044APDS1	2	Post Digestion/Distillation Spike				Run: ICPMS206-B_180515A			05/16/18 07:17	
Beryllium		3.95	mg/kg	1.0	71	75	125			S
Molybdenum		6.09	mg/kg	1.0	95	75	125			
Lab ID: B18050864-044AMS3	2	Sample Matrix Spike				Run: ICPMS206-B_180515A			05/16/18 07:21	
Beryllium		18.0	mg/kg	1.0	72	75	125			S
Molybdenum		45.3	mg/kg	1.0	90	75	125			
Lab ID: B18050864-044AMSD	2	Sample Matrix Spike Duplicate				Run: ICPMS206-B_180515A			05/16/18 07:25	
Beryllium		16.9	mg/kg	1.0	68	75	125	6.4	20	S
Molybdenum		43.0	mg/kg	1.0	86	75	125	5.3	20	
Method: SW6020										Batch: 121329
Lab ID: MB-121329	3	Method Blank				Run: ICPMS206-B_180515A			05/16/18 07:30	
Arsenic		ND	mg/kg	0.6						
Molybdenum		0.04	mg/kg	0.04						
Selenium		ND	mg/kg	1						
Lab ID: SRM3-121329	3	Standard Reference Material				Run: ICPMS206-B_180515A			05/16/18 07:34	
Arsenic		164	mg/kg	1.0	84	71	105			
Molybdenum		111	mg/kg	1.0	88	66	104			
Selenium		198	mg/kg	1.0	97	71	111			
Lab ID: B18050864-063ADIL	3	Serial Dilution				Run: ICPMS206-B_180515A			05/16/18 09:23	
Arsenic		2.50	mg/kg	1.5					10	N
Molybdenum		0.620	mg/kg	1.0					10	N
Selenium		ND	mg/kg	2.5					10	
Lab ID: B18050864-063APDS1	3	Post Digestion/Distillation Spike				Run: ICPMS206-B_180515A			05/16/18 09:28	
Arsenic		7.46	mg/kg	1.0	94	75	125			
Molybdenum		5.17	mg/kg	1.0	91	75	125			
Selenium		5.02	mg/kg	1.0	102	75	125			
Lab ID: B18050864-063AMS3	3	Sample Matrix Spike				Run: ICPMS206-B_180515A			05/16/18 09:32	
Arsenic		47.8	mg/kg	1.0	93	75	125			
Molybdenum		40.0	mg/kg	1.0	81	75	125			
Selenium		46.8	mg/kg	1.0	97	75	125			
Lab ID: B18050864-063AMSD	3	Sample Matrix Spike Duplicate				Run: ICPMS206-B_180515A			05/16/18 09:46	
Arsenic		50.2	mg/kg	1.0	98	75	125	4.8	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020										Batch: 121329
Lab ID: B18050864-063AMSD	3	Sample Matrix Spike Duplicate				Run: ICPMS206-B_180515A				05/16/18 09:46
Molybdenum		40.9	mg/kg	1.0	83	75	125	2.4	20	
Selenium		47.6	mg/kg	1.0	99	75	125	1.7	20	
Method: SW6020										Analytical Run: ICPMS206-B_180517A
Lab ID: QCS		Initial Calibration Verification Standard								05/18/18 12:12
Lead		0.0481	mg/L	0.0010	96	90	110			
Lab ID: ICSA		Interference Check Sample A								05/18/18 12:16
Lead		0.000231	mg/L	0.0010						
Lab ID: ICSAB		Interference Check Sample AB								05/18/18 12:21
Lead		0.000223	mg/L	0.0010						
Method: SW6020										Batch: 121273
Lab ID: MB-121273		Method Blank				Run: ICPMS206-B_180517A				05/18/18 16:28
Lead		ND	mg/kg	0.4						
Lab ID: SRM3-121273		Standard Reference Material				Run: ICPMS206-B_180517A				05/18/18 17:05
Lead		94.2	mg/kg	1.0	90	74	120			
Lab ID: B18050864-023ADIL		Serial Dilution				Run: ICPMS206-B_180517A				05/18/18 17:41
Lead		25.7	mg/kg	2.1				1.2	10	
Lab ID: B18050864-023APDS1		Post Digestion/Distillation Spike				Run: ICPMS206-B_180517A				05/18/18 17:46
Lead		29.8	mg/kg	1.0		75	125			A
Lab ID: B18050864-023AMS3		Sample Matrix Spike				Run: ICPMS206-B_180517A				05/18/18 17:51
Lead		65.6	mg/kg	1.0	82	75	125			
Lab ID: B18050864-023AMSD		Sample Matrix Spike Duplicate				Run: ICPMS206-B_180517A				05/18/18 17:55
Lead		62.7	mg/kg	1.0	76	75	125	4.6	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Analytical Run: ICPMS207-B_180514A	
Lab ID: QCS	10	Initial Calibration Verification Standard								05/14/18 11:16
Antimony		0.0468	mg/L	0.0010	94	90	110			
Arsenic		0.0493	mg/L	0.0010	99	90	110			
Barium		0.0490	mg/L	0.0010	98	90	110			
Cadmium		0.0244	mg/L	0.0010	98	90	110			
Chromium		0.0498	mg/L	0.0010	100	90	110			
Cobalt		0.0497	mg/L	0.0010	99	90	110			
Lead		0.0481	mg/L	0.0010	96	90	110			
Manganese		0.250	mg/L	0.0010	100	90	110			
Selenium		0.0488	mg/L	0.0010	98	90	110			
Thallium		0.0487	mg/L	0.0010	97	90	110			
Lab ID: ICSA	10	Interference Check Sample A								05/14/18 11:33
Antimony		0.000269	mg/L	0.0010						
Arsenic		0.000995	mg/L	0.0010						
Barium		0.0000736	mg/L	0.0010						
Cadmium		0.0000548	mg/L	0.0010						
Chromium		0.000930	mg/L	0.0010						
Cobalt		0.0000730	mg/L	0.0010						
Lead		0.000137	mg/L	0.0010						
Manganese		0.000220	mg/L	0.0010						
Selenium		0.00224	mg/L	0.0010						
Thallium		0.000117	mg/L	0.0010						
Lab ID: ICSAB	10	Interference Check Sample AB								05/14/18 11:36
Antimony		-0.000121	mg/L	0.0010						
Arsenic		0.0102	mg/L	0.0010	102	70	130			
Barium		0.0000601	mg/L	0.0010						
Cadmium		0.00915	mg/L	0.0010	91	70	130			
Chromium		0.0204	mg/L	0.0010	102	70	130			
Cobalt		0.0215	mg/L	0.0010	107	70	130			
Lead		0.000107	mg/L	0.0010						
Manganese		0.0198	mg/L	0.0010	99	70	130			
Selenium		0.00972	mg/L	0.0010	97	70	130			
Thallium		-2.53E-06	mg/L	0.0010						
Method: SW6020										Batch: 121328
Lab ID: MB-121328	10	Method Blank				Run: ICPMS207-B_180514A				05/14/18 21:53
Antimony		ND	mg/kg	0.04						
Arsenic		ND	mg/kg	0.3						
Barium		ND	mg/kg	0.06						
Cadmium		ND	mg/kg	0.01						
Chromium		ND	mg/kg	0.10						
Cobalt		0.01	mg/kg	0.01						
Lead		ND	mg/kg	0.2						
Manganese		ND	mg/kg	0.2						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020										Batch: 121328
Lab ID: MB-121328	10	Method Blank				Run: ICPMS207-B_180514A				05/14/18 21:53
Selenium		ND	mg/kg	0.5						
Thallium		0.01	mg/kg	0.006						
Lab ID: SRM3-121328	10	Standard Reference Material				Run: ICPMS207-B_180514A				05/14/18 21:56
Antimony		86.1	mg/kg	1.0	36	0	120			
Arsenic		167	mg/kg	1.0	85	71	120			
Barium		160	mg/kg	1.0	86	78	120			
Cadmium		84.1	mg/kg	1.0	85	73.2	120			
Chromium		111	mg/kg	1.0	95	73	120			
Cobalt		102	mg/kg	1.0	95	74	120			
Lead		105	mg/kg	1.0	100	74	120			
Manganese		415	mg/kg	1.0	96	80	120			
Selenium		202	mg/kg	1.0	99	71	120			
Thallium		91.9	mg/kg	1.0	93	71	120			
Lab ID: B18050864-044ADIL	10	Serial Dilution				Run: ICPMS207-B_180514A				05/14/18 23:08
Antimony		ND	mg/kg	1.0					10	
Arsenic		3.44	mg/kg	1.6					10	N
Barium		184	mg/kg	1.0				2.9	10	
Cadmium		0.0701	mg/kg	1.0					10	N
Chromium		12.7	mg/kg	1.0				3.3	10	
Cobalt		4.29	mg/kg	1.0				0.6	10	
Lead		7.19	mg/kg	1.1					10	N
Manganese		116	mg/kg	1.0				4.8	10	
Selenium		ND	mg/kg	2.5					10	
Thallium		0.108	mg/kg	1.0					10	N
Lab ID: B18050864-044APDS1	10	Post Digestion/Distillation Spike				Run: ICPMS207-B_180514A				05/14/18 23:11
Antimony		2.49	mg/kg	1.0	93	75	125			
Arsenic		6.07	mg/kg	1.0	105	75	125			
Barium		192	mg/kg	1.0		75	125			A
Cadmium		2.46	mg/kg	1.0	97	75	125			
Chromium		15.5	mg/kg	1.0		75	125			A
Cobalt		6.39	mg/kg	1.0	83	75	125			
Lead		10.1	mg/kg	1.0	102	75	125			
Manganese		125	mg/kg	1.0		75	125			A
Selenium		2.65	mg/kg	1.0	107	75	125			
Thallium		2.55	mg/kg	1.0	98	75	125			
Lab ID: B18050864-044AMS3	10	Sample Matrix Spike				Run: ICPMS207-B_180514A				05/14/18 23:14
Antimony		17.9	mg/kg	1.0	36	75	125			S
Arsenic		45.6	mg/kg	1.0	86	75	125			
Barium		168	mg/kg	1.0	-42	75	125			S
Cadmium		18.1	mg/kg	1.0	74	75	125			S
Chromium		57.8	mg/kg	1.0	92	75	125			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020										Batch: 121328
Lab ID: B18050864-044AMS3	10	Sample Matrix Spike				Run: ICPMS207-B_180514A				05/14/18 23:14
Cobalt		40.1	mg/kg	1.0	73	75	125			S
Lead		46.8	mg/kg	1.0	81	75	125			
Manganese		325	mg/kg	1.0	83	75	125			
Selenium		41.9	mg/kg	1.0	86	75	125			
Thallium		42.5	mg/kg	1.0	87	75	125			
Lab ID: B18050864-044AMSD	10	Sample Matrix Spike Duplicate				Run: ICPMS207-B_180514A				05/14/18 23:16
Antimony		20.7	mg/kg	1.0	42	75	125	15	20	S
Arsenic		53.0	mg/kg	1.0	102	75	125	15	20	
Barium		225	mg/kg	1.0	75	75	125	29	20	R
Cadmium		20.7	mg/kg	1.0	85	75	125	13	20	
Chromium		67.9	mg/kg	1.0	113	75	125	16	20	
Cobalt		46.9	mg/kg	1.0	88	75	125	16	20	
Lead		54.3	mg/kg	1.0	96	75	125	15	20	
Manganese		393	mg/kg	1.0	112	75	125	19	20	
Selenium		47.4	mg/kg	1.0	98	75	125	12	20	
Thallium		47.9	mg/kg	1.0	98	75	125	12	20	
Method: SW6020										Batch: 121329
Lab ID: MB-121329	10	Method Blank				Run: ICPMS207-B_180514A				05/14/18 23:18
Antimony		0.2	mg/kg	0.04						
Arsenic		0.5	mg/kg	0.3						
Barium		0.1	mg/kg	0.06						
Cadmium		ND	mg/kg	0.01						
Chromium		ND	mg/kg	0.10						
Cobalt		0.02	mg/kg	0.01						
Lead		ND	mg/kg	0.2						
Manganese		ND	mg/kg	0.2						
Selenium		0.5	mg/kg	0.5						
Thallium		0.08	mg/kg	0.006						
Lab ID: SRM3-121329	10	Standard Reference Material				Run: ICPMS207-B_180514A				05/14/18 23:21
Antimony		88.3	mg/kg	1.0	37	0	120			
Arsenic		178	mg/kg	1.0	91	71	120			
Barium		166	mg/kg	1.0	89	78	120			
Cadmium		86.3	mg/kg	1.0	87	73.2	120			
Chromium		116	mg/kg	1.0	99	73	120			
Cobalt		104	mg/kg	1.0	96	74	120			
Lead		102	mg/kg	1.0	97	74	120			
Manganese		429	mg/kg	1.0	99	80	120			
Selenium		207	mg/kg	1.0	101	71	120			
Thallium		94.8	mg/kg	1.0	96	71	120			
Lab ID: B18050864-063ADIL	10	Serial Dilution				Run: ICPMS207-B_180514A				05/15/18 00:31
Antimony		ND	mg/kg	1.0					10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

R - RPD exceeds advisory limit.

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Batch: 121329	
Lab ID: B18050864-063ADIL	10	Serial Dilution				Run: ICPMS207-B_180514A			05/15/18 00:31	
Arsenic		3.12	mg/kg	1.5					10	N
Barium		48.0	mg/kg	1.0				5.2	10	
Cadmium		0.0743	mg/kg	1.0					10	N
Chromium		16.1	mg/kg	1.0				2.4	10	
Cobalt		7.91	mg/kg	1.0				7.1	10	
Lead		11.9	mg/kg	1.1				5.0	10	
Manganese		139	mg/kg	1.0				3.2	10	
Selenium		ND	mg/kg	2.5					10	
Thallium		0.0804	mg/kg	1.0					10	N
Lab ID: B18050864-063APDS1	10	Post Digestion/Distillation Spike				Run: ICPMS207-B_180514A			05/15/18 00:34	
Antimony		2.38	mg/kg	1.0	92	75	125			
Arsenic		5.61	mg/kg	1.0	102	75	125			
Barium		47.1	mg/kg	1.0		75	125			A
Cadmium		2.40	mg/kg	1.0	95	75	125			
Chromium		18.8	mg/kg	1.0		75	125			A
Cobalt		9.54	mg/kg	1.0	88	75	125			
Lead		14.8	mg/kg	1.0		75	125			A
Manganese		144	mg/kg	1.0		75	125			A
Selenium		2.65	mg/kg	1.0	108	75	125			
Thallium		2.51	mg/kg	1.0	98	75	125			
Lab ID: B18050864-063AMS3	10	Sample Matrix Spike				Run: ICPMS207-B_180514A			05/15/18 00:37	
Antimony		18.1	mg/kg	1.0	37	75	125			S
Arsenic		53.2	mg/kg	1.0	103	75	125			
Barium		138	mg/kg	1.0	192	75	125			S
Cadmium		20.6	mg/kg	1.0	85	75	125			
Chromium		72.7	mg/kg	1.0	116	75	125			
Cobalt		49.4	mg/kg	1.0	87	75	125			
Lead		58.8	mg/kg	1.0	96	75	125			
Manganese		401	mg/kg	1.0	106	75	125			
Selenium		47.8	mg/kg	1.0	99	75	125			
Thallium		47.4	mg/kg	1.0	98	75	125			
Lab ID: B18050864-063AMSD	10	Sample Matrix Spike Duplicate				Run: ICPMS207-B_180514A			05/15/18 00:45	
Antimony		18.6	mg/kg	1.0	38	75	125	3.0	20	S
Arsenic		53.7	mg/kg	1.0	105	75	125	1.0	20	
Barium		174	mg/kg	1.0	267	75	125	23	20	SR
Cadmium		20.2	mg/kg	1.0	83	75	125	2.2	20	
Chromium		68.1	mg/kg	1.0	107	75	125	6.5	20	
Cobalt		48.3	mg/kg	1.0	85	75	125	2.2	20	
Lead		56.8	mg/kg	1.0	92	75	125	3.4	20	
Manganese		427	mg/kg	1.0	118	75	125	6.4	20	
Selenium		47.0	mg/kg	1.0	97	75	125	1.7	20	
Thallium		45.8	mg/kg	1.0	95	75	125	3.3	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/30/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **SW6020**										Batch: 121329
Lab ID: **B18050864-063AMSD**	10	Sample Matrix Spike Duplicate				Run: ICPMS207-B_180514A				05/15/18 00:45

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC **Report Date:** 05/30/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill **Work Order:** B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW7471B									Analytical Run: HGCV202-B_180515A	
Lab ID: ICV		Initial Calibration Verification Standard							05/15/18 09:32	
Mercury		0.00200	mg/kg	1.0	100	90	110			
Method: SW7471B									Batch: 121336	
Lab ID: MB-121336		Method Blank				Run: HGCV202-B_180515A			05/15/18 13:17	
Mercury		ND	mg/kg	0.005						
Lab ID: LCS3-121336		Laboratory Control Sample				Run: HGCV202-B_180515A			05/15/18 13:19	
Mercury		0.206	mg/kg	1.0	103	80	120			
Lab ID: B18050864-020ADIL		Serial Dilution				Run: HGCV202-B_180515A			05/15/18 13:59	
Mercury		ND	mg/kg	1.0					10	
Lab ID: B18050864-020AMS3		Sample Matrix Spike				Run: HGCV202-B_180515A			05/15/18 14:00	
Mercury		0.226	mg/kg	1.0	106	80	120			
Lab ID: B18050864-020AMSD		Sample Matrix Spike Duplicate				Run: HGCV202-B_180515A			05/15/18 14:02	
Mercury		0.231	mg/kg	1.0	109	80	120		20	
Method: SW7471B									Batch: 121354	
Lab ID: MB-121354		Method Blank				Run: HGCV202-B_180515A			05/15/18 10:50	
Mercury		ND	mg/kg	0.005						
Lab ID: LCS3-121354		Laboratory Control Sample				Run: HGCV202-B_180515A			05/15/18 10:52	
Mercury		0.211	mg/kg	1.0	106	80	120			
Lab ID: B18050864-039ADIL		Serial Dilution				Run: HGCV202-B_180515A			05/15/18 11:32	
Mercury		ND	mg/kg	1.0					10	
Lab ID: B18050864-039AMS3		Sample Matrix Spike				Run: HGCV202-B_180515A			05/15/18 11:33	
Mercury		0.219	mg/kg	1.0	99	80	120			
Lab ID: B18050864-039AMSD		Sample Matrix Spike Duplicate				Run: HGCV202-B_180515A			05/15/18 11:35	
Mercury		0.224	mg/kg	1.0	101	80	120		20	
Method: SW7471B									Batch: 121368	
Lab ID: MB-121368		Method Blank				Run: HGCV202-B_180515A			05/15/18 15:06	
Mercury		ND	mg/kg	0.005						
Lab ID: LCS3-121368		Laboratory Control Sample				Run: HGCV202-B_180515A			05/15/18 15:08	
Mercury		0.216	mg/kg	1.0	108	80	120			
Lab ID: B18050864-060ADIL		Serial Dilution				Run: HGCV202-B_180515A			05/15/18 16:00	
Mercury		ND	mg/kg	1.0					10	
Lab ID: B18050864-060AMS3		Sample Matrix Spike				Run: HGCV202-B_180515A			05/15/18 16:01	
Mercury		0.228	mg/kg	1.0	102	80	120			
Lab ID: B18050864-060AMSD		Sample Matrix Spike Duplicate				Run: HGCV202-B_180515A			05/15/18 16:03	
Mercury		0.232	mg/kg	1.0	103	80	120		20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/30/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18050864

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW7471B										Batch: 121368
Lab ID: B18050864-060AMSD	Sample Matrix Spike Duplicate					Run: HGCV202-B_180515A				05/15/18 16:03
Method: SW7471B										Analytical Run: HGCV202-B_180517A
Lab ID: ICV	Initial Calibration Verification Standard									05/17/18 12:26
Mercury		0.00199	mg/kg	1.0	99	90	110			
Method: SW7471B										Batch: 121462
Lab ID: MB-121462	Method Blank					Run: HGCV202-B_180517A				05/17/18 12:31
Mercury		ND	mg/kg	0.005						
Lab ID: LCS3-121462	Laboratory Control Sample					Run: HGCV202-B_180517A				05/17/18 12:33
Mercury		0.210	mg/kg	1.0	105	80	120			
Lab ID: B18050647-017ADIL	Serial Dilution					Run: HGCV202-B_180517A				05/17/18 13:07
Mercury		0.0421	mg/kg-dry	1.0					10	
Lab ID: B18050647-017AMS3	Sample Matrix Spike					Run: HGCV202-B_180517A				05/17/18 13:09
Mercury		0.332	mg/kg-dry	1.0	106	80	120			
Lab ID: B18050647-017AMSD	Sample Matrix Spike Duplicate					Run: HGCV202-B_180517A				05/17/18 13:10
Mercury		0.332	mg/kg-dry	1.0	105	80	120		20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Talen Energy Supply LLC
Report Date: 06/06/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18050864

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0									Batch: 51672
Lab ID: MB-51672	Method Blank				Run: G542M_180524E				06/05/18 12:49
Radium 226	0.006	pCi/g-dry							U
Radium 226 precision (±)	0.006	pCi/g-dry							
Radium 226 MDC	0.009	pCi/g-dry							
Lab ID: LCS1-51672	Laboratory Control Sample				Run: G542M_180524E				06/05/18 12:49
Radium 226	2.1	pCi/g-dry		84	67	120			
Lab ID: B18050864-054AMS1	Sample Matrix Spike				Run: G542M_180524E				06/05/18 12:49
Radium 226	2.0	pCi/g-dry		68	70	130			S
Lab ID: B18050864-054AMSD1	Sample Matrix Spike Duplicate				Run: G542M_180524E				06/05/18 12:49
Radium 226	2.3	pCi/g-dry		80	70	130	14	20	
Method: E903.0									Batch: 51656
Lab ID: LCS1-51656	Laboratory Control Sample				Run: G542M-2_180518A				05/29/18 14:43
Radium 226	2.4	pCi/g-dry		96	67	120			
Lab ID: MB-51656	Method Blank				Run: G542M-2_180518A				05/29/18 14:43
Radium 226	0.008	pCi/g-dry							
Radium 226 precision (±)	0.006	pCi/g-dry							
Radium 226 MDC	0.008	pCi/g-dry							
Lab ID: B18050864-001AMS1	Sample Matrix Spike				Run: G542M-2_180518A				05/29/18 14:43
Radium 226	2.6	pCi/g-dry		82	70	130			
Lab ID: B18050864-001AMSD1	Sample Matrix Spike Duplicate				Run: G542M-2_180518A				05/29/18 14:43
Radium 226	2.3	pCi/g-dry		73	70	130	8.7	20	
Method: E903.0									Batch: 51657
Lab ID: MB-51657	Method Blank				Run: G542M-2_180521A				06/04/18 13:32
Radium 226	0.006	pCi/g-dry							
Radium 226 precision (±)	0.005	pCi/g-dry							
Radium 226 MDC	0.006	pCi/g-dry							
Lab ID: LCS1-51657	Laboratory Control Sample				Run: G542M-2_180521A				06/04/18 13:32
Radium 226	2.0	pCi/g-dry		81	67	120			
Lab ID: B18050864-021AMS1	Sample Matrix Spike				Run: G542M-2_180521A				06/04/18 13:32
Radium 226	2.2	pCi/g-dry		77	70	130			
Lab ID: B18050864-021AMS1D	Sample Matrix Spike Duplicate				Run: G542M-2_180521A				06/04/18 13:32
Radium 226	1.8	pCi/g-dry		58	70	130	22	20	SR

- For all R qualified analytes the RERs are less than the limit of 2.0.

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
S - Spike recovery outside of advisory limits.
ND - Not detected at the reporting limit.
R - RPD exceeds advisory limit.
U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Talen Energy Supply LLC
Report Date: 06/06/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18050864

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0									Batch: 51657
Lab ID: B18050864-021AMS1	Sample Matrix Spike				Run: G542M-2_180521B				06/05/18 17:06
Radium 226	2.2	pCi/g-dry		76	70	130			
Method: E903.0									Batch: 51671
Lab ID: MB-51671	Method Blank				Run: G542M-2_180524B				06/05/18 10:43
Radium 226	0.01	pCi/g-dry							
Radium 226 precision (±)	0.007	pCi/g-dry							
Radium 226 MDC	0.008	pCi/g-dry							
Lab ID: LCS1-51671	Laboratory Control Sample				Run: G542M-2_180524B				06/05/18 10:43
Radium 226	2.2	pCi/g-dry		90	67	120			
Lab ID: B18050864-035AMS1	Sample Matrix Spike				Run: G542M-2_180524B				06/05/18 10:43
Radium 226	2.6	pCi/g-dry		83	70	130			
Lab ID: B18050864-035AMSD1	Sample Matrix Spike Duplicate				Run: G542M-2_180524B				06/05/18 10:43
Radium 226	2.3	pCi/g-dry		70	70	130	12	20	
Method: E903.0									Batch: RA226-8935
Lab ID: LCS-RA226-8935	Laboratory Control Sample				Run: TENNELEC-3_180517D				05/28/18 11:35
Radium 226	10	pCi/L		99	80	120			
Lab ID: MB-RA226-8935	Method Blank				Run: TENNELEC-3_180517D				05/28/18 11:35
Radium 226	0.1	pCi/L							U
Radium 226 precision (±)	0.1	pCi/L							
Radium 226 MDC	0.2	pCi/L							
Lab ID: C18050486-022DMS	Sample Matrix Spike				Run: TENNELEC-3_180517D				05/28/18 11:35
Radium 226	27	pCi/L		119	70	130			
Lab ID: C18050486-022DMSD	Sample Matrix Spike Duplicate				Run: TENNELEC-3_180517D				05/28/18 11:35
Radium 226	22	pCi/L		98	70	130	19	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Talen Energy Supply LLC
Report Date: 06/06/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18050864

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: RA-05									Batch: RA228-5776
Lab ID: LCS-228-RA226-8935	Laboratory Control Sample				Run: TENNELEC-3_180517A				05/23/18 07:51
Radium 228	8.8	pCi/L		87	80	120			
Lab ID: MB-RA226-8935	Method Blank				Run: TENNELEC-3_180517A				05/23/18 07:51
Radium 228	0.8	pCi/L							U
Radium 228 precision (±)	0.8	pCi/L							
Radium 228 MDC	1	pCi/L							
Lab ID: B18050864-042CMS	Sample Matrix Spike				Run: TENNELEC-3_180517A				05/23/18 07:51
Radium 228	18	pCi/L		85	70	130			
Lab ID: B18050864-042CMSD	Sample Matrix Spike Duplicate				Run: TENNELEC-3_180517A				05/23/18 07:51
Radium 228	19	pCi/L		91	70	130	5.8	20	
Method: RA-05									Batch: 51656
Lab ID: MB-51656	Method Blank				Run: TENNELEC-3_180518A				05/24/18 12:25
Radium 228	0.1	pCi/g-dry							
Radium 228 precision (±)	0.04	pCi/g-dry							
Radium 228 MDC	0.06	pCi/g-dry							
Lab ID: LCS4-51656	Laboratory Control Sample				Run: TENNELEC-3_180518A				05/24/18 13:57
Radium 228	1.9	pCi/g-dry		82	80	120			
Lab ID: B18050864-002AMS4	Sample Matrix Spike				Run: TENNELEC-3_180518A				05/24/18 13:57
Radium 228	2.1	pCi/g-dry		71	70	130			
Lab ID: B18050864-002AMS4D	Sample Matrix Spike Duplicate				Run: TENNELEC-3_180518A				05/24/18 13:57
Radium 228	2.1	pCi/g-dry		70	70	130	0.3	20	
Method: RA-05									Batch: 51657
Lab ID: MB-51657	Method Blank				Run: TENNELEC-3_180521B				05/29/18 10:29
Radium 228	0.08	pCi/g-dry							
Radium 228 precision (±)	0.04	pCi/g-dry							
Radium 228 MDC	0.07	pCi/g-dry							
Lab ID: LCS4-51657	Laboratory Control Sample				Run: TENNELEC-3_180521B				05/29/18 12:02
Radium 228	2.3	pCi/g-dry		94	80	120			
Lab ID: B18050864-022AMS4	Sample Matrix Spike				Run: TENNELEC-3_180521B				05/29/18 12:02
Radium 228	2.6	pCi/g-dry		74	70	130			
Lab ID: B18050864-022AMS4D	Sample Matrix Spike Duplicate				Run: TENNELEC-3_180521B				05/29/18 12:02
Radium 228	2.6	pCi/g-dry		73	70	130	1.4	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Talen Energy Supply LLC
Report Date: 06/06/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18050864

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: RA-05									Batch: 51672
Lab ID: MB-51672	Method Blank				Run: TENNELEC-3_180524B				05/31/18 14:47
Radium 228	0.07	pCi/g-dry							U
Radium 228 precision (±)	0.05	pCi/g-dry							
Radium 228 MDC	0.08	pCi/g-dry							
Lab ID: LCS4-51672	Laboratory Control Sample				Run: TENNELEC-3_180524B				05/31/18 16:33
Radium 228	2.2	pCi/g-dry		94	80	120			
Lab ID: B18050864-055AMS4	Sample Matrix Spike				Run: TENNELEC-3_180524B				05/31/18 16:33
Radium 228	2.9	pCi/g-dry		89	70	130			
Lab ID: B18050864-055AMS4D	Sample Matrix Spike Duplicate				Run: TENNELEC-3_180524B				05/31/18 16:33
Radium 228	2.7	pCi/g-dry		84	70	130	5.4	20	
Method: RA-05									Batch: 51671
Lab ID: MB-51671	Method Blank				Run: TENNELEC-3_180524C				05/31/18 11:33
Radium 228	0.003	pCi/g-dry							U
Radium 228 precision (±)	0.04	pCi/g-dry							
Radium 228 MDC	0.07	pCi/g-dry							
Lab ID: LCS4-51671	Laboratory Control Sample				Run: TENNELEC-3_180524C				05/31/18 13:12
Radium 228	2.1	pCi/g-dry		95	80	120			
Lab ID: B18050864-037AMS4	Sample Matrix Spike				Run: TENNELEC-3_180524C				05/31/18 13:12
Radium 228	2.3	pCi/g-dry		86	70	130			
Lab ID: B18050864-037AMS4D	Sample Matrix Spike Duplicate				Run: TENNELEC-3_180524C				05/31/18 13:12
Radium 228	2.5	pCi/g-dry		93	70	130	6.2	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

Work Order Receipt Checklist

Talen Energy Supply LLC

B18050864

Login completed by: Richard L. Shular
Date Received: 5/8/2018
Reviewed by: BL2000\raschim
Received by: snk
Reviewed Date: 5/10/2018
Carrier name: Courier

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☑	No ☐	Not Applicable ☐
Container/Temp Blank temperature:	°C		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	Not Applicable ☐

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Contact and Corrective Action Comments:

The Temperature Blank temperature for shipping container 1 was 1.0°C on ice, shipping container 2 was 20.2°C, shipping container 3 was 20.1°C, shipping container 4 was 19.6°C , shipping container 5 was 19.1°C, shipping container 6 was 17.4°C, and shipping container 7 was 18.2°C.

Chain of Custody and Analytical Request Record

PLEASE PRINT; provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name:
Hydrometrics, Inc.

Project Name, PWS#, Permit #, Etc.
Talen Montana, LLC – Soil Sampling at Historic Spills (12073.18 Task 400)

Report Mail Address:
Kordelle Stephenson
PO Box 38
Colstrip, MT 59323

Contact Name: Rich Labbe or Al Hilty
Voice: 656-1172
Fax: 656-8912
Email: ahilty@hydrometrics.com

Sampler Name if other than Contact:
John Bergin 690-8304
Garry Hoffman 671-8177

Invoice Address:
TALEN MONTANA, LLC; ATTN: A.P. GENTW13
P.O. Box 25223
Lehigh Valley, PA 18002-5223

Invoice Contact & Phone #:
Kordelle Stephenson
406-748-5364

Purchase Order #:
Ariba #21057984
Contract #622268-04

ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐
Other ____
Special Report Formats – ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☐
Other ____
EDD/EDT ☐ Format ____

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments:
Please email copy of sample results to Jenny Vanek Hydrometrics jvanek@hydrometrics.com and to Kordelle Stephenson Talen Montana kordelle.stephenson@talenenergy.com

Receipt Temp ____ ° C
Cooler ID(s) ____
Custody Seal Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air, Water Soils/Solids, Vegetation, Bioassay Other)	EC, pH	HCO3 Bromide, CO3 Ca, Chloride, Fluoride, Magnesium, K	SAR, Sodium Sulfate	Antimony, Ar, Barium, Beryllium, Boron, Cadmium, Chromium	Cobalt, Lead, Manganese, Mercury, Selenium, Thallium, Lithium	Molybdenum	Radium 226 and Radium 228			SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	LAB ID
TLN-1805- 001	5/7/18	1005	1 Soil	X	X	X	X	X	X	X			X	X		1805086 4-001
TLN-1805- 002	5-7-18	1010	1 Soil	X	X	X	X	X	X	X			X	X		-002
TLN-1805- 003	5-7-18	1020	1 Soil	X	X	X	X	X	X	X			X	X		-003
TLN-1805- 004	5-7-18	1025	1 Soil	X	X	X	X	X	X	X			X	X		-004
TLN-1805- 005	5-7-18	1030	1 Soil	X	X	X	X	X	X	X			X	X		-005
TLN-1805- 006	5-7-18	1045	1 Soil	X	X	X	X	X	X	X			X	X		-006
TLN-1805- 007	5-7-18	1050	1 Soil	X	X	X	X	X	X	X			X	X		-007
TLN-1805- 008	5-7-18	1055	1 Soil	X	X	X	X	X	X	X			X	X		-008
TLN-1805- 009	5-7-18	1110	1 Soil	X	X	X	X	X	X	X			X	X		-009
TLN-1805- 010	5-7-18	1115	1 Soil	X	X	X	X	X	X	X			X	X		-010
TLN-1805- 011	5-7-18	1120	1 Soil	X	X	X	X	X	X	X			X	X		-011

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by: John Bergin Date/Time: 5/9/18 1430 Shipped by:
Relinquished by: Date/Time: Shipped by;
Sample Disposal: Return to Client ☐ Lab Disposal ☐

Received by: Date/Time:
Received by: Sarah Kirch Date/Time: 5-8-18 14:3
LABORATORY USE ONLY
Sample Type ____ # of fractions ____

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Report Mail Address: **Kordelle Stephenson** **PO Box 38** **Colstrip, MT 59323**	Contact Name: Rich Labbe or Al Hilty Voice: 656-1172 Fax: 656-8912 Email: ahilty@hydrometrics.com
Sampler Name if other than Contact: John Bergin 690-8304 Garry Hoffman 671-8177	
Invoice Address: **TALEN MONTANA, LLC**; ATTN: A.P. GENTW13 P.O. Box 25223 Lehigh Valley, PA 18002-5223	Invoice Contact & Phone #: Kordelle Stephenson 406-748-5364
Purchase Order #: **Ariba #21057984** **Contract #622268-04**	ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____

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NELAC ☐ A2LA ☐ Level IV ☐ Other ____

EDD/EDT ☐ Format ____

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Receipt Temp ____ ° C

Cooler ID(s) ____

Custody Seal Y N
Intact Y N
Signature Y N
Match

SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air, Water Soils/Solids, Vegetation, Bioassay Other)	EC, pH	HCO3,Bromide, CO3,Ca, Chloride, Fluoride, Magnesium, K	SAR, Sodium Sulfate	Antimony, Ar, Barium, Beryllium, Boron, Cadmium, Chromium	Cobalt, Lead, Manganese, Mercury, Selenium, Thallium, Lithium	Molybdenum	Radium 226 and Radium 228			SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	LAB ID
TLN-1805- 012	5/7/18	1130	1 Soil	X	X	X	X	X	X	X			X	X		B18050864-012
TLN-1805- 013	5-7-18	1135	1 Soil	X	X	X	X	X	X	X			X	X		-013
TLN-1805- 014	5-7-18	1140	1 Soil	X	X	X	X	X	X	X			X	X		-014
TLN-1805- 015	5-7-18	1305	1 Soil	X	X	X	X	X	X	X			X	X		-015
TLN-1805- 016	5-7-18	1310	1 Soil	X	X	X	X	X	X	X			X	X		-016
TLN-1805- 017	5-7-18	1315	1 Soil	X	X	X	X	X	X	X			X	X		-017
TLN-1805- 018	5-7-18	1345	1 Soil	X	X	X	X	X	X	X			X	X		-018
TLN-1805- 019	5-7-18	1350	1 Soil	X	X	X	X	X	X	X			X	X		-019
TLN-1805- 020	5-7-18	1355	1 Soil	X	X	X	X	X	X	X			X	X		-020
TLN-1805- 021	5-7-18	1405	1 Soil	X	X	X	X	X	X	X			X	X		-021
TLN-1805- 022	5-7-18	1415	1 Soil	X	X	X	X	X	X	X			X	X		-022

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by: [signature] Date/Time: 5/8/18 1420 Shipped by:

Relinquished by: Date/Time: Shipped by:

Sample Disposal: Return to Client ☐ Lab Disposal ☐

Received by: Date/Time:

Received by: Sarah Kuch Date/Time: 5-8-18 14:30

LABORATORY USE ONLY

Sample Type ____ # of fractions ____

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Project Name, PWS#, Permit #, Etc.
Talen Montana, LLC – Soil Sampling at Historic Spills (12073.18 Task 400)

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Kordelle Stephenson
PO Box 38
Colstrip, MT 59323

Contact Name: Rich Labbe or Al Hilty
Voice: 656-1172
Fax: 656-8912
Email: ahilty@hydrometrics.com

Sampler Name if other than Contact:
John Bergin 690-8304
Garry Hoffman 671-8177

Invoice Address:
TALEN MONTANA, LLC; ATTN: A P. GENTW13
P.O. Box 25223
Lehigh Valley, PA 18002-5223

Invoice Contact & Phone #:
Kordelle Stephenson
406-748-5364

Purchase Order #:
Ariba #21057984
Contract #622268-04

ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐
Other _____
Special Report Formats – ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☐
Other _____
EDD/EDT ☐ Format _____

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments:
Please email copy of sample results to Jenny Vanek Hydrometrics jvanek@hydrometrics.com and to Kordelle Stephenson Talen Montana kordelle.stephenson@talenenergy.com

Receipt Temp _____ ° C
Cooler ID(s) _____
Custody Seal Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	Number of Containers / Sample Type: A W S V B O / Air, Water Soils/Solids, Vegetation, Bioassay Other / MATRIX	ANALYSIS REQUESTED: EC, pH	HCO3,Bromide, CO3,Ca, Chloride, Fluoride, Magnesium, K	SAR, Sodium Sulfate	Antimony, Ar, Barium, Beryllium, Boron, Cadmium, Chromium	Cobalt, Lead, Manganese, Mercury, Selenium, Thallium, Lithium	Molybdenum	Radium 226 and Radium 228			SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	LAB ID
TLN-1805- 023	5/7/18	1420	1 Soil	X	X	X	X	X	X	X			X	X		1805064-023
TLN-1805- 024	5-7-18	1410	1 Soil	X	X	X	X	X	X	X			X	X		-024
TLN-1805- 025	5-7-18	1430	1 Soil	X	X	X	X	X	X	X			X	X		-025
TLN-1805- 026	5-7-18	1435	1 Soil	X	X	X	X	X	X	X			X	X		-026
TLN-1805- 027	5-7-18	1445	1 Soil	X	X	X	X	X	X	X			X	X		-027
TLN-1805- 028	5-7-18	1450	1 Soil	X	X	X	X	X	X	X			X	X		-028
TLN-1805- 029	5-7-18	1455	1 Soil	X	X	X	X	X	X	X			X	X		-029
TLN-1805- 030	5-7-18	1510	1 Soil	X	X	X	X	X	X	X			X	X		-030
TLN-1805- 031	5-7-18	1515	1 Soil	X	X	X	X	X	X	X			X	X		-031
TLN-1805- 032	5-7-18	1525	1 Soil	X	X	X	X	X	X	X			X	X		-032
TLN-1805- 033	5-7-18	1530	1 Soil	X	X	X	X	X	X	X			X	X		-033

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by: [signature] Date/Time: 5/8/18 1430 Shipped by:

Relinquished by: [signature] Date/Time: Shipped by:

Sample Disposal: Return to Client ☐ Lab Disposal ☐

Received by: Date/Time:

Received by: [signature] Date/Time: 5-8-18 14:30

LABORATORY USE ONLY
Sample Type _____ # of fractions _____

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Report Mail Address: **Kordelle Stephenson** **PO Box 38** **Colstrip, MT 59323**	Contact Name: Rich Labbe or Al Hilty Voice: 656-1172 Fax: 656-8912 Email: ahilty@hydrometrics.com
Sampler Name if other than Contact: John Bergin 690-8304 Garry Hoffman 671-8177	
Invoice Address: **TALEN MONTANA, LLC**; ATTN: A.P. GENTW13 P.O. Box 25223 Lehigh Valley, PA 18002-5223	Invoice Contact & Phone #: Kordelle Stephenson 406-748-5364
Purchase Order #: **Ariba #21057984** **Contract #622268-04**	ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐
Other ____
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Other ____
EDD/EDT ☐ Format ____

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

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Receipt Temp ____ °C
Cooler ID(s) ____
Custody Seal Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air, Water, Soils/Solids, Vegetation, Bioassay, Other)	EC, pH	HCO3, Bromide, CO3, Ca, Chloride, Fluoride, Magnesium, K	SAR, Sodium Sulfate	Antimony, Ar, Barium, Beryllium, Boron, Cadmium, Chromium	Cobalt, Lead, Manganese, Mercury, Selenium, Thallium, Lithium	Molybdenum	Radium 226 and Radium 228			SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)		LAB ID
TLN-1805- 034	5/7/18	1535	1 Soil	X	X	X	X	X	X	X			X	X			1805086 4-034
TLN-1805- 035	5-7-18	1540	1 Soil	X	X	X	X	X	X	X			X	X			-035
TLN-1805- 036	5-7-18	1555	1 Soil	X	X	X	X	X	X	X			X	X			-036
TLN-1805- 037	5-7-18	1600	1 Soil	X	X	X	X	X	X	X			X	X			-037
TLN-1805- 038	5-7-18	1615	1 Soil	X	X	X	X	X	X	X			X	X			-038
TLN-1805- 039	5-7-18	1620	1 Soil	X	X	X	X	X	X	X			X	X			-039
TLN-1805- 040	5/8/18	0720	1 Soil	X	X	X	X	X	X	X			X	X			-040
TLN-1805- 041	5/7/18	1617	1 Soil	X	X	X	X	X	X	X			X	X			-041
TLN-1805- 042	5-8-18	0730	~~1 Soil~~ 4W	X	X	X	X	X	X	X			X	X		Cooler #1	-042
TLN-1805- 043	5-8-18	0755	1 Soil	X	X	X	X	X	X	X			X	X			-043
TLN-1805- 044	5-8-18	0800	1 Soil	X	X	X	X	X	X	X			X	X			-044

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by: John Bergin Date/Time: 5/8/18 1130 Shipped by:
Relinquished by: Date/Time: Shipped by:
Sample Disposal: Return to Client ☐ Lab Disposal ☐

Received by: Date/Time:
Received by: Sarah Kirsch Date/Time: 5-8-18 14:30

LABORATORY USE ONLY
Sample Type ____ # of fractions ____

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Report Required For: POTW/WWTP ☐ DW ☐
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Other ____
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Receipt Temp ____ ° C
Cooler ID(s) ____
Custody Seal Y N
Intact Y N
Signature Y N
Match

SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air, Water Soils/Solids, Vegetation, Bioassay Other)	EC, pH	HCO3,Bromide, CO3,Ca, Chloride, Fluoride, Magnesium, K	SAR, Sodium Sulfate	Antimony, Ar, Barium, Beryllium, Boron, Cadmium, Chromium	Cobalt, Lead, Manganese, Mercury, Selenium, Thallium, Lithium	Molybdenum	Radium 226 and Radium 228			SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	LAB ID
TLN-1805- 045	~~5/8/18~~ 5/8/18	0805	1 Soil	X	X	X	X	X	X	X			X	X		1805086 4-045
TLN-1805- 046	5/8/18	0810	1 Soil	X	X	X	X	X	X	X			X	X		-046
TLN-1805- 047	5-8-18	0820	1 Soil	X	X	X	X	X	X	X			X	X		-047
TLN-1805- 048	5-8-18	0825	1 Soil	X	X	X	X	X	X	X			X	X		-048
TLN-1805- 049	5-8-18	0835	1 Soil	X	X	X	X	X	X	X			X	X		-049
TLN-1805- 050	5-8-18	~~0840~~ 0840	1 Soil	X	X	X	X	X	X	X			X	X		-050
TLN-1805- 051	5-8-18	0845	1 Soil	X	X	X	X	X	X	X			X	X		-051
TLN-1805- 052	5-8-18	0847	1 Soil	X	X	X	X	X	X	X			X	X		-052
TLN-1805- 053	5-8-18	0850	1 Soil	X	X	X	X	X	X	X			X	X		-053
TLN-1805- 054	5-8-18	~~0900~~ 0900	1 Soil	X	X	X	X	X	X	X			X	X		-054
TLN-1805- 055	5-8-18	0905	1 Soil	X	X	X	X	X	X	X			X	X		-055

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by:	Date/Time: 5/8/18 1400	Shipped by:	Received by: Date/Time:
Relinquished by:	Date/Time:	Shipped by:	Received by: Sarah Vasek Date/Time: 5-8-18 14:30
Sample Disposal: Return to Client ☐		Lab Disposal ☐	LABORATORY USE ONLY Sample Type ____ # of fractions ____

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Sampler Name if other than Contact: John Bergin 690-8304 Garry Hoffman 671-8177	Purchase Order #: **Ariba #21057984** **Contract #622268-04** ELI Quote #:

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Other ____

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Receipt Temp ____ ° C

Cooler ID(s) ____

Custody Seal Intact Y N

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TLN-1805- 056	5/8/18	0920	1 Soil	X	X	X	X	X	X	X			X	X		1805086[illegible]-056
TLN-1805- 057	5/8/18	0925	1 Soil	X	X	X	X	X	X	X			X	X		-057
TLN-1805- 058	5/8/18	0940	1 Soil	X	X	X	X	X	X	X			X	X		-058
TLN-1805- 059	5-8-18	0945	1 Soil	X	X	X	X	X	X	X			X	X		-059
TLN-1805- 060	5-8-18	1005	1 Soil	X	X	X	X	X	X	X			X	X		-060
TLN-1805- 061	5-8-18	1010	1 Soil	X	X	X	X	X	X	X			X	X		-061
TLN-1805- 062	5-8-18	1035	1 Soil	X	X	X	X	X	X	X			X	X		-062
TLN-1805- 063	5-8-18	1040	1 Soil	X	X	X	X	X	X	X			X	X		-063
~~TLN-1805- 064~~			~~1 Soil~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~			~~X~~	~~X~~		
~~TLN-1805- 065~~			~~1 Soil~~	X	X	X	X	X	X	X			X	X		
~~TLN-1805- 063~~			~~1 Soil~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~	~~X~~			~~X~~	~~X~~		

LABORATORY USE ONLY

Custody Record MUST be Signed				
Relinquished by: [signature]	Date/Time: 5/8/18 1430	Shipped by:	Received by:	Date/Time:
Relinquished by:	Date/Time:	Shipped by:	Received by: [signature]	Date/Time: 5-8-18 14:30
Sample Disposal:	Return to Client ☐	Lab Disposal ☐	LABORATORY USE ONLY Sample Type ____	# of fractions ____

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ANALYTICAL SUMMARY REPORT

August 27, 2018

Talen Energy Supply LLC
PO Box 38
Colstrip, MT 59323-0038

Work Order: B18051240

Project Name: Talen Montana, LLC Soil Sampling at Historic Spill

Energy Laboratories Inc Billings MT received the following 153 samples for Talen Energy Supply LLC on 5/11/2018 for analysis.

Lab ID	Client Sample ID	Collect Date	Receive Date	Matrix	Test
B18051240-001	TLN-1805-064	05/08/18 13:40	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18051240-002	TLN-1805-065	05/08/18 13:45	05/11/18	Soil	Same As Above
B18051240-003	TLN-1805-066	05/08/18 14:10	05/11/18	Soil	Same As Above
B18051240-004	TLN-1805-067	05/08/18 14:15	05/11/18	Soil	Same As Above
B18051240-005	TLN-1805-068	05/08/18 14:45	05/11/18	Soil	Same As Above
B18051240-006	TLN-1805-069	05/08/18 14:55	05/11/18	Soil	Same As Above
B18051240-007	TLN-1805-070	05/08/18 15:05	05/11/18	Soil	Same As Above
B18051240-008	TLN-1805-071	05/08/18 15:15	05/11/18	Soil	Same As Above
B18051240-009	TLN-1805-072	05/08/18 15:30	05/11/18	Soil	Same As Above
B18051240-010	TLN-1805-073	05/08/18 15:40	05/11/18	Soil	Same As Above
B18051240-011	TLN-1805-074	05/08/18 15:55	05/11/18	Soil	Same As Above
B18051240-012	TLN-1805-075	05/08/18 16:05	05/11/18	Soil	Same As Above

ANALYTICAL SUMMARY REPORT

B18051240-013	TLN-1805-076	05/09/18 9:40	05/11/18	Aqueous	Metals by ICP/ICPMS, Total Alkalinity Conductivity Mercury, Total Fluoride Chloride Sulfate/Anions by Ion Chromatography pH Metals Digestion by E200.2 Mercury Digestion by E245.1 Radium 226, Total Radium 228, Total Sodium Adsorption Ratio
B18051240-014	TLN-1805-077	05/09/18 10:00	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18051240-015	TLN-1805-078	05/09/18 10:02	05/11/18	Soil	Same As Above
B18051240-016	TLN-1805-079	05/09/18 10:05	05/11/18	Soil	Same As Above
B18051240-017	TLN-1805-080	05/09/18 10:45	05/11/18	Soil	Same As Above
B18051240-018	TLN-1805-081	05/09/18 11:00	05/11/18	Soil	Same As Above
B18051240-019	TLN-1805-082	05/09/18 11:05	05/11/18	Soil	Same As Above
B18051240-020	TLN-1805-083	05/09/18 11:15	05/11/18	Splp Extract	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A

ANALYTICAL SUMMARY REPORT

B18051240-021	TLN-1805-084	05/09/18 11:20	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18051240-022	TLN-1805-085	05/09/18 11:25	05/11/18	Soil	Same As Above
B18051240-023	TLN-1805-086	05/09/18 11:35	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18051240-024	TLN-1805-087	05/09/18 11:50	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18051240-025	TLN-1805-088	05/09/18 11:55	05/11/18	Soil	Same As Above
B18051240-026	TLN-1805-089	05/09/18 12:05	05/11/18	Soil	Same As Above
B18051240-027	TLN-1805-090	05/09/18 12:40	05/11/18	Soil	Same As Above
B18051240-028	TLN-1805-091	05/09/18 12:45	05/11/18	Soil	Same As Above

ANALYTICAL SUMMARY REPORT

B18051240-029	TLN-1805-092	05/09/18 12:55	05/11/18	Soil	Same As Above
B18051240-030	TLN-1805-093	05/09/18 13:10	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18051240-031	TLN-1805-094	05/09/18 13:12	05/11/18	Splp Extract	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18051240-032	TLN-1805-095	05/09/18 13:15	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio

ANALYTICAL SUMMARY REPORT

B18051240-033	TLN-1805-096	05/09/18 13:25	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18051240-034	TLN-1805-097	05/09/18 13:55	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18051240-035	TLN-1805-098	05/09/18 14:00	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio

ANALYTICAL SUMMARY REPORT

B18051240-036	TLN-1805-099	05/09/18 14:10	05/11/18	Splp Extract	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18051240-037	TLN-1805-100	05/09/18 14:15	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18051240-038	TLN-1805-101	05/09/18 14:20	05/11/18	Soil	Same As Above
B18051240-039	TLN-1805-102	05/09/18 14:25	05/11/18	Soil	Same As Above
B18051240-040	TLN-1805-103	05/09/18 14:30	05/11/18	Soil	Same As Above
B18051240-041	TLN-1805-104	05/09/18 14:40	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A

ANALYTICAL SUMMARY REPORT

B18051240-042	TLN-1805-105	05/09/18 14:50	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18051240-043	TLN-1805-106	05/09/18 14:55	05/11/18	Soil	Same As Above
B18051240-044	TLN-1805-107	05/09/18 15:00	05/11/18	Soil	Same As Above
B18051240-045	TLN-1805-108	05/09/18 15:05	05/11/18	Soil	Same As Above
B18051240-046	TLN-1805-109	05/09/18 15:10	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18051240-047	TLN-1805-110	05/09/18 15:55	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18051240-048	TLN-1805-111	05/09/18 16:00	05/11/18	Soil	Same As Above
B18051240-049	TLN-1805-112	05/09/18 16:05	05/11/18	Soil	Same As Above

ANALYTICAL SUMMARY REPORT

B18051240-050	TLN-1805-113	05/09/18 16:10	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18051240-051	TLN-1805-114	05/09/18 16:15	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18051240-052	TLN-1805-115	05/09/18 16:20	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A

ANALYTICAL SUMMARY REPORT

B18051240-053	TLN-1805-116	05/09/18 16:25	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18051240-054	TLN-1805-117	05/09/18 16:30	05/11/18	Soil	Same As Above
B18051240-055	TLN-1805-118	05/09/18 16:35	05/11/18	Soil	Same As Above
B18051240-056	TLN-1805-119	05/09/18 16:40	05/11/18	Soil	Same As Above
B18051240-057	TLN-1805-120	05/09/18 16:42	05/11/18	Soil	Same As Above
B18051240-058	TLN-1805-121	05/09/18 16:45	05/11/18	Soil	Same As Above
B18051240-059	TLN-1805-122	05/09/18 16:50	05/11/18	Soil	Same As Above
B18051240-060	TLN-1805-123	05/09/18 16:55	05/11/18	Soil	Same As Above
B18051240-061	TLN-1805-124	05/09/18 17:00	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A

ANALYTICAL SUMMARY REPORT

B18051240-062	TLN-1805-125	05/09/18 17:05	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18051240-063	TLN-1805-126	05/09/18 17:10	05/11/18	Soil	Same As Above
B18051240-064	TLN-1805-127	05/09/18 17:15	05/11/18	Soil	Same As Above
B18051240-065	TLN-1805-128	05/09/18 17:20	05/11/18	Soil	Same As Above
B18051240-066	TLN-1805-129	05/09/18 17:22	05/11/18	Soil	Same As Above
B18051240-067	TLN-1805-130	05/09/18 17:25	05/11/18	Soil	Same As Above
B18051240-068	TLN-1805-131	05/09/18 17:30	05/11/18	Soil	Same As Above
B18051240-069	TLN-1805-132	05/09/18 17:35	05/11/18	Soil	Same As Above
B18051240-070	TLN-1805-133	05/10/18 8:00	05/11/18	Aqueous	Metals by ICP/ICPMS, Total Alkalinity Conductivity Mercury, Total Fluoride Chloride Sulfate/Anions by Ion Chromatography pH Metals Digestion by E200.2 Mercury Digestion by E245.1 Radium 226, Total Radium 228, Total Sodium Adsorption Ratio
B18051240-071	TLN-1805-134	05/10/18 8:20	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18051240-072	TLN-1805-135	05/10/18 8:25	05/11/18	Soil	Same As Above
B18051240-073	TLN-1805-136	05/10/18 8:30	05/11/18	Soil	Same As Above

ANALYTICAL SUMMARY REPORT

B18051240-074	TLN-1805-137	05/10/18 8:40	05/11/18	Soil	Same As Above
B18051240-075	TLN-1805-138	05/10/18 8:45	05/11/18	Soil	Same As Above
B18051240-076	TLN-1805-139	05/10/18 8:50	05/11/18	Soil	Same As Above
B18051240-077	TLN-1805-140	05/10/18 8:55	05/11/18	Soil	Same As Above
B18051240-078	TLN-1805-141	05/10/18 9:00	05/11/18	Soil	Same As Above
B18051240-079	TLN-1805-142	05/10/18 9:10	05/11/18	Soil	Same As Above
B18051240-080	TLN-1805-143	05/10/18 9:20	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18051240-081	TLN-1805-144	05/10/18 9:25	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18051240-082	TLN-1805-145	05/10/18 9:35	05/11/18	Soil	Same As Above
B18051240-083	TLN-1805-146	05/10/18 9:35	05/11/18	Soil	Same As Above
B18051240-084	TLN-1805-147	05/10/18 9:37	05/11/18	Soil	Same As Above
B18051240-085	TLN-1805-148	05/10/18 9:40	05/11/18	Soil	Same As Above
B18051240-086	TLN-1805-149	05/10/18 9:50	05/11/18	Soil	Same As Above
B18051240-087	TLN-1805-150	05/10/18 9:55	05/11/18	Soil	Same As Above
B18051240-088	TLN-1805-151	05/10/18 10:25	05/11/18	Soil	Same As Above
B18051240-089	TLN-1805-152	05/10/18 10:30	05/11/18	Soil	Same As Above
B18051240-090	TLN-1805-153	05/10/18 10:35	05/11/18	Soil	Same As Above

ANALYTICAL SUMMARY REPORT

B18051240-091	TLN-1805-154	05/10/18 10:40	05/11/18	Soil	Same As Above
B18051240-092	TLN-1805-155	05/10/18 10:45	05/11/18	Soil	Same As Above
B18051240-093	TLN-1805-156	05/10/18 10:50	05/11/18	Soil	Same As Above
B18051240-094	TLN-1805-157	05/10/18 10:55	05/11/18	Soil	Same As Above
B18051240-095	TLN-1805-158	05/10/18 11:00	05/11/18	Soil	Same As Above
B18051240-096	TLN-1805-159	05/10/18 11:25	05/11/18	Soil	Same As Above
B18051240-097	TLN-1805-160	05/10/18 11:30	05/11/18	Soil	Same As Above
B18051240-098	TLN-1805-161	05/10/18 11:35	05/11/18	Soil	Same As Above
B18051240-099	TLN-1805-162	05/10/18 11:40	05/11/18	Soil	Same As Above
B18051240-100	TLN-1805-163	05/10/18 11:45	05/11/18	Soil	Same As Above
B18051240-101	TLN-1805-164	05/10/18 11:50	05/11/18	Soil	Same As Above
B18051240-102	TLN-1805-165	05/10/18 11:55	05/11/18	Soil	Same As Above
B18051240-103	TLN-1805-166	05/10/18 11:57	05/11/18	Soil	Same As Above
B18051240-104	TLN-1805-167	05/10/18 12:00	05/11/18	Soil	Same As Above
B18051240-105	TLN-1805-168	05/10/18 12:05	05/11/18	Soil	Same As Above
B18051240-106	TLN-1805-169	05/10/18 12:10	05/11/18	Soil	Same As Above
B18051240-107	TLN-1805-170	05/10/18 12:15	05/11/18	Soil	Same As Above
B18051240-108	TLN-1805-171	05/10/18 12:20	05/11/18	Soil	Same As Above
B18051240-109	TLN-1805-172	05/10/18 12:25	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A

ANALYTICAL SUMMARY REPORT

B18051240-110	TLN-1805-173	05/10/18 12:30	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18051240-111	TLN-1805-174	05/10/18 12:35	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18051240-112	TLN-1805-175	05/10/18 12:40	05/11/18	Soil	Same As Above
B18051240-113	TLN-1805-176	05/10/18 12:45	05/11/18	Soil	Same As Above
B18051240-114	TLN-1805-177	05/10/18 12:50	05/11/18	Soil	Same As Above
B18051240-115	TLN-1805-178	05/10/18 12:55	05/11/18	Soil	Same As Above
B18051240-116	TLN-1805-179	05/10/18 13:00	05/11/18	Soil	Same As Above
B18051240-117	TLN-1805-180	05/10/18 13:02	05/11/18	Soil	Same As Above
B18051240-118	TLN-1805-181	05/10/18 13:05	05/11/18	Soil	Same As Above

ANALYTICAL SUMMARY REPORT

B18051240-119	TLN-1805-182	05/10/18 13:10	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18051240-120	TLN-1805-183	05/10/18 13:15	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18051240-121	TLN-1805-184	05/10/18 13:20	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18051240-122	TLN-1805-185	05/10/18 13:25	05/11/18	Soil	Same As Above
B18051240-123	TLN-1805-186	05/10/18 13:30	05/11/18	Soil	Same As Above
B18051240-124	TLN-1805-187	05/10/18 13:45	05/11/18	Soil	Same As Above

ANALYTICAL SUMMARY REPORT

B18051240-125	TLN-1805-188	05/10/18 13:50	05/11/18	Soil	Same As Above
B18051240-126	TLN-1805-189	05/10/18 13:55	05/11/18	Soil	Same As Above
B18051240-127	TLN-1805-190	05/10/18 14:00	05/11/18	Soil	Same As Above
B18051240-128	TLN-1805-191	05/10/18 14:05	05/11/18	Soil	Same As Above
B18051240-129	TLN-1805-192	05/10/18 14:10	05/11/18	Soil	Same As Above
B18051240-130	TLN-1805-193	05/10/18 14:15	05/11/18	Soil	Same As Above
B18051240-131	TLN-1805-194	05/10/18 14:20	05/11/18	Soil	Same As Above
B18051240-132	TLN-1805-195	05/10/18 14:23	05/11/18	Soil	Same As Above
B18051240-133	TLN-1805-196	05/10/18 14:26	05/11/18	Soil	Same As Above
B18051240-134	TLN-1805-197	05/10/18 14:30	05/11/18	Soil	Same As Above
B18051240-135	TLN-1805-198	05/10/18 14:35	05/11/18	Soil	Same As Above
B18051240-136	TLN-1805-199	05/10/18 14:40	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18051240-137	TLN-1805-200	05/10/18 14:40	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18051240-138	TLN-1805-201	05/10/18 14:45	05/11/18	Soil	Same As Above
B18051240-139	TLN-1805-202	05/10/18 14:50	05/11/18	Soil	Same As Above
B18051240-140	TLN-1805-203	05/10/18 14:55	05/11/18	Soil	Same As Above

ANALYTICAL SUMMARY REPORT

B18051240-141	TLN-1805-204	05/10/18 15:00	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18051240-142	TLN-1805-205	05/10/18 15:10	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18051240-143	TLN-1805-206	05/10/18 15:15	05/11/18	Soil	Same As Above
B18051240-144	TLN-1805-207	05/10/18 15:20	05/11/18	Soil	Same As Above
B18051240-145	TLN-1805-208	05/10/18 15:25	05/11/18	Soil	Same As Above
B18051240-146	TLN-1805-209	05/10/18 15:30	05/11/18	Soil	Same As Above
B18051240-147	TLN-1805-210	05/10/18 15:35	05/11/18	Soil	Same As Above
B18051240-148	TLN-1805-211	05/10/18 15:40	05/11/18	Soil	Same As Above
B18051240-149	TLN-1805-212	05/10/18 15:45	05/11/18	Soil	Same As Above

ANALYTICAL SUMMARY REPORT

B18051240-150	TLN-1805-213	05/10/18 15:50	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Metals by ICP/ICPMS, SPLP Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio SPLP Extraction by SW1312 SPLP Metals Digestion by SW3010A
B18051240-151	TLN-1805-214	05/10/18 15:55	05/11/18	Soil	Metals by ICP/ICPMS, Total or Soluble Metals, Saturated Paste Alkalinity, Saturated Paste Extract Conductivity, Saturated Paste Extract Mercury in Solid By CVAA Anions, Saturated Paste Extract Moisture pH, Saturated Paste Total Metals Digestion by SW3050B Mercury Digestion by SW7471B Digestion For RadioChemistry ELI_50-169 Saturated Paste Extraction ASA Radium 226 Radium 228 Sodium Adsorption Ratio
B18051240-152	TLN-1805-215	05/10/18 16:00	05/11/18	Soil	Same As Above
B18051240-153	TLN-1805-216	05/10/18 14:47	05/11/18	Soil	Same As Above

The analyses presented in this report were performed by Energy Laboratories, Inc., 1120 S 27th St., Billings, MT 59101, unless otherwise noted. Any exceptions or problems with the analyses are noted in the Laboratory Analytical Report, the QA/QC Summary Report, or the Case Narrative.

The results as reported relate only to the item(s) submitted for testing.

If you have any questions regarding these test results, please call.

Report Approved By:

CLIENT: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic S
Work Order: B18051240

Revised Date: 08/27/18
Report Date: 06/29/18

CASE NARRATIVE

Tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories, PO Box 247, Casper, WY, EPA Number WY00002.

Revised 8/7/2018:

On 7/13/2018 a request was received from Jenny Vanek at Hydrometrics to revise this workorder by adding SPLP Metals as described below:

TLN-1805-083 (B18051240-020)	Arsenic
TLN-1805-086 (B18051240-023)	Manganese
TLN-1805-093 (B18051240-030)	Barium
TLN-1805-094 (B18051240-031)	Barium
TLN-1805-096 (B18051240-033)	Manganese
TLN-1805-097 (B18051240-034)	Barium
TLN-1805-099 (B18051240-036)	Arsenic, Barium, and Cobalt
TLN-1805-104 (B18051240-041)	Cobalt
TLN-1805-109 (B18051240-046)	Arsenic, Barium, Cobalt, and Manganese
TLN-1805-113 (B18051240-050)	Barium and Boron
TLN-1805-115 (B18051240-052)	Barium and Boron
TLN-1805-124 (B18051240-061)	Boron
TLN-1805-143 (B18051240-080)	Barium
TLN-1805-172 (B18051240-109)	Arsenic
TLN-1805-173 (B18051240-110)	Barium
TLN-1805-182 (B18051240-119)	Manganese
TLN-1805-183 (B18051240-120)	Barium
TLN-1805-199 (B18051240-136)	Arsenic and Cobalt
TLN-1805-204 (B18051240-141)	Cobalt and Manganese
TLN-1805-213 (B18051240-150)	Arsenic, Barium, Cobalt, and Manganese

The report has been revised and replaces any previously issued report in its entirety.

Revised Date: 8/27/2018

Workorder: B18051240
Project: Talen Montana, LLC Soil Sampling at Historic Spill

On 8/8/2018 a request was received from Jenny Vanek at Hydrometrics to revise this workorder by adding a table that includes Sample Weight, Leachate Voulme, and Final pH for the SPLP Extraction.

The report has been revised and replaces any previously issued report in its entirety.

Lab Number	Client Sample ID	Post Extraction pH	Sample Wt.	Leachate Volume
B18051240-020B	TLN-1805-083	6.8 s.u.	100 g	2000 mL
B18051240-023B	TLN-1805-086	8.19 s.u.	100 g	2000 mL
B18051240-030B	TLN-1805-093	8.71 s.u.	100 g	2000 mL
B18051240-031B	TLN-1805-094	8.41 s.u.	100 g	2000 mL
B18051240-033B	TLN-1805-096	8.6 s.u.	100 g	2000 mL
B18051240-034B	TLN-1805-097	8.56 s.u.	100 g	2000 mL
B18051240-036B	TLN-1805-099	8.83 s.u.	100 g	2000 mL
B18051240-041B	TLN-1805-104	8.94 s.u.	100 g	2000 mL
B18051240-046B	TLN-1805-109	8.47 s.u.	100 g	2000 mL
B18051240-050B	TLN-1805-113	8.44 s.u.	100 g	2000 mL
B18051240-052B	TLN-1805-115	8.74 s.u.	100 g	2000 mL
B18051240-061B	TLN-1805-124	8.2 s.u.	100 g	2000 mL
B18051240-080B	TLN-1805-143	8.63 s.u.	100 g	2000 mL
B18051240-109B	TLN-1805-172	8.08 s.u.	100 g	2000 mL
B18051240-110B	TLN-1805-173	8.07 s.u.	100 g	2000 mL
B18051240-119B	TLN-1805-182	8.16 s.u.	100 g	2000 mL
B18051240-120B	TLN-1805-183	8.34 s.u.	100 g	2000 mL
B18051240-136B	TLN-1805-199	8.01 s.u.	100 g	2000 mL
B18051240-141B	TLN-1805-204	8.7 s.u.	100 g	2000 mL
B18051240-150B	TLN-1805-213	8.8 s.u.	100 g	2000 mL

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-001
Client Sample ID: TLN-1805-064

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/08/18 13:40
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	25.0	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.7	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	2.4	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	15.4	meq/L		0.05		SW6010B	05/18/18 18:29 / rjh
Magnesium, sat. paste	11.7	meq/L		0.08		SW6010B	05/18/18 18:29 / rjh
Potassium, sat. paste	0.87	meq/L		0.03		SW6010B	05/18/18 18:29 / rjh
Sodium, sat. paste	1.53	meq/L		0.04		SW6010B	05/18/18 18:29 / rjh
Sodium Adsorption Ratio (SAR)	0.42	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	233	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	1		E300.0	05/18/18 17:32 / ens
Chloride	8	mg/L		1		E300.0	05/18/18 17:32 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/18/18 17:32 / ens
Sulfate	1480	mg/L	D	2		E300.0	05/18/18 17:32 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 19:13 / rlh
Arsenic	5	mg/kg		1		SW6020	05/19/18 19:13 / rlh
Barium	111	mg/kg		1		SW6020	05/19/18 19:13 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 03:50 / rlh
Boron	16	mg/kg		1		SW6010B	06/02/18 13:15 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 19:13 / rlh
Chromium	14	mg/kg	D	5		SW6020	05/25/18 03:50 / rlh
Cobalt	5	mg/kg		1		SW6020	05/19/18 19:13 / rlh
Lead	10	mg/kg		1		SW6020	05/19/18 19:13 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/02/18 13:15 / by
Manganese	256	mg/kg		1		SW6020	05/19/18 19:13 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/18/18 09:50 / jag
Molybdenum	2	mg/kg		1		SW6020	05/25/18 03:50 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 19:13 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 19:13 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 12:49 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-002
Client Sample ID: TLN-1805-065

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/08/18 13:45
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	23.6	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.8	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	3.5	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	20.7	meq/L		0.05		SW6010B	05/18/18 18:33 / rjh
Magnesium, sat. paste	22.2	meq/L		0.08		SW6010B	05/18/18 18:33 / rjh
Potassium, sat. paste	0.50	meq/L		0.03		SW6010B	05/18/18 18:33 / rjh
Sodium, sat. paste	2.41	meq/L		0.04		SW6010B	05/18/18 18:33 / rjh
Sodium Adsorption Ratio (SAR)	0.52	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	148	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 17:52 / ens
Chloride	12	mg/L		1		E300.0	05/18/18 17:52 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 17:52 / ens
Sulfate	2700	mg/L	D	5		E300.0	05/18/18 17:52 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 19:54 / rlh
Arsenic	5	mg/kg		1		SW6020	05/19/18 19:54 / rlh
Barium	123	mg/kg		1		SW6020	05/19/18 19:54 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 03:53 / rlh
Boron	17	mg/kg		1		SW6010B	06/02/18 13:19 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 19:54 / rlh
Chromium	14	mg/kg	D	5		SW6020	05/25/18 03:53 / rlh
Cobalt	6	mg/kg		1		SW6020	05/25/18 03:53 / rlh
Lead	10	mg/kg		1		SW6020	05/19/18 19:54 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/02/18 13:19 / by
Manganese	272	mg/kg		1		SW6020	05/19/18 19:54 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/18/18 09:52 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 03:53 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 19:54 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 19:54 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/05/18 14:40 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 14:40 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 14:40 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-003
Client Sample ID: TLN-1805-066

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/08/18 14:10
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	17.2	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.9	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	0.7	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	3.14	meq/L		0.05		SW6010B	05/18/18 18:37 / rjh
Magnesium, sat. paste	3.45	meq/L		0.08		SW6010B	05/18/18 18:37 / rjh
Potassium, sat. paste	0.82	meq/L		0.03		SW6010B	05/18/18 18:37 / rjh
Sodium, sat. paste	0.41	meq/L		0.04		SW6010B	05/18/18 18:37 / rjh
Sodium Adsorption Ratio (SAR)	0.22	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	308	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L		0.5		E300.0	05/18/18 18:11 / ens
Chloride	6	mg/L		1		E300.0	05/18/18 18:11 / ens
Fluoride	0.5	mg/L	D	0.5		E300.0	05/18/18 18:11 / ens
Sulfate	76	mg/L		1		E300.0	05/18/18 18:11 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 19:59 / rlh
Arsenic	8	mg/kg		1		SW6020	05/19/18 19:59 / rlh
Barium	157	mg/kg		1		SW6020	05/19/18 19:59 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 03:56 / rlh
Boron	14	mg/kg		1		SW6010B	06/02/18 13:24 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 19:59 / rlh
Chromium	17	mg/kg	D	5		SW6020	05/25/18 03:56 / rlh
Cobalt	8	mg/kg		1		SW6020	05/25/18 03:56 / rlh
Lead	12	mg/kg		1		SW6020	05/19/18 19:59 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/02/18 13:24 / by
Manganese	341	mg/kg		1		SW6020	05/19/18 19:59 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/18/18 09:54 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 03:56 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 19:59 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 19:59 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/05/18 14:40 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 14:40 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 14:40 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	05/31/18 14:47 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-004
Client Sample ID: TLN-1805-067

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/08/18 14:15
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	19.7	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.8	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	3.9	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	25.4	meq/L		0.05		SW6010B	05/18/18 18:52 / rjh
Magnesium, sat. paste	38.4	meq/L		0.08		SW6010B	05/18/18 18:52 / rjh
Potassium, sat. paste	0.85	meq/L		0.03		SW6010B	05/18/18 18:52 / rjh
Sodium, sat. paste	4.53	meq/L		0.04		SW6010B	05/18/18 18:52 / rjh
Sodium Adsorption Ratio (SAR)	0.80	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	117	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 18:50 / ens
Chloride	23	mg/L		1		E300.0	05/18/18 18:50 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 18:50 / ens
Sulfate	3250	mg/L	D	5		E300.0	05/18/18 18:50 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 20:04 / rlh
Arsenic	8	mg/kg		1		SW6020	05/19/18 20:04 / rlh
Barium	140	mg/kg		1		SW6020	05/19/18 20:04 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 03:59 / rlh
Boron	14	mg/kg		1		SW6010B	06/02/18 13:28 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 20:04 / rlh
Chromium	15	mg/kg	D	5		SW6020	05/25/18 03:59 / rlh
Cobalt	7	mg/kg		1		SW6020	05/25/18 03:59 / rlh
Lead	12	mg/kg		1		SW6020	05/19/18 20:04 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/02/18 13:28 / by
Manganese	253	mg/kg		1		SW6020	05/19/18 20:04 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/18/18 09:56 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 03:59 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 20:04 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 20:04 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/05/18 14:40 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/05/18 14:40 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 14:40 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	05/31/18 16:33 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/31/18 16:33 / eli-ca
Radium 228 MDC	0.5	pCi/g-dry				RA-05	05/31/18 16:33 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-005
Client Sample ID: TLN-1805-068

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/08/18 14:45
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	11.0	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.7	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	0.7	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	5.41	meq/L		0.05		SW6010B	05/18/18 19:00 / rjh
Magnesium, sat. paste	1.68	meq/L		0.08		SW6010B	05/18/18 19:00 / rjh
Potassium, sat. paste	0.54	meq/L		0.03		SW6010B	05/18/18 19:00 / rjh
Sodium, sat. paste	0.21	meq/L		0.04		SW6010B	05/18/18 19:00 / rjh
Sodium Adsorption Ratio (SAR)	0.11	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	284	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L		0.5		E300.0	05/18/18 19:10 / ens
Chloride	6	mg/L		1		E300.0	05/18/18 19:10 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/18/18 19:10 / ens
Sulfate	122	mg/L		1		E300.0	05/18/18 19:10 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 20:08 / rlh
Arsenic	6	mg/kg		1		SW6020	05/19/18 20:08 / rlh
Barium	157	mg/kg		1		SW6020	05/19/18 20:08 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 04:02 / rlh
Boron	17	mg/kg		1		SW6010B	06/02/18 13:32 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 20:08 / rlh
Chromium	14	mg/kg	D	5		SW6020	05/25/18 04:02 / rlh
Cobalt	6	mg/kg		1		SW6020	05/25/18 04:02 / rlh
Lead	11	mg/kg		1		SW6020	05/19/18 20:08 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/02/18 13:32 / by
Manganese	263	mg/kg		1		SW6020	05/19/18 20:08 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/18/18 09:58 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 04:02 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 20:08 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 20:08 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/05/18 14:40 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/05/18 14:40 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 14:40 / eli-ca
Radium 228	0.4	pCi/g-dry	U			RA-05	05/31/18 16:33 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/31/18 16:33 / eli-ca
Radium 228 MDC	0.5	pCi/g-dry				RA-05	05/31/18 16:33 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-006
Client Sample ID: TLN-1805-069

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/08/18 14:55
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	21.6	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.7	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	3.2	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	15.8	meq/L		0.05		SW6010B	05/18/18 19:04 / rjh
Magnesium, sat. paste	21.6	meq/L		0.08		SW6010B	05/18/18 19:04 / rjh
Potassium, sat. paste	0.52	meq/L		0.03		SW6010B	05/18/18 19:04 / rjh
Sodium, sat. paste	3.61	meq/L		0.04		SW6010B	05/18/18 19:04 / rjh
Sodium Adsorption Ratio (SAR)	0.84	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	127	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 19:29 / ens
Chloride	24	mg/L		1		E300.0	05/18/18 19:29 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 19:29 / ens
Sulfate	2330	mg/L	D	5		E300.0	05/18/18 19:29 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 20:13 / rlh
Arsenic	6	mg/kg		1		SW6020	05/19/18 20:13 / rlh
Barium	140	mg/kg		1		SW6020	05/19/18 20:13 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 04:05 / rlh
Boron	ND	mg/kg		1		SW6010B	06/02/18 13:37 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 20:13 / rlh
Chromium	13	mg/kg	D	5		SW6020	05/25/18 04:05 / rlh
Cobalt	6	mg/kg		1		SW6020	05/25/18 04:05 / rlh
Lead	11	mg/kg		1		SW6020	05/19/18 20:13 / rlh
Lithium	ND	mg/kg	D	5		SW6010B	06/02/18 13:37 / by
Manganese	213	mg/kg		1		SW6020	05/19/18 20:13 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/18/18 09:59 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 04:05 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 20:13 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 20:13 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/05/18 14:41 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/05/18 14:41 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/05/18 14:41 / eli-ca
Radium 228	0.4	pCi/g-dry	U			RA-05	05/31/18 16:33 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	05/31/18 16:33 / eli-ca
Radium 228 MDC	0.5	pCi/g-dry				RA-05	05/31/18 16:33 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-007
Client Sample ID: TLN-1805-070

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/08/18 15:05
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	22.3	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	0.6	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	3.88	meq/L		0.05		SW6010B	05/18/18 19:08 / rjh
Magnesium, sat. paste	1.64	meq/L		0.08		SW6010B	05/18/18 19:08 / rjh
Potassium, sat. paste	0.80	meq/L		0.03		SW6010B	05/18/18 19:08 / rjh
Sodium, sat. paste	0.12	meq/L		0.04		SW6010B	05/18/18 19:08 / rjh
Sodium Adsorption Ratio (SAR)	0.07	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	277	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L		0.5		E300.0	05/18/18 19:49 / ens
Chloride	4	mg/L		1		E300.0	05/18/18 19:49 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/18/18 19:49 / ens
Sulfate	32	mg/L		1		E300.0	05/18/18 19:49 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 20:18 / rlh
Arsenic	6	mg/kg		1		SW6020	05/19/18 20:18 / rlh
Barium	157	mg/kg		1		SW6020	05/19/18 20:18 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 04:08 / rlh
Boron	10	mg/kg		1		SW6010B	06/02/18 13:41 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 20:18 / rlh
Chromium	17	mg/kg	D	5		SW6020	05/25/18 04:08 / rlh
Cobalt	7	mg/kg		1		SW6020	05/25/18 04:08 / rlh
Lead	12	mg/kg		1		SW6020	05/19/18 20:18 / rlh
Lithium	10	mg/kg	D	5		SW6010B	06/02/18 13:41 / by
Manganese	326	mg/kg		1		SW6020	05/19/18 20:18 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/18/18 10:01 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 04:08 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 20:18 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 20:18 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-008
Client Sample ID: TLN-1805-071

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/08/18 15:15
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	17.1	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.7	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	0.5	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	2.25	meq/L		0.05		SW6010B	05/18/18 19:12 / rjh
Magnesium, sat. paste	2.20	meq/L		0.08		SW6010B	05/18/18 19:12 / rjh
Potassium, sat. paste	0.60	meq/L		0.03		SW6010B	05/18/18 19:12 / rjh
Sodium, sat. paste	0.39	meq/L		0.04		SW6010B	05/18/18 19:12 / rjh
Sodium Adsorption Ratio (SAR)	0.26	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	200	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L		0.5		E300.0	05/18/18 20:28 / ens
Chloride	5	mg/L		1		E300.0	05/18/18 20:28 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/18/18 20:28 / ens
Sulfate	73	mg/L		1		E300.0	05/18/18 20:28 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 20:22 / rlh
Arsenic	6	mg/kg		1		SW6020	05/19/18 20:22 / rlh
Barium	108	mg/kg		1		SW6020	05/19/18 20:22 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 04:11 / rlh
Boron	6	mg/kg		1		SW6010B	06/02/18 13:45 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 20:22 / rlh
Chromium	15	mg/kg	D	5		SW6020	05/25/18 04:11 / rlh
Cobalt	7	mg/kg		1		SW6020	05/25/18 04:11 / rlh
Lead	11	mg/kg		1		SW6020	05/19/18 20:22 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/02/18 13:45 / by
Manganese	321	mg/kg		1		SW6020	05/19/18 20:22 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/18/18 10:03 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 04:11 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 20:22 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 20:22 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-009
Client Sample ID: TLN-1805-072

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/08/18 15:30
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	21.2	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.7	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	0.6	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	2.98	meq/L		0.05		SW6010B	05/18/18 19:16 / rjh
Magnesium, sat. paste	2.32	meq/L		0.08		SW6010B	05/18/18 19:16 / rjh
Potassium, sat. paste	0.74	meq/L		0.03		SW6010B	05/18/18 19:16 / rjh
Sodium, sat. paste	0.51	meq/L		0.04		SW6010B	05/18/18 19:16 / rjh
Sodium Adsorption Ratio (SAR)	0.31	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	257	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L		0.5		E300.0	05/18/18 20:47 / ens
Chloride	6	mg/L		1		E300.0	05/18/18 20:47 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/18/18 20:47 / ens
Sulfate	83	mg/L		1		E300.0	05/18/18 20:47 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 20:27 / rlh
Arsenic	6	mg/kg		1		SW6020	05/19/18 20:27 / rlh
Barium	73	mg/kg		1		SW6020	05/19/18 20:27 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 04:14 / rlh
Boron	10	mg/kg		1		SW6010B	06/02/18 13:49 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 20:27 / rlh
Chromium	20	mg/kg	D	5		SW6020	05/25/18 04:14 / rlh
Cobalt	9	mg/kg		1		SW6020	05/25/18 04:14 / rlh
Lead	16	mg/kg		1		SW6020	05/19/18 20:27 / rlh
Lithium	14	mg/kg	D	5		SW6010B	06/02/18 13:49 / by
Manganese	249	mg/kg		1		SW6020	05/19/18 20:27 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 14:32 / jag
Molybdenum	1	mg/kg		1		SW6020	05/25/18 04:14 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 20:27 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 20:27 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 228	0.9	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-010
Client Sample ID: TLN-1805-073

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/08/18 15:40
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	17.6	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	3.4	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	25.1	meq/L		0.05		SW6010B	05/18/18 19:20 / rjh
Magnesium, sat. paste	25.6	meq/L		0.08		SW6010B	05/18/18 19:20 / rjh
Potassium, sat. paste	1.02	meq/L		0.03		SW6010B	05/18/18 19:20 / rjh
Sodium, sat. paste	5.34	meq/L		0.04		SW6010B	05/18/18 19:20 / rjh
Sodium Adsorption Ratio (SAR)	1.06	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	83	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	2		E300.0	05/18/18 21:07 / ens
Chloride	19	mg/L		1		E300.0	05/18/18 21:07 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 21:07 / ens
Sulfate	2740	mg/L	D	5		E300.0	05/18/18 21:07 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 20:31 / rlh
Arsenic	7	mg/kg		1		SW6020	05/19/18 20:31 / rlh
Barium	116	mg/kg		1		SW6020	05/19/18 20:31 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 04:23 / rlh
Boron	8	mg/kg		1		SW6010B	06/02/18 13:53 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 20:31 / rlh
Chromium	21	mg/kg		1		SW6020	05/25/18 04:23 / rlh
Cobalt	9	mg/kg		1		SW6020	05/25/18 04:23 / rlh
Lead	15	mg/kg		1		SW6020	05/19/18 20:31 / rlh
Lithium	15	mg/kg	D	5		SW6010B	06/02/18 13:53 / by
Manganese	296	mg/kg		1		SW6020	05/19/18 20:31 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 14:34 / jag
Molybdenum	1	mg/kg		1		SW6020	05/25/18 04:23 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 20:31 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 20:31 / rlh
RADIONUCLIDES							
Radium 226	0.7	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 226 precision (±)	0.2	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 228	0.8	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-011
Client Sample ID: TLN-1805-074

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/08/18 15:55
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	6.9	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.8	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	0.4	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	2.40	meq/L		0.05		SW6010B	05/18/18 19:23 / rjh
Magnesium, sat. paste	0.79	meq/L		0.08		SW6010B	05/18/18 19:23 / rjh
Potassium, sat. paste	0.58	meq/L		0.03		SW6010B	05/18/18 19:23 / rjh
Sodium, sat. paste	0.10	meq/L		0.04		SW6010B	05/18/18 19:23 / rjh
Sodium Adsorption Ratio (SAR)	0.08	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	111	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L		0.5		E300.0	05/18/18 22:05 / ens
Chloride	4	mg/L		1		E300.0	05/18/18 22:05 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/18/18 22:05 / ens
Sulfate	24	mg/L		1		E300.0	05/18/18 22:05 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 20:36 / rlh
Arsenic	7	mg/kg		1		SW6020	05/19/18 20:36 / rlh
Barium	352	mg/kg		1		SW6020	05/25/18 04:26 / rlh
Beryllium	ND	mg/kg		1		SW6010B	06/02/18 14:05 / by
Boron	9	mg/kg		1		SW6010B	06/02/18 14:05 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 20:36 / rlh
Chromium	16	mg/kg	D	5		SW6010B	06/02/18 14:05 / by
Cobalt	10	mg/kg		1		SW6020	05/25/18 04:26 / rlh
Lead	13	mg/kg		1		SW6020	05/19/18 20:36 / rlh
Lithium	10	mg/kg	D	5		SW6010B	06/02/18 14:05 / by
Manganese	608	mg/kg		1		SW6020	06/12/18 15:00 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 14:36 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 04:26 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 20:36 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 20:36 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 228	0.8	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-012
Client Sample ID: TLN-1805-075

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/08/18 16:05
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	21.3	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	0.4	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	3.03	meq/L		0.05		SW6010B	05/18/18 19:27 / rjh
Magnesium, sat. paste	1.22	meq/L		0.08		SW6010B	05/18/18 19:27 / rjh
Potassium, sat. paste	0.62	meq/L		0.03		SW6010B	05/18/18 19:27 / rjh
Sodium, sat. paste	0.07	meq/L		0.04		SW6010B	05/18/18 19:27 / rjh
Sodium Adsorption Ratio (SAR)	0.05	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	201	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L		0.5		E300.0	05/18/18 22:24 / ens
Chloride	6	mg/L		1		E300.0	05/18/18 22:24 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/18/18 22:24 / ens
Sulfate	13	mg/L		1		E300.0	05/18/18 22:24 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 20:50 / rlh
Arsenic	7	mg/kg		1		SW6020	05/19/18 20:50 / rlh
Barium	144	mg/kg		1		SW6020	05/25/18 04:29 / rlh
Beryllium	ND	mg/kg		1		SW6010B	06/02/18 14:10 / by
Boron	9	mg/kg		1		SW6010B	06/02/18 14:10 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 20:50 / rlh
Chromium	17	mg/kg		1		SW6020	05/25/18 04:29 / rlh
Cobalt	7	mg/kg		1		SW6020	05/25/18 04:29 / rlh
Lead	15	mg/kg		1		SW6020	05/19/18 20:50 / rlh
Lithium	10	mg/kg	D	5		SW6010B	06/02/18 14:10 / by
Manganese	483	mg/kg		1		SW6020	05/25/18 04:29 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 14:37 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 04:29 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 20:50 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 20:50 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-013
Client Sample ID: TLN-1805-076

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 09:40
DateReceived: 05/11/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	6.0	s.u.	H	0.1		A4500-H B	05/15/18 14:16 / cjm
pH Measurement Temp	20	°C				A4500-H B	05/15/18 14:16 / cjm
Conductivity @ 25 C	ND	umhos/cm		5		A2510 B	05/15/18 14:16 / cjm
INORGANICS							
Bicarbonate as HCO3	ND	mg/L		4		A2320 B	05/19/18 17:42 / rco
Carbonate as CO3	ND	mg/L		4		A2320 B	05/19/18 17:42 / rco
Chloride	ND	mg/L		1		E300.0	05/16/18 02:46 / ens
Sulfate	ND	mg/L		1		E300.0	05/16/18 02:46 / ens
Bromide	ND	mg/L		0.5		E300.0	05/16/18 02:46 / ens
Fluoride	ND	mg/L		0.1		A4500-F C	05/16/18 17:15 / rco
Sodium Adsorption Ratio (SAR)	ND	unitless		0.01		Calculation	05/22/18 01:45 / jbm
METALS, TOTAL							
Antimony	ND	mg/L		0.001		E200.8	05/22/18 12:38 / rlh
Arsenic	ND	mg/L		0.001		E200.8	05/22/18 12:38 / rlh
Barium	ND	mg/L		0.05		E200.7	05/22/18 01:45 / rjh
Beryllium	ND	mg/L		0.001		E200.8	05/22/18 12:38 / rlh
Boron	ND	mg/L		0.05		E200.7	06/04/18 15:21 / rjh
Cadmium	ND	mg/L		0.001		E200.8	05/22/18 12:38 / rlh
Calcium	ND	mg/L		1		E200.8	05/22/18 12:38 / rlh
Chromium	ND	mg/L		0.005		E200.8	05/22/18 12:38 / rlh
Cobalt	ND	mg/L		0.005		E200.8	05/22/18 12:38 / rlh
Lead	ND	mg/L		0.001		E200.8	05/22/18 12:38 / rlh
Lithium	ND	mg/L		0.1		E200.7	05/22/18 01:45 / rjh
Magnesium	ND	mg/L		1		E200.7	05/22/18 01:45 / rjh
Manganese	ND	mg/L		0.001		E200.8	05/22/18 12:38 / rlh
Mercury	ND	mg/L		0.0001		E245.1	05/23/18 11:12 / jag
Molybdenum	ND	mg/L		0.001		E200.8	06/12/18 16:57 / rlh
Potassium	ND	mg/L		1		E200.7	05/22/18 01:45 / rjh
Selenium	ND	mg/L		0.001		E200.8	06/12/18 16:57 / rlh
Sodium	ND	mg/L		1		E200.8	05/22/18 12:38 / rlh
Thallium	ND	mg/L		0.0005		E200.8	05/22/18 12:38 / rlh
RADIONUCLIDES - TOTAL							
Radium 226	0.1	pCi/L	U			E903.0	06/04/18 11:20 / eli-ca
Radium 226 precision (±)	0.2	pCi/L				E903.0	06/04/18 11:20 / eli-ca
Radium 226 MDC	0.3	pCi/L				E903.0	06/04/18 11:20 / eli-ca
Radium 228	-0.01	pCi/L	U			RA-05	05/29/18 14:40 / eli-ca
Radium 228 precision (±)	1.5	pCi/L				RA-05	05/29/18 14:40 / eli-ca
Radium 228 MDC	2.6	pCi/L				RA-05	05/29/18 14:40 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
H - Analysis performed past recommended holding time.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-014
Client Sample ID: TLN-1805-077

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 10:00
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	13.9	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.7	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	3.2	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	22.4	meq/L		0.05		SW6010B	05/18/18 20:06 / rjh
Magnesium, sat. paste	17.4	meq/L		0.08		SW6010B	05/18/18 20:06 / rjh
Potassium, sat. paste	0.65	meq/L		0.03		SW6010B	05/18/18 20:06 / rjh
Sodium, sat. paste	2.98	meq/L		0.04		SW6010B	05/18/18 20:06 / rjh
Sodium Adsorption Ratio (SAR)	0.67	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	109	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	4	mg/L	D	2		E300.0	05/18/18 22:44 / ens
Chloride	36	mg/L		1		E300.0	05/18/18 22:44 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 22:44 / ens
Sulfate	2420	mg/L	D	5		E300.0	05/18/18 22:44 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/20/18 01:47 / rlh
Arsenic	4	mg/kg		1		SW6020	05/20/18 01:47 / rlh
Barium	141	mg/kg		1		SW6020	05/20/18 01:47 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 06:58 / rlh
Boron	17	mg/kg		1		SW6010B	06/02/18 15:28 / by
Cadmium	ND	mg/kg		1		SW6020	05/20/18 01:47 / rlh
Chromium	13	mg/kg		1		SW6020	05/20/18 01:47 / rlh
Cobalt	5	mg/kg		1		SW6020	05/20/18 01:47 / rlh
Lead	9	mg/kg		1		SW6020	05/20/18 01:47 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/02/18 15:28 / by
Manganese	274	mg/kg		1		SW6020	05/20/18 01:47 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 14:39 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/20/18 01:47 / rlh
Selenium	ND	mg/kg		1		SW6020	05/20/18 01:47 / rlh
Thallium	ND	mg/kg		1		SW6020	05/20/18 01:47 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-015
Client Sample ID: TLN-1805-078

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 10:02
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	13.2	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.7	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	3.2	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	25.9	meq/L		0.05		SW6010B	05/18/18 20:14 / rjh
Magnesium, sat. paste	19.7	meq/L		0.08		SW6010B	05/18/18 20:14 / rjh
Potassium, sat. paste	0.72	meq/L		0.03		SW6010B	05/18/18 20:14 / rjh
Sodium, sat. paste	3.24	meq/L		0.04		SW6010B	05/18/18 20:14 / rjh
Sodium Adsorption Ratio (SAR)	0.68	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	66	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	4	mg/L	D	2		E300.0	05/18/18 23:23 / ens
Chloride	34	mg/L		1		E300.0	05/18/18 23:23 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 23:23 / ens
Sulfate	2400	mg/L	D	5		E300.0	05/18/18 23:23 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 20:54 / rlh
Arsenic	4	mg/kg		1		SW6020	05/19/18 20:54 / rlh
Barium	183	mg/kg		1		SW6020	05/19/18 20:54 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 04:33 / rlh
Boron	17	mg/kg		1		SW6010B	06/02/18 14:14 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 20:54 / rlh
Chromium	15	mg/kg		1		SW6020	05/25/18 04:33 / rlh
Cobalt	6	mg/kg		1		SW6020	05/25/18 04:33 / rlh
Lead	9	mg/kg		1		SW6020	05/19/18 20:54 / rlh
Lithium	9	mg/kg	D	5		SW6010B	06/02/18 14:14 / by
Manganese	322	mg/kg		1		SW6020	05/19/18 20:54 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 14:41 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 04:33 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 20:54 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 20:54 / rlh
RADIONUCLIDES							
Radium 226	0.7	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-016
Client Sample ID: TLN-1805-079

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 10:05
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.3	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.9	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	4.4	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	23.1	meq/L		0.05		SW6010B	05/18/18 20:22 / rjh
Magnesium, sat. paste	43.2	meq/L		0.08		SW6010B	05/18/18 20:22 / rjh
Potassium, sat. paste	1.05	meq/L		0.03		SW6010B	05/18/18 20:22 / rjh
Sodium, sat. paste	10.2	meq/L		0.04		SW6010B	05/18/18 20:22 / rjh
Sodium Adsorption Ratio (SAR)	1.77	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	88	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	5	mg/L	D	2		E300.0	05/18/18 23:42 / ens
Chloride	49	mg/L		1		E300.0	05/18/18 23:42 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/18/18 23:42 / ens
Sulfate	3760	mg/L	D	5		E300.0	05/18/18 23:42 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 20:59 / rlh
Arsenic	3	mg/kg		1		SW6020	05/19/18 20:59 / rlh
Barium	193	mg/kg		1		SW6020	05/19/18 20:59 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 04:36 / rlh
Boron	20	mg/kg		1		SW6010B	06/02/18 14:18 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 20:59 / rlh
Chromium	14	mg/kg		1		SW6020	05/25/18 04:36 / rlh
Cobalt	6	mg/kg		1		SW6020	05/25/18 04:36 / rlh
Lead	8	mg/kg		1		SW6020	05/19/18 20:59 / rlh
Lithium	9	mg/kg	D	5		SW6010B	06/02/18 14:18 / by
Manganese	228	mg/kg		1		SW6020	05/19/18 20:59 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 14:43 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 04:36 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 20:59 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 20:59 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 226 precision (±)	0.08	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-017
Client Sample ID: TLN-1805-080

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 10:45
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	18.2	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	8.2	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	0.9	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	1.29	meq/L		0.05		SW6010B	05/18/18 20:26 / rjh
Magnesium, sat. paste	6.12	meq/L		0.08		SW6010B	05/18/18 20:26 / rjh
Potassium, sat. paste	0.29	meq/L		0.03		SW6010B	05/18/18 20:26 / rjh
Sodium, sat. paste	1.58	meq/L		0.04		SW6010B	05/18/18 20:26 / rjh
Sodium Adsorption Ratio (SAR)	0.82	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	87	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	1.4	mg/L		0.5		E300.0	05/19/18 00:03 / ens
Chloride	9	mg/L		1		E300.0	05/19/18 00:03 / ens
Fluoride	3	mg/L	D	1		E300.0	05/19/18 00:03 / ens
Sulfate	391	mg/L		1		E300.0	05/19/18 00:03 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 21:04 / rlh
Arsenic	3	mg/kg		1		SW6020	05/19/18 21:04 / rlh
Barium	43	mg/kg		1		SW6020	05/25/18 04:39 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 04:39 / rlh
Boron	4	mg/kg		1		SW6010B	06/02/18 14:22 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 21:04 / rlh
Chromium	15	mg/kg		1		SW6020	05/25/18 04:39 / rlh
Cobalt	5	mg/kg		1		SW6020	05/25/18 04:39 / rlh
Lead	6	mg/kg		1		SW6020	05/19/18 21:04 / rlh
Lithium	ND	mg/kg	D	5		SW6010B	06/02/18 14:22 / by
Manganese	98	mg/kg		1		SW6020	05/19/18 21:04 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 14:44 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 04:39 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 21:04 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 21:04 / rlh
RADIONUCLIDES							
Radium 226	0.3	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 226 precision (±)	0.08	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 228	0.9	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-018
Client Sample ID: TLN-1805-081

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 11:00
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	12.9	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.9	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	3.4	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	23.1	meq/L		0.05		SW6010B	05/18/18 20:30 / rjh
Magnesium, sat. paste	24.3	meq/L		0.08		SW6010B	05/18/18 20:30 / rjh
Potassium, sat. paste	0.70	meq/L		0.03		SW6010B	05/18/18 20:30 / rjh
Sodium, sat. paste	4.26	meq/L		0.04		SW6010B	05/18/18 20:30 / rjh
Sodium Adsorption Ratio (SAR)	0.88	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	77	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	2		E300.0	05/19/18 00:42 / ens
Chloride	12	mg/L		1		E300.0	05/19/18 00:42 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/19/18 00:42 / ens
Sulfate	2780	mg/L	D	5		E300.0	05/19/18 00:42 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 21:49 / rlh
Arsenic	5	mg/kg	D	2		SW6020	05/25/18 04:42 / rlh
Barium	138	mg/kg		1		SW6020	05/19/18 21:49 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 04:42 / rlh
Boron	25	mg/kg		1		SW6010B	06/02/18 14:26 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 21:49 / rlh
Chromium	13	mg/kg		1		SW6020	05/25/18 04:42 / rlh
Cobalt	6	mg/kg		1		SW6020	05/25/18 04:42 / rlh
Lead	9	mg/kg		1		SW6020	05/19/18 21:49 / rlh
Lithium	9	mg/kg	D	5		SW6010B	06/02/18 14:26 / by
Manganese	340	mg/kg		1		SW6020	05/19/18 21:49 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 14:46 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 04:42 / rlh
Selenium	ND	mg/kg		1		SW6020	06/12/18 19:05 / jcg
Thallium	ND	mg/kg		1		SW6020	05/19/18 21:49 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/10/18 11:13 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-019
Client Sample ID: TLN-1805-082

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 11:05
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.8	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.9	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	5.1	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	21.2	meq/L		0.05		SW6010B	05/18/18 20:33 / rjh
Magnesium, sat. paste	55.0	meq/L		0.08		SW6010B	05/18/18 20:33 / rjh
Potassium, sat. paste	0.83	meq/L		0.03		SW6010B	05/18/18 20:33 / rjh
Sodium, sat. paste	15.4	meq/L		0.04		SW6010B	05/18/18 20:33 / rjh
Sodium Adsorption Ratio (SAR)	2.49	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	53	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	ND	mg/L	D	2		E300.0	05/19/18 01:01 / ens
Chloride	26	mg/L		1		E300.0	05/19/18 01:01 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/19/18 01:01 / ens
Sulfate	4640	mg/L	D	10		E300.0	05/22/18 05:18 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 21:54 / rlh
Arsenic	5	mg/kg		1		SW6020	05/19/18 21:54 / rlh
Barium	163	mg/kg		1		SW6020	05/19/18 21:54 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 04:45 / rlh
Boron	27	mg/kg		1		SW6010B	06/02/18 14:30 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 21:54 / rlh
Chromium	15	mg/kg		1		SW6020	05/25/18 04:45 / rlh
Cobalt	6	mg/kg		1		SW6020	05/25/18 04:45 / rlh
Lead	11	mg/kg		1		SW6020	05/19/18 21:54 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/02/18 14:30 / by
Manganese	274	mg/kg		1		SW6020	05/19/18 21:54 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 14:48 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 04:45 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 21:54 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 21:54 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-020
Client Sample ID: TLN-1805-083

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 11:15
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.5	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.9	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	4.2	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	20.2	meq/L		0.05		SW6010B	05/18/18 20:37 / rjh
Magnesium, sat. paste	37.1	meq/L		0.08		SW6010B	05/18/18 20:37 / rjh
Potassium, sat. paste	0.66	meq/L		0.03		SW6010B	05/18/18 20:37 / rjh
Sodium, sat. paste	6.99	meq/L		0.04		SW6010B	05/18/18 20:37 / rjh
Sodium Adsorption Ratio (SAR)	1.31	unitless		0.01		Calculation	05/21/18 10:28 / srm
Bicarbonate as HCO3	68	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	7	mg/L	D	2		E300.0	05/19/18 01:21 / ens
Chloride	46	mg/L		1		E300.0	05/19/18 01:21 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/19/18 01:21 / ens
Sulfate	3600	mg/L	D	5		E300.0	05/19/18 01:21 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 21:59 / rlh
Arsenic	38	mg/kg		1		SW6020	05/19/18 21:59 / rlh
Barium	20	mg/kg		1		SW6020	05/19/18 21:59 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 04:48 / rlh
Boron	10	mg/kg		1		SW6010B	06/02/18 14:35 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 21:59 / rlh
Chromium	15	mg/kg		1		SW6020	05/25/18 04:48 / rlh
Cobalt	6	mg/kg		1		SW6020	05/25/18 04:48 / rlh
Lead	10	mg/kg		1		SW6020	05/19/18 21:59 / rlh
Lithium	10	mg/kg	D	5		SW6010B	06/02/18 14:35 / by
Manganese	139	mg/kg		1		SW6020	05/19/18 21:59 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 14:53 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 04:48 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 21:59 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 21:59 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 228	1.1	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/04/18 12:48 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-020
Client Sample ID: TLN-1805-083

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 11:15
DateReceived: 05/11/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Arsenic	ND	mg/L		0.001		SW6020	08/03/18 04:18 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-021
Client Sample ID: TLN-1805-084

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 11:20
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	11.8	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	8.3	s.u.		0.1		ASA10-3	05/18/18 12:08 / srm
Conductivity, sat. paste	9.4	mmhos/cm		0.1		ASA10-3	05/18/18 12:08 / srm
Calcium, sat. paste	20.7	meq/L		0.05		SW6010B	05/18/18 20:41 / rjh
Magnesium, sat. paste	172	meq/L		0.08		SW6010B	05/22/18 15:39 / rjh
Potassium, sat. paste	1.62	meq/L	D	0.04		SW6010B	05/18/18 20:41 / rjh
Sodium, sat. paste	55.2	meq/L	D	0.09		SW6010B	05/18/18 20:41 / rjh
Sodium Adsorption Ratio (SAR)	5.63	unitless		0.01		Calculation	05/21/18 08:46 / srm
Bicarbonate as HCO3	140	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 08:47 / rco
Bromide	17	mg/L	D	5		E300.0	05/19/18 01:41 / ens
Chloride	411	mg/L	D	2		E300.0	05/19/18 01:41 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/19/18 01:41 / ens
Sulfate	11700	mg/L	D	20		E300.0	05/22/18 06:16 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 21:08 / rlh
Arsenic	5	mg/kg		1		SW6020	05/19/18 21:08 / rlh
Barium	88	mg/kg		1		SW6020	05/19/18 21:08 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 04:51 / rlh
Boron	31	mg/kg		1		SW6010B	06/02/18 14:39 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 21:08 / rlh
Chromium	11	mg/kg		1		SW6020	05/25/18 04:51 / rlh
Cobalt	6	mg/kg		1		SW6020	05/25/18 04:51 / rlh
Lead	6	mg/kg		1		SW6020	05/19/18 21:08 / rlh
Lithium	6	mg/kg	D	5		SW6010B	06/02/18 14:39 / by
Manganese	195	mg/kg		1		SW6020	05/19/18 21:08 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 10:23 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 04:51 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 21:08 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 21:08 / rlh
RADIONUCLIDES							
Radium 226	0.3	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 226 precision (±)	0.08	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 228	0.3	pCi/g-dry	U			RA-05	06/04/18 14:22 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/04/18 14:22 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/04/18 14:22 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-022
Client Sample ID: TLN-1805-085

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 11:25
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	12.9	wt%		0.2		D2974	05/22/18 18:05 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	8.0	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	7.5	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	19.5	meq/L		0.05		SW6010B	05/19/18 07:00 / rjh
Magnesium, sat. paste	112	meq/L		0.08		SW6010B	05/19/18 07:00 / rjh
Potassium, sat. paste	1.25	meq/L	D	0.09		SW6010B	05/22/18 17:41 / rjh
Sodium, sat. paste	37.7	meq/L	D	0.09		SW6010B	05/19/18 07:00 / rjh
Sodium Adsorption Ratio (SAR)	4.64	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	83	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	8	mg/L	D	5		E300.0	05/20/18 05:12 / ens
Chloride	248	mg/L	D	2		E300.0	05/20/18 05:12 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/20/18 05:12 / ens
Sulfate	8440	mg/L	D	10		E300.0	05/20/18 05:12 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 21:13 / rlh
Arsenic	4	mg/kg		1		SW6020	05/19/18 21:13 / rlh
Barium	108	mg/kg		1		SW6020	05/19/18 21:13 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 05:00 / rlh
Boron	26	mg/kg		1		SW6010B	06/02/18 14:43 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 21:13 / rlh
Chromium	14	mg/kg		1		SW6020	05/25/18 05:00 / rlh
Cobalt	5	mg/kg		1		SW6020	05/25/18 05:00 / rlh
Lead	7	mg/kg		1		SW6020	05/19/18 21:13 / rlh
Lithium	8	mg/kg	D	5		SW6010B	06/02/18 14:43 / by
Manganese	263	mg/kg		1		SW6020	05/19/18 21:13 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 14:55 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 05:00 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 21:13 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 21:13 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	06/04/18 14:22 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/04/18 14:22 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/04/18 14:22 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-023
Client Sample ID: TLN-1805-086

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 11:35
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.9	wt%		0.2		D2974	05/22/18 18:05 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.9	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	6.2	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	17.6	meq/L		0.05		SW6010B	05/19/18 07:16 / rjh
Magnesium, sat. paste	82.5	meq/L		0.08		SW6010B	05/19/18 07:16 / rjh
Potassium, sat. paste	0.39	meq/L	D	0.09		SW6010B	05/22/18 17:49 / rjh
Sodium, sat. paste	26.9	meq/L	D	0.09		SW6010B	05/19/18 07:16 / rjh
Sodium Adsorption Ratio (SAR)	3.79	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	56	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	15	mg/L	D	5		E300.0	05/20/18 06:11 / ens
Chloride	204	mg/L	D	2		E300.0	05/20/18 06:11 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/20/18 06:11 / ens
Sulfate	6240	mg/L	D	10		E300.0	05/20/18 06:11 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 22:03 / rlh
Arsenic	4	mg/kg		1		SW6020	05/19/18 22:03 / rlh
Barium	34	mg/kg		1		SW6020	05/19/18 22:03 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 05:20 / rlh
Boron	18	mg/kg		1		SW6010B	06/02/18 18:09 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 22:03 / rlh
Chromium	13	mg/kg		1		SW6020	05/25/18 05:20 / rlh
Cobalt	6	mg/kg		1		SW6020	05/25/18 05:20 / rlh
Lead	7	mg/kg		1		SW6020	05/19/18 22:03 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/02/18 18:09 / by
Manganese	2410	mg/kg		1		SW6020	05/19/18 22:03 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 14:56 / jag
Molybdenum	2	mg/kg		1		SW6020	05/25/18 05:20 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 22:03 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 22:03 / rlh
RADIONUCLIDES							
Radium 226	0.7	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 226 precision (±)	0.2	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	06/04/18 14:22 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/04/18 14:22 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/04/18 14:22 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-023
Client Sample ID: TLN-1805-086

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 11:35
DateReceived: 05/11/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Manganese	ND	mg/L		0.001		SW6020	08/03/18 04:26 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-024
Client Sample ID: TLN-1805-087

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 11:50
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.6	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.8	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	5.7	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	19.6	meq/L		0.05		SW6010B	05/19/18 07:24 / rjh
Magnesium, sat. paste	75.5	meq/L		0.08		SW6010B	05/19/18 07:24 / rjh
Potassium, sat. paste	0.79	meq/L	D	0.04		SW6010B	05/22/18 17:56 / rjh
Sodium, sat. paste	19.9	meq/L	D	0.09		SW6010B	05/19/18 07:24 / rjh
Sodium Adsorption Ratio (SAR)	2.89	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	107	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L	D	5		E300.0	05/20/18 07:11 / ens
Chloride	58	mg/L	D	2		E300.0	05/20/18 07:11 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/20/18 07:11 / ens
Sulfate	5850	mg/L	D	10		E300.0	05/20/18 07:11 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 22:08 / rlh
Arsenic	4	mg/kg		1		SW6020	05/19/18 22:08 / rlh
Barium	275	mg/kg		1		SW6020	05/25/18 05:24 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 05:24 / rlh
Boron	39	mg/kg		1		SW6010B	06/02/18 18:13 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 22:08 / rlh
Chromium	12	mg/kg		1		SW6020	05/25/18 05:24 / rlh
Cobalt	7	mg/kg		1		SW6020	05/25/18 05:24 / rlh
Lead	9	mg/kg		1		SW6020	05/19/18 22:08 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/02/18 18:13 / by
Manganese	390	mg/kg		1		SW6020	05/19/18 22:08 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 14:58 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 05:24 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 22:08 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 22:08 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 228	0.4	pCi/g-dry	U			RA-05	06/04/18 14:22 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/04/18 14:22 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/04/18 14:22 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-025
Client Sample ID: TLN-1805-088

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 11:55
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	17.5	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	8.1	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	10.0	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	18.8	meq/L		0.05		SW6010B	05/19/18 07:28 / rjh
Magnesium, sat. paste	225	meq/L		0.08		SW6010B	05/22/18 18:00 / rjh
Potassium, sat. paste	1.27	meq/L	D	0.09		SW6010B	05/22/18 18:00 / rjh
Sodium, sat. paste	64.1	meq/L	D	0.09		SW6010B	05/19/18 07:28 / rjh
Sodium Adsorption Ratio (SAR)	5.81	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	213	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	25	mg/L	D	5		E300.0	05/20/18 07:32 / ens
Chloride	537	mg/L	D	2		E300.0	05/20/18 07:32 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/20/18 07:32 / ens
Sulfate	14700	mg/L	D	50		E300.0	05/22/18 06:55 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 22:13 / rlh
Arsenic	9	mg/kg		1		SW6020	05/19/18 22:13 / rlh
Barium	136	mg/kg		1		SW6020	05/19/18 22:13 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 05:27 / rlh
Boron	47	mg/kg		1		SW6010B	06/02/18 18:17 / by
Cadmium	4	mg/kg		1		SW6020	05/19/18 22:13 / rlh
Chromium	14	mg/kg		1		SW6020	05/25/18 05:27 / rlh
Cobalt	6	mg/kg		1		SW6020	05/25/18 05:27 / rlh
Lead	13	mg/kg		1		SW6020	05/19/18 22:13 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/02/18 18:17 / by
Manganese	219	mg/kg		1		SW6020	05/19/18 22:13 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 15:00 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 05:27 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 22:13 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 22:13 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	06/04/18 14:22 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/04/18 14:22 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/04/18 14:22 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-026
Client Sample ID: TLN-1805-089

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 12:05
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.2	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	8.1	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	6.4	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	18.7	meq/L		0.05		SW6010B	05/19/18 07:32 / rjh
Magnesium, sat. paste	141	meq/L		0.08		SW6010B	05/19/18 07:32 / rjh
Potassium, sat. paste	1.35	meq/L	D	0.09		SW6010B	05/22/18 18:04 / rjh
Sodium, sat. paste	45.2	meq/L	D	0.09		SW6010B	05/19/18 07:32 / rjh
Sodium Adsorption Ratio (SAR)	5.05	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	120	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	12	mg/L	D	5		E300.0	05/20/18 07:53 / ens
Chloride	329	mg/L	D	2		E300.0	05/20/18 07:53 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/20/18 07:53 / ens
Sulfate	10100	mg/L	D	20		E300.0	05/22/18 07:34 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 22:17 / rlh
Arsenic	2	mg/kg		1		SW6020	05/19/18 22:17 / rlh
Barium	99	mg/kg		1		SW6020	05/19/18 22:17 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 05:36 / rlh
Boron	27	mg/kg		1		SW6010B	06/02/18 18:21 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 22:17 / rlh
Chromium	17	mg/kg		1		SW6020	05/25/18 05:36 / rlh
Cobalt	5	mg/kg		1		SW6020	05/25/18 05:36 / rlh
Lead	6	mg/kg		1		SW6020	05/19/18 22:17 / rlh
Lithium	7	mg/kg	D	5		SW6010B	06/02/18 18:21 / by
Manganese	321	mg/kg		1		SW6020	05/19/18 22:17 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 15:01 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 05:36 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 22:17 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 22:17 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 228	0.3	pCi/g-dry	U			RA-05	06/04/18 14:22 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/04/18 14:22 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/04/18 14:22 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-027
Client Sample ID: TLN-1805-090

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 12:40
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.2	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	0.7	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	3.82	meq/L		0.05		SW6010B	05/19/18 07:36 / rjh
Magnesium, sat. paste	2.33	meq/L		0.08		SW6010B	05/19/18 07:36 / rjh
Potassium, sat. paste	0.82	meq/L		0.03		SW6010B	05/22/18 18:08 / rjh
Sodium, sat. paste	0.21	meq/L		0.04		SW6010B	05/22/18 18:08 / rjh
Sodium Adsorption Ratio (SAR)	0.12	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	115	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L		0.5		E300.0	05/20/18 08:12 / ens
Chloride	10	mg/L		1		E300.0	05/20/18 08:12 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/20/18 08:12 / ens
Sulfate	60	mg/L		1		E300.0	05/20/18 08:12 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 22:22 / rlh
Arsenic	5	mg/kg		1		SW6020	05/19/18 22:22 / rlh
Barium	188	mg/kg		1		SW6020	05/19/18 22:22 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 05:39 / rlh
Boron	15	mg/kg		1		SW6010B	06/02/18 18:26 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 22:22 / rlh
Chromium	15	mg/kg		1		SW6020	05/25/18 05:39 / rlh
Cobalt	6	mg/kg		1		SW6020	05/25/18 05:39 / rlh
Lead	9	mg/kg		1		SW6020	05/19/18 22:22 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/02/18 18:26 / by
Manganese	383	mg/kg		1		SW6020	05/19/18 22:22 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 15:03 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 05:39 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 22:22 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 22:22 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/10/18 12:46 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	06/04/18 14:22 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/04/18 14:22 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/04/18 14:22 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-028
Client Sample ID: TLN-1805-091

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 12:45
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	11.4	wt%		0.2		D2974	05/22/18 18:05 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	3.0	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	23.1	meq/L		0.05		SW6010B	05/19/18 07:40 / rjh
Magnesium, sat. paste	21.0	meq/L		0.08		SW6010B	05/19/18 07:40 / rjh
Potassium, sat. paste	0.58	meq/L		0.03		SW6010B	05/22/18 18:20 / rjh
Sodium, sat. paste	1.74	meq/L		0.04		SW6010B	05/22/18 18:20 / rjh
Sodium Adsorption Ratio (SAR)	0.37	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	64	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L	D	2		E300.0	05/20/18 08:32 / ens
Chloride	8	mg/L		1		E300.0	05/20/18 08:32 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/20/18 08:32 / ens
Sulfate	2560	mg/L	D	5		E300.0	05/20/18 08:32 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 22:40 / rlh
Arsenic	2	mg/kg		1		SW6020	05/19/18 22:40 / rlh
Barium	20	mg/kg		1		SW6020	05/19/18 22:40 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 05:42 / rlh
Boron	12	mg/kg		1		SW6010B	06/02/18 18:30 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 22:40 / rlh
Chromium	15	mg/kg		1		SW6020	05/25/18 05:42 / rlh
Cobalt	6	mg/kg		1		SW6020	05/25/18 05:42 / rlh
Lead	6	mg/kg		1		SW6020	05/19/18 22:40 / rlh
Lithium	ND	mg/kg	D	5		SW6010B	06/02/18 18:30 / by
Manganese	244	mg/kg		1		SW6020	05/19/18 22:40 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 15:05 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 05:42 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 22:40 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 22:40 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 228	0.3	pCi/g-dry	U			RA-05	06/06/18 14:02 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-029
Client Sample ID: TLN-1805-092

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 12:55
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	12.5	wt%		0.2		D2974	05/22/18 18:05 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.7	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	6.1	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	17.4	meq/L		0.05		SW6010B	05/19/18 07:44 / rjh
Magnesium, sat. paste	77.1	meq/L		0.08		SW6010B	05/19/18 07:44 / rjh
Potassium, sat. paste	0.87	meq/L	D	0.04		SW6010B	05/22/18 18:24 / rjh
Sodium, sat. paste	23.4	meq/L	D	0.09		SW6010B	05/19/18 07:44 / rjh
Sodium Adsorption Ratio (SAR)	3.41	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	63	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	13	mg/L	D	5		E300.0	05/20/18 08:51 / ens
Chloride	165	mg/L	D	2		E300.0	05/20/18 08:51 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/20/18 08:51 / ens
Sulfate	6010	mg/L	D	10		E300.0	05/20/18 08:51 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 22:45 / rlh
Arsenic	2	mg/kg		1		SW6020	05/19/18 22:45 / rlh
Barium	23	mg/kg		1		SW6020	05/19/18 22:45 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 05:45 / rlh
Boron	19	mg/kg		1		SW6010B	06/02/18 18:42 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 22:45 / rlh
Chromium	18	mg/kg		1		SW6020	05/25/18 05:45 / rlh
Cobalt	7	mg/kg		1		SW6020	05/25/18 05:45 / rlh
Lead	9	mg/kg		1		SW6020	05/19/18 22:45 / rlh
Lithium	4.9	mg/kg	D	5		SW6010B	06/02/18 18:42 / by
Manganese	452	mg/kg		1		SW6020	05/19/18 22:45 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 15:07 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 05:45 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 22:45 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 22:45 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-030
Client Sample ID: TLN-1805-093

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 13:10
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	20.2	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.9	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	1.5	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	4.50	meq/L		0.05		SW6010B	05/19/18 07:48 / rjh
Magnesium, sat. paste	8.65	meq/L		0.08		SW6010B	05/19/18 07:48 / rjh
Potassium, sat. paste	0.65	meq/L		0.03		SW6010B	05/22/18 18:28 / rjh
Sodium, sat. paste	3.66	meq/L		0.04		SW6010B	05/19/18 07:48 / rjh
Sodium Adsorption Ratio (SAR)	1.43	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	245	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L	D	1		E300.0	05/20/18 09:11 / ens
Chloride	17	mg/L		1		E300.0	05/20/18 09:11 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/20/18 09:11 / ens
Sulfate	699	mg/L	D	2		E300.0	05/20/18 09:11 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 22:49 / rlh
Arsenic	7	mg/kg		1		SW6020	05/19/18 22:49 / rlh
Barium	634	mg/kg		1		SW6020	05/19/18 22:49 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 05:48 / rlh
Boron	25	mg/kg		1		SW6010B	06/02/18 18:46 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 22:49 / rlh
Chromium	14	mg/kg		1		SW6020	05/25/18 05:48 / rlh
Cobalt	7	mg/kg		1		SW6020	05/25/18 05:48 / rlh
Lead	11	mg/kg		1		SW6020	05/19/18 22:49 / rlh
Lithium	15	mg/kg	D	5		SW6010B	06/02/18 18:46 / by
Manganese	302	mg/kg		1		SW6020	05/19/18 22:49 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 10:25 / jag
Molybdenum	1	mg/kg		1		SW6020	05/25/18 05:48 / rlh
Selenium	ND	mg/kg		1		SW6020	06/14/18 22:46 / jcg
Thallium	ND	mg/kg		1		SW6020	05/19/18 22:49 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-030
Client Sample ID: TLN-1805-093

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 13:10
DateReceived: 05/11/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Barium	0.09	mg/L		0.05		SW6020	08/03/18 04:30 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-031
Client Sample ID: TLN-1805-094

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 13:12
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	19.0	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	1.5	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	4.35	meq/L		0.05		SW6010B	05/19/18 07:52 / rjh
Magnesium, sat. paste	9.18	meq/L		0.08		SW6010B	05/19/18 07:52 / rjh
Potassium, sat. paste	0.63	meq/L		0.03		SW6010B	05/22/18 18:32 / rjh
Sodium, sat. paste	3.71	meq/L		0.04		SW6010B	05/19/18 07:52 / rjh
Sodium Adsorption Ratio (SAR)	1.43	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	272	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L	D	1		E300.0	05/20/18 09:30 / ens
Chloride	14	mg/L		1		E300.0	05/20/18 09:30 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/20/18 09:30 / ens
Sulfate	706	mg/L	D	2		E300.0	05/20/18 09:30 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 22:54 / rlh
Arsenic	5	mg/kg		1		SW6020	05/19/18 22:54 / rlh
Barium	543	mg/kg		1		SW6020	05/25/18 05:51 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 05:51 / rlh
Boron	28	mg/kg		1		SW6010B	06/02/18 18:50 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 22:54 / rlh
Chromium	13	mg/kg		1		SW6020	05/25/18 05:51 / rlh
Cobalt	6	mg/kg		1		SW6020	05/25/18 05:51 / rlh
Lead	9	mg/kg		1		SW6020	05/19/18 22:54 / rlh
Lithium	14	mg/kg	D	5		SW6010B	06/02/18 18:50 / by
Manganese	286	mg/kg		1		SW6020	05/19/18 22:54 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 10:27 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 05:51 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 22:54 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 22:54 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 228	0.3	pCi/g-dry	U			RA-05	06/06/18 14:02 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-031
Client Sample ID: TLN-1805-094

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 13:12
DateReceived: 05/11/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Barium	0.10	mg/L		0.05		SW6020	08/03/18 04:34 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-032
Client Sample ID: TLN-1805-095

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 13:15
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.6	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	1.9	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	6.16	meq/L		0.05		SW6010B	05/22/18 18:36 / rjh
Magnesium, sat. paste	12.2	meq/L		0.08		SW6010B	05/19/18 08:04 / rjh
Potassium, sat. paste	0.81	meq/L		0.03		SW6010B	05/22/18 18:36 / rjh
Sodium, sat. paste	5.36	meq/L		0.04		SW6010B	05/19/18 08:04 / rjh
Sodium Adsorption Ratio (SAR)	1.77	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	188	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L	D	1		E300.0	05/20/18 10:09 / ens
Chloride	29	mg/L		1		E300.0	05/20/18 10:09 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/20/18 10:09 / ens
Sulfate	1090	mg/L	D	2		E300.0	05/20/18 10:09 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 22:59 / rlh
Arsenic	10	mg/kg		1		SW6020	05/19/18 22:59 / rlh
Barium	250	mg/kg		1		SW6020	05/19/18 22:59 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 05:54 / rlh
Boron	16	mg/kg		1		SW6010B	06/02/18 18:54 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 22:59 / rlh
Chromium	14	mg/kg		1		SW6020	05/25/18 05:54 / rlh
Cobalt	7	mg/kg		1		SW6020	05/25/18 05:54 / rlh
Lead	11	mg/kg		1		SW6020	05/19/18 22:59 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/02/18 18:54 / by
Manganese	338	mg/kg		1		SW6020	05/19/18 22:59 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 10:28 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 05:54 / rlh
Selenium	ND	mg/kg		1		SW6020	05/19/18 22:59 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 22:59 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-033
Client Sample ID: TLN-1805-096

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 13:25
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.9	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	4.3	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	14.7	meq/L		0.05		SW6010B	05/22/18 18:44 / rjh
Magnesium, sat. paste	38.3	meq/L		0.08		SW6010B	05/19/18 08:12 / rjh
Potassium, sat. paste	1.01	meq/L	D	0.04		SW6010B	05/22/18 18:44 / rjh
Sodium, sat. paste	17.0	meq/L		0.04		SW6010B	05/19/18 08:12 / rjh
Sodium Adsorption Ratio (SAR)	3.31	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	136	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L	D	2		E300.0	05/20/18 10:48 / ens
Chloride	93	mg/L		1		E300.0	05/20/18 10:48 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/20/18 10:48 / ens
Sulfate	3490	mg/L	D	5		E300.0	05/20/18 10:48 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 23:03 / rlh
Arsenic	13	mg/kg		1		SW6020	05/25/18 05:57 / rlh
Barium	355	mg/kg		1		SW6020	05/25/18 05:57 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 05:57 / rlh
Boron	21	mg/kg		1		SW6010B	06/02/18 18:59 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 23:03 / rlh
Chromium	14	mg/kg		1		SW6020	05/25/18 05:57 / rlh
Cobalt	6	mg/kg		1		SW6020	05/25/18 05:57 / rlh
Lead	10	mg/kg		1		SW6020	05/19/18 23:03 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/02/18 18:59 / by
Manganese	822	mg/kg		1		SW6020	05/25/18 05:57 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 10:30 / jag
Molybdenum	1	mg/kg		1		SW6020	05/25/18 05:57 / rlh
Selenium	ND	mg/kg		1		SW6020	06/14/18 23:02 / jcg
Thallium	ND	mg/kg		1		SW6020	05/19/18 23:03 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 228	0.8	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-033
Client Sample ID: TLN-1805-096

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 13:25
DateReceived: 05/11/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Manganese	0.014	mg/L		0.001		SW6020	08/03/18 04:43 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-034
Client Sample ID: TLN-1805-097

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 13:55
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	18.9	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	3.8	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	11.5	meq/L		0.05		SW6010B	05/22/18 18:52 / rjh
Magnesium, sat. paste	32.6	meq/L		0.08		SW6010B	05/19/18 08:20 / rjh
Potassium, sat. paste	0.83	meq/L		0.03		SW6010B	05/22/18 18:52 / rjh
Sodium, sat. paste	15.4	meq/L		0.04		SW6010B	05/19/18 08:20 / rjh
Sodium Adsorption Ratio (SAR)	3.27	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	191	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L	D	2		E300.0	05/20/18 11:47 / ens
Chloride	78	mg/L		1		E300.0	05/20/18 11:47 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/20/18 11:47 / ens
Sulfate	2810	mg/L	D	5		E300.0	05/20/18 11:47 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 23:08 / rlh
Arsenic	5	mg/kg	D	2		SW6020	05/25/18 06:00 / rlh
Barium	931	mg/kg		1		SW6020	05/25/18 06:00 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 06:00 / rlh
Boron	41	mg/kg		1		SW6010B	06/02/18 19:03 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 23:08 / rlh
Chromium	13	mg/kg		1		SW6020	05/25/18 06:00 / rlh
Cobalt	5	mg/kg		1		SW6020	05/25/18 06:00 / rlh
Lead	8	mg/kg		1		SW6020	05/19/18 23:08 / rlh
Lithium	18	mg/kg	D	5		SW6010B	06/02/18 19:03 / by
Manganese	350	mg/kg		1		SW6020	05/25/18 06:00 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 10:32 / jag
Molybdenum	1	mg/kg		1		SW6020	05/25/18 06:00 / rlh
Selenium	ND	mg/kg		1		SW6020	06/14/18 23:05 / jcg
Thallium	ND	mg/kg		1		SW6020	05/19/18 23:08 / rlh
RADIONUCLIDES							
Radium 226	0.3	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 226 precision (±)	0.07	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 228	0.2	pCi/g-dry	U			RA-05	06/06/18 14:02 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-034
Client Sample ID: TLN-1805-097

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 13:55
DateReceived: 05/11/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Barium	0.11	mg/L		0.05		SW6020	08/03/18 04:47 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-035
Client Sample ID: TLN-1805-098

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 14:00
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	17.3	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	3.0	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	11.0	meq/L		0.05		SW6010B	05/22/18 18:56 / rjh
Magnesium, sat. paste	21.9	meq/L		0.08		SW6010B	05/19/18 08:25 / rjh
Potassium, sat. paste	0.66	meq/L		0.03		SW6010B	05/22/18 18:56 / rjh
Sodium, sat. paste	10.9	meq/L		0.04		SW6010B	05/19/18 08:25 / rjh
Sodium Adsorption Ratio (SAR)	2.69	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	109	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L	D	2		E300.0	05/20/18 12:06 / ens
Chloride	54	mg/L		1		E300.0	05/20/18 12:06 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/20/18 12:06 / ens
Sulfate	2130	mg/L	D	5		E300.0	05/20/18 12:06 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 23:12 / rlh
Arsenic	6	mg/kg	D	2		SW6020	05/25/18 06:03 / rlh
Barium	165	mg/kg		1		SW6020	05/19/18 23:12 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 06:03 / rlh
Boron	10	mg/kg		1		SW6010B	06/02/18 19:08 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 23:12 / rlh
Chromium	12	mg/kg		1		SW6020	05/25/18 06:03 / rlh
Cobalt	7	mg/kg		1		SW6020	05/25/18 06:03 / rlh
Lead	9	mg/kg		1		SW6020	05/19/18 23:12 / rlh
Lithium	9	mg/kg	D	5		SW6010B	06/02/18 19:08 / by
Manganese	176	mg/kg		1		SW6010B	06/02/18 19:08 / by
Mercury	ND	mg/kg		1		SW7471B	05/22/18 10:34 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 06:03 / rlh
Selenium	ND	mg/kg		1		SW6020	06/14/18 23:19 / jcg
Thallium	ND	mg/kg		1		SW6020	05/19/18 23:12 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-036
Client Sample ID: TLN-1805-099

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 14:10
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	18.7	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	2.1	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	10.1	meq/L		0.05		SW6010B	05/22/18 19:08 / rjh
Magnesium, sat. paste	10.5	meq/L		0.08		SW6010B	05/19/18 08:29 / rjh
Potassium, sat. paste	0.59	meq/L		0.03		SW6010B	05/22/18 19:08 / rjh
Sodium, sat. paste	6.50	meq/L		0.04		SW6010B	05/19/18 08:29 / rjh
Sodium Adsorption Ratio (SAR)	2.03	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	90	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L	D	1		E300.0	05/20/18 12:26 / ens
Chloride	34	mg/L		1		E300.0	05/20/18 12:26 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/20/18 12:26 / ens
Sulfate	1320	mg/L	D	2		E300.0	05/20/18 12:26 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 23:17 / rlh
Arsenic	14	mg/kg	D	2		SW6020	05/25/18 06:13 / rlh
Barium	443	mg/kg		1		SW6020	05/19/18 23:17 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 06:13 / rlh
Boron	9	mg/kg		1		SW6010B	06/02/18 19:12 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 23:17 / rlh
Chromium	16	mg/kg		1		SW6020	05/25/18 06:13 / rlh
Cobalt	11	mg/kg		1		SW6020	05/25/18 06:13 / rlh
Lead	17	mg/kg		1		SW6020	05/19/18 23:17 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/02/18 19:12 / by
Manganese	389	mg/kg		1		SW6010B	06/02/18 19:12 / by
Mercury	ND	mg/kg		1		SW7471B	05/22/18 10:35 / jag
Molybdenum	1	mg/kg		1		SW6020	05/25/18 06:13 / rlh
Selenium	ND	mg/kg		1		SW6020	06/14/18 23:22 / jcg
Thallium	ND	mg/kg		1		SW6020	05/19/18 23:17 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-036
Client Sample ID: TLN-1805-099

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 14:10
DateReceived: 05/11/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Arsenic	0.002	mg/L		0.001		SW6020	08/03/18 05:04 / car
Barium	ND	mg/L		0.05		SW6020	08/03/18 05:04 / car
Cobalt	ND	mg/L		0.005		SW6020	08/03/18 05:04 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-037
Client Sample ID: TLN-1805-100

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 14:15
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.6	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	1.2	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	4.38	meq/L		0.05		SW6010B	05/22/18 19:12 / rjh
Magnesium, sat. paste	5.87	meq/L		0.08		SW6010B	05/19/18 08:33 / rjh
Potassium, sat. paste	0.51	meq/L		0.03		SW6010B	05/22/18 19:12 / rjh
Sodium, sat. paste	2.83	meq/L		0.04		SW6010B	05/19/18 08:33 / rjh
Sodium Adsorption Ratio (SAR)	1.25	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	217	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L		0.5		E300.0	05/20/18 12:45 / ens
Chloride	12	mg/L		1		E300.0	05/20/18 12:45 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/20/18 12:45 / ens
Sulfate	488	mg/L		1		E300.0	05/20/18 12:45 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 23:22 / rlh
Arsenic	7	mg/kg	D	2		SW6020	05/25/18 06:16 / rlh
Barium	185	mg/kg		1		SW6020	05/25/18 06:16 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 06:16 / rlh
Boron	9	mg/kg		1		SW6010B	06/02/18 19:17 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 23:22 / rlh
Chromium	13	mg/kg		1		SW6020	05/25/18 06:16 / rlh
Cobalt	7	mg/kg		1		SW6020	05/25/18 06:16 / rlh
Lead	10	mg/kg		1		SW6020	05/19/18 23:22 / rlh
Lithium	10	mg/kg	D	5		SW6010B	06/02/18 19:17 / by
Manganese	337	mg/kg		1		SW6020	05/25/18 06:16 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 10:37 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 06:16 / rlh
Selenium	ND	mg/kg		1		SW6020	06/14/18 23:25 / jcg
Thallium	ND	mg/kg		1		SW6020	05/19/18 23:22 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/11/18 14:29 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/06/18 14:02 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-038
Client Sample ID: TLN-1805-101

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 14:20
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.6	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	1.4	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	5.02	meq/L		0.05		SW6010B	05/22/18 19:16 / rjh
Magnesium, sat. paste	7.33	meq/L		0.08		SW6010B	05/19/18 08:37 / rjh
Potassium, sat. paste	0.50	meq/L		0.03		SW6010B	05/22/18 19:16 / rjh
Sodium, sat. paste	3.24	meq/L		0.04		SW6010B	05/19/18 08:37 / rjh
Sodium Adsorption Ratio (SAR)	1.30	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	160	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	0.5	mg/L		0.5		E300.0	05/20/18 13:05 / ens
Chloride	20	mg/L		1		E300.0	05/20/18 13:05 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/20/18 13:05 / ens
Sulfate	659	mg/L		1		E300.0	05/20/18 13:05 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 23:36 / rlh
Arsenic	11	mg/kg		1		SW6020	05/25/18 06:19 / rlh
Barium	227	mg/kg		1		SW6020	05/19/18 23:36 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 06:19 / rlh
Boron	9	mg/kg		1		SW6010B	06/02/18 19:21 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 23:36 / rlh
Chromium	13	mg/kg		1		SW6020	05/25/18 06:19 / rlh
Cobalt	7	mg/kg		1		SW6020	05/25/18 06:19 / rlh
Lead	11	mg/kg		1		SW6020	05/19/18 23:36 / rlh
Lithium	9	mg/kg	D	5		SW6010B	06/02/18 19:21 / by
Manganese	384	mg/kg		1		SW6010B	06/02/18 19:21 / by
Mercury	ND	mg/kg		1		SW7471B	05/22/18 10:39 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 06:19 / rlh
Selenium	ND	mg/kg		1		SW6020	06/14/18 23:28 / jcg
Thallium	ND	mg/kg		1		SW6020	05/19/18 23:36 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/11/18 16:03 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/11/18 16:03 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/11/18 16:03 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	06/06/18 15:40 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/06/18 15:40 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/06/18 15:40 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-039
Client Sample ID: TLN-1805-102

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 14:25
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.6	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.7	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	1.0	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	3.72	meq/L		0.05		SW6010B	05/22/18 19:19 / rjh
Magnesium, sat. paste	4.99	meq/L		0.08		SW6010B	05/19/18 08:40 / rjh
Potassium, sat. paste	0.44	meq/L		0.03		SW6010B	05/22/18 19:19 / rjh
Sodium, sat. paste	2.32	meq/L		0.04		SW6010B	05/19/18 08:40 / rjh
Sodium Adsorption Ratio (SAR)	1.11	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	180	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L		0.5		E300.0	05/20/18 13:24 / ens
Chloride	10	mg/L		1		E300.0	05/20/18 13:24 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/20/18 13:24 / ens
Sulfate	411	mg/L		1		E300.0	05/20/18 13:24 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 23:40 / rlh
Arsenic	6	mg/kg	D	2		SW6020	05/25/18 06:22 / rlh
Barium	196	mg/kg		1		SW6020	05/19/18 23:40 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 06:22 / rlh
Boron	10	mg/kg		1		SW6010B	06/02/18 19:33 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 23:40 / rlh
Chromium	13	mg/kg		1		SW6020	05/25/18 06:22 / rlh
Cobalt	6	mg/kg		1		SW6020	05/25/18 06:22 / rlh
Lead	10	mg/kg		1		SW6020	05/19/18 23:40 / rlh
Lithium	10	mg/kg	D	5		SW6010B	06/02/18 19:33 / by
Manganese	262	mg/kg		1		SW6010B	06/02/18 19:33 / by
Mercury	ND	mg/kg		1		SW7471B	05/22/18 10:44 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 06:22 / rlh
Selenium	ND	mg/kg		1		SW6020	06/14/18 23:33 / jcg
Thallium	ND	mg/kg		1		SW6020	05/19/18 23:40 / rlh
RADIONUCLIDES							
Radium 226	0.2	pCi/g-dry				E903.0	06/11/18 16:03 / eli-ca
Radium 226 precision (±)	0.06	pCi/g-dry				E903.0	06/11/18 16:03 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/11/18 16:03 / eli-ca
Radium 228	0.1	pCi/g-dry	U			RA-05	06/06/18 15:40 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/06/18 15:40 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/06/18 15:40 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-040
Client Sample ID: TLN-1805-103

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 14:30
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.5	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	1.2	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	4.11	meq/L		0.05		SW6010B	05/19/18 09:20 / rjh
Magnesium, sat. paste	6.04	meq/L		0.08		SW6010B	05/19/18 09:20 / rjh
Potassium, sat. paste	0.46	meq/L		0.03		SW6010B	05/22/18 19:23 / rjh
Sodium, sat. paste	2.41	meq/L		0.04		SW6010B	05/22/18 19:23 / rjh
Sodium Adsorption Ratio (SAR)	1.07	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	156	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L		0.5		E300.0	05/20/18 13:44 / ens
Chloride	17	mg/L		1		E300.0	05/20/18 13:44 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/20/18 13:44 / ens
Sulfate	508	mg/L		1		E300.0	05/20/18 13:44 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 23:45 / rlh
Arsenic	6	mg/kg	D	2		SW6020	05/25/18 06:25 / rlh
Barium	231	mg/kg		1		SW6020	05/19/18 23:45 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 06:25 / rlh
Boron	12	mg/kg		1		SW6010B	06/02/18 19:37 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 23:45 / rlh
Chromium	13	mg/kg		1		SW6020	05/25/18 06:25 / rlh
Cobalt	6	mg/kg		1		SW6020	05/25/18 06:25 / rlh
Lead	10	mg/kg		1		SW6020	05/19/18 23:45 / rlh
Lithium	10	mg/kg	D	5		SW6010B	06/02/18 19:37 / by
Manganese	256	mg/kg		1		SW6010B	06/02/18 19:37 / by
Mercury	ND	mg/kg		1		SW7471B	05/22/18 10:46 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 06:25 / rlh
Selenium	ND	mg/kg		1		SW6020	06/14/18 23:36 / jcg
Thallium	ND	mg/kg		1		SW6020	05/19/18 23:45 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/11/18 16:03 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/11/18 16:03 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/11/18 16:03 / eli-ca
Radium 228	0.1	pCi/g-dry	U			RA-05	06/06/18 15:40 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/06/18 15:40 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/06/18 15:40 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-041
Client Sample ID: TLN-1805-104

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 14:40
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.5	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	1.1	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	3.89	meq/L		0.05		SW6010B	05/19/18 09:24 / rjh
Magnesium, sat. paste	5.18	meq/L		0.08		SW6010B	05/19/18 09:24 / rjh
Potassium, sat. paste	0.43	meq/L		0.03		SW6010B	05/22/18 19:27 / rjh
Sodium, sat. paste	2.44	meq/L		0.04		SW6010B	05/22/18 19:27 / rjh
Sodium Adsorption Ratio (SAR)	1.15	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	140	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L		0.5		E300.0	05/20/18 14:23 / ens
Chloride	14	mg/L		1		E300.0	05/20/18 14:23 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/20/18 14:23 / ens
Sulfate	484	mg/L		1		E300.0	05/20/18 14:23 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 23:49 / rlh
Arsenic	11	mg/kg	D	2		SW6020	05/25/18 06:28 / rlh
Barium	307	mg/kg		1		SW6020	05/19/18 23:49 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 06:28 / rlh
Boron	9	mg/kg		1		SW6010B	06/02/18 19:41 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 23:49 / rlh
Chromium	14	mg/kg		1		SW6020	05/25/18 06:28 / rlh
Cobalt	10	mg/kg		1		SW6020	05/25/18 06:28 / rlh
Lead	11	mg/kg		1		SW6020	05/19/18 23:49 / rlh
Lithium	10	mg/kg	D	5		SW6010B	06/02/18 19:41 / by
Manganese	590	mg/kg		1		SW6010B	06/02/18 19:41 / by
Mercury	ND	mg/kg		1		SW7471B	05/22/18 10:47 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 06:28 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/25/18 06:28 / rlh
Thallium	ND	mg/kg		1		SW6020	05/19/18 23:49 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/11/18 16:03 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/11/18 16:03 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/11/18 16:03 / eli-ca
Radium 228	-0.03	pCi/g-dry	U			RA-05	06/06/18 15:40 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/06/18 15:40 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/06/18 15:40 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-041
Client Sample ID: TLN-1805-104

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 14:40
DateReceived: 05/11/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Cobalt	ND	mg/L		0.005		SW6020	08/03/18 05:08 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-042
Client Sample ID: TLN-1805-105

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 14:50
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.7	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	0.9	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	2.97	meq/L		0.05		SW6010B	05/19/18 09:27 / rjh
Magnesium, sat. paste	4.28	meq/L		0.08		SW6010B	05/19/18 09:27 / rjh
Potassium, sat. paste	0.43	meq/L		0.03		SW6010B	05/22/18 19:31 / rjh
Sodium, sat. paste	1.67	meq/L		0.04		SW6010B	05/22/18 19:31 / rjh
Sodium Adsorption Ratio (SAR)	0.88	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	119	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L		0.5		E300.0	05/20/18 14:42 / ens
Chloride	8	mg/L		1		E300.0	05/20/18 14:42 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/20/18 14:42 / ens
Sulfate	348	mg/L		1		E300.0	05/20/18 14:42 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/19/18 23:54 / rlh
Arsenic	7	mg/kg	D	2		SW6020	05/25/18 06:31 / rlh
Barium	153	mg/kg		1		SW6020	05/25/18 06:31 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 06:31 / rlh
Boron	10	mg/kg		1		SW6010B	06/02/18 19:46 / by
Cadmium	ND	mg/kg		1		SW6020	05/19/18 23:54 / rlh
Chromium	16	mg/kg		1		SW6020	05/25/18 06:31 / rlh
Cobalt	7	mg/kg		1		SW6020	05/25/18 06:31 / rlh
Lead	11	mg/kg		1		SW6020	05/19/18 23:54 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/02/18 19:46 / by
Manganese	277	mg/kg		1		SW6010B	06/02/18 19:46 / by
Mercury	ND	mg/kg		1		SW7471B	05/22/18 10:49 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 06:31 / rlh
Selenium	ND	mg/kg		1		SW6020	06/14/18 23:42 / jcg
Thallium	ND	mg/kg		1		SW6020	05/19/18 23:54 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/11/18 16:04 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/11/18 16:04 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/11/18 16:04 / eli-ca
Radium 228	0.3	pCi/g-dry	U			RA-05	06/06/18 15:40 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/06/18 15:40 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/06/18 15:40 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-043
Client Sample ID: TLN-1805-106

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 14:55
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	18.6	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	1.0	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	3.06	meq/L		0.05		SW6010B	05/19/18 09:35 / rjh
Magnesium, sat. paste	4.88	meq/L		0.08		SW6010B	05/19/18 09:35 / rjh
Potassium, sat. paste	0.45	meq/L		0.03		SW6010B	05/22/18 19:39 / rjh
Sodium, sat. paste	1.91	meq/L		0.04		SW6010B	05/22/18 19:39 / rjh
Sodium Adsorption Ratio (SAR)	0.96	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	177	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L		0.5		E300.0	05/20/18 15:21 / ens
Chloride	10	mg/L		1		E300.0	05/20/18 15:21 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/20/18 15:21 / ens
Sulfate	374	mg/L		1		E300.0	05/20/18 15:21 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/20/18 01:51 / rlh
Arsenic	7	mg/kg		1		SW6020	05/20/18 01:51 / rlh
Barium	171	mg/kg		1		SW6020	05/25/18 07:01 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 07:01 / rlh
Boron	12	mg/kg		1		SW6010B	06/02/18 15:32 / by
Cadmium	ND	mg/kg		1		SW6020	05/20/18 01:51 / rlh
Chromium	16	mg/kg		1		SW6020	05/20/18 01:51 / rlh
Cobalt	7	mg/kg		1		SW6020	05/20/18 01:51 / rlh
Lead	12	mg/kg		1		SW6020	05/20/18 01:51 / rlh
Lithium	14	mg/kg	D	5		SW6010B	06/02/18 15:32 / by
Manganese	330	mg/kg		1		SW6010B	06/02/18 15:32 / by
Mercury	ND	mg/kg		1		SW7471B	05/22/18 10:51 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/20/18 01:51 / rlh
Selenium	ND	mg/kg		1		SW6020	05/20/18 01:51 / rlh
Thallium	ND	mg/kg		1		SW6020	05/20/18 01:51 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/12/18 10:13 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/12/18 10:13 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/12/18 10:13 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	06/06/18 15:40 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/06/18 15:40 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/06/18 15:40 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-044
Client Sample ID: TLN-1805-107

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 15:00
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	13.5	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	1.0	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	3.32	meq/L		0.05		SW6010B	05/19/18 09:43 / rjh
Magnesium, sat. paste	5.37	meq/L		0.08		SW6010B	05/19/18 09:43 / rjh
Potassium, sat. paste	0.43	meq/L		0.03		SW6010B	05/22/18 19:54 / rjh
Sodium, sat. paste	1.99	meq/L		0.04		SW6010B	05/22/18 19:54 / rjh
Sodium Adsorption Ratio (SAR)	0.96	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	70	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L		0.5		E300.0	05/20/18 16:20 / ens
Chloride	15	mg/L		1		E300.0	05/20/18 16:20 / ens
Fluoride	1	mg/L	D	1		E300.0	05/20/18 16:20 / ens
Sulfate	447	mg/L		1		E300.0	05/20/18 16:20 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/20/18 01:56 / rlh
Arsenic	9	mg/kg		1		SW6020	05/20/18 01:56 / rlh
Barium	258	mg/kg		1		SW6020	05/20/18 01:56 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 07:04 / rlh
Boron	10	mg/kg		1		SW6010B	06/02/18 15:44 / by
Cadmium	ND	mg/kg		1		SW6020	05/20/18 01:56 / rlh
Chromium	13	mg/kg		1		SW6020	05/20/18 01:56 / rlh
Cobalt	7	mg/kg		1		SW6020	05/20/18 01:56 / rlh
Lead	11	mg/kg		1		SW6020	05/20/18 01:56 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/02/18 15:44 / by
Manganese	325	mg/kg		1		SW6020	05/20/18 01:56 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 10:53 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/20/18 01:56 / rlh
Selenium	ND	mg/kg		1		SW6020	05/20/18 01:56 / rlh
Thallium	ND	mg/kg		1		SW6020	05/20/18 01:56 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 226 MDC	0.05	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 MDC	0.2	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-045
Client Sample ID: TLN-1805-108

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 15:05
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.8	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	0.8	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	3.14	meq/L		0.05		SW6010B	05/19/18 09:47 / rjh
Magnesium, sat. paste	3.86	meq/L		0.08		SW6010B	05/19/18 09:47 / rjh
Potassium, sat. paste	0.54	meq/L		0.03		SW6010B	05/22/18 19:58 / rjh
Sodium, sat. paste	0.96	meq/L		0.04		SW6010B	05/22/18 19:58 / rjh
Sodium Adsorption Ratio (SAR)	0.51	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	232	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L		0.5		E300.0	05/20/18 16:40 / ens
Chloride	5	mg/L		1		E300.0	05/20/18 16:40 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/20/18 16:40 / ens
Sulfate	212	mg/L		1		E300.0	05/20/18 16:40 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/20/18 02:01 / rlh
Arsenic	6	mg/kg		1		SW6020	05/20/18 02:01 / rlh
Barium	200	mg/kg		1		SW6020	05/20/18 02:01 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 07:07 / rlh
Boron	11	mg/kg		1		SW6010B	06/02/18 15:49 / by
Cadmium	ND	mg/kg		1		SW6020	05/20/18 02:01 / rlh
Chromium	14	mg/kg		1		SW6020	05/20/18 02:01 / rlh
Cobalt	7	mg/kg		1		SW6020	05/20/18 02:01 / rlh
Lead	11	mg/kg		1		SW6020	05/20/18 02:01 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/02/18 15:49 / by
Manganese	311	mg/kg		1		SW6020	05/20/18 02:01 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 10:54 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/20/18 02:01 / rlh
Selenium	ND	mg/kg		1		SW6020	05/20/18 02:01 / rlh
Thallium	ND	mg/kg		1		SW6020	05/20/18 02:01 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 226 MDC	0.05	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-046
Client Sample ID: TLN-1805-109

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 15:10
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.1	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	0.8	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	2.78	meq/L		0.05		SW6010B	05/19/18 09:51 / rjh
Magnesium, sat. paste	3.40	meq/L		0.08		SW6010B	05/19/18 09:51 / rjh
Potassium, sat. paste	0.49	meq/L		0.03		SW6010B	05/22/18 20:02 / rjh
Sodium, sat. paste	1.31	meq/L		0.04		SW6010B	05/22/18 20:02 / rjh
Sodium Adsorption Ratio (SAR)	0.75	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	163	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L		0.5		E300.0	05/20/18 16:59 / ens
Chloride	8	mg/L		1		E300.0	05/20/18 16:59 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/20/18 16:59 / ens
Sulfate	258	mg/L		1		E300.0	05/20/18 16:59 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/20/18 02:05 / rlh
Arsenic	18	mg/kg		1		SW6020	05/20/18 02:05 / rlh
Barium	537	mg/kg		1		SW6020	05/25/18 07:10 / rlh
Beryllium	1	mg/kg		1		SW6020	05/25/18 07:10 / rlh
Boron	11	mg/kg		1		SW6010B	06/02/18 15:53 / by
Cadmium	ND	mg/kg		1		SW6020	05/20/18 02:05 / rlh
Chromium	20	mg/kg		1		SW6020	05/20/18 02:05 / rlh
Cobalt	10	mg/kg		1		SW6020	05/20/18 02:05 / rlh
Lead	13	mg/kg		1		SW6020	05/20/18 02:05 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/02/18 15:53 / by
Manganese	1790	mg/kg		1		SW6020	05/20/18 02:05 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 10:56 / jag
Molybdenum	5	mg/kg		1		SW6020	05/20/18 02:05 / rlh
Selenium	ND	mg/kg		1		SW6020	05/20/18 02:05 / rlh
Thallium	ND	mg/kg		1		SW6020	05/20/18 02:05 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 MDC	0.2	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-046
Client Sample ID: TLN-1805-109

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 15:10
DateReceived: 05/11/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Arsenic	0.006	mg/L		0.001		SW6020	08/03/18 05:12 / car
Barium	0.15	mg/L		0.05		SW6020	08/03/18 05:12 / car
Cobalt	ND	mg/L		0.005		SW6020	08/03/18 05:12 / car
Manganese	0.160	mg/L		0.001		SW6020	08/03/18 05:12 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-047
Client Sample ID: TLN-1805-110

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 15:55
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	12.6	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	3.1	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	26.3	meq/L		0.05		SW6010B	05/19/18 09:55 / rjh
Magnesium, sat. paste	16.7	meq/L		0.08		SW6010B	05/19/18 09:55 / rjh
Potassium, sat. paste	1.74	meq/L	D	0.04		SW6010B	05/22/18 20:06 / rjh
Sodium, sat. paste	2.92	meq/L	D	0.09		SW6010B	05/22/18 20:06 / rjh
Sodium Adsorption Ratio (SAR)	0.63	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	148	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L	D	2		E300.0	05/20/18 17:19 / ens
Chloride	7	mg/L		1		E300.0	05/20/18 17:19 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/20/18 17:19 / ens
Sulfate	2410	mg/L	D	5		E300.0	05/20/18 17:19 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/20/18 02:10 / rlh
Arsenic	10	mg/kg		1		SW6020	05/20/18 02:10 / rlh
Barium	239	mg/kg		1		SW6020	05/20/18 02:10 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 07:13 / rlh
Boron	46	mg/kg		1		SW6010B	06/02/18 15:57 / by
Cadmium	ND	mg/kg		1		SW6020	05/20/18 02:10 / rlh
Chromium	14	mg/kg		1		SW6020	05/20/18 02:10 / rlh
Cobalt	6	mg/kg		1		SW6020	05/20/18 02:10 / rlh
Lead	13	mg/kg		1		SW6020	05/20/18 02:10 / rlh
Lithium	19	mg/kg	D	5		SW6010B	06/02/18 15:57 / by
Manganese	292	mg/kg		1		SW6020	05/20/18 02:10 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 10:58 / jag
Molybdenum	3	mg/kg		1		SW6020	05/20/18 02:10 / rlh
Selenium	ND	mg/kg		1		SW6020	05/20/18 02:10 / rlh
Thallium	ND	mg/kg		1		SW6020	05/20/18 02:10 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 228	1	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 MDC	0.2	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-048
Client Sample ID: TLN-1805-111

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 16:00
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.7	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.8	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	5.3	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	21.7	meq/L		0.05		SW6010B	05/19/18 10:06 / rjh
Magnesium, sat. paste	68.1	meq/L		0.08		SW6010B	05/19/18 10:06 / rjh
Potassium, sat. paste	1.64	meq/L	D	0.04		SW6010B	05/22/18 20:10 / rjh
Sodium, sat. paste	15.9	meq/L	D	0.09		SW6010B	05/22/18 20:10 / rjh
Sodium Adsorption Ratio (SAR)	2.37	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	100	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L	D	5		E300.0	05/20/18 17:38 / ens
Chloride	32	mg/L	D	2		E300.0	05/20/18 17:38 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/20/18 17:38 / ens
Sulfate	5500	mg/L	D	10		E300.0	05/20/18 17:38 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/20/18 02:14 / rlh
Arsenic	3	mg/kg		1		SW6020	05/20/18 02:14 / rlh
Barium	35	mg/kg		1		SW6020	05/20/18 02:14 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 07:16 / rlh
Boron	53	mg/kg		1		SW6010B	06/02/18 16:01 / by
Cadmium	ND	mg/kg		1		SW6020	05/20/18 02:14 / rlh
Chromium	13	mg/kg		1		SW6020	05/20/18 02:14 / rlh
Cobalt	8	mg/kg		1		SW6020	05/20/18 02:14 / rlh
Lead	14	mg/kg		1		SW6020	05/20/18 02:14 / rlh
Lithium	18	mg/kg	D	5		SW6010B	06/02/18 16:01 / by
Manganese	242	mg/kg		1		SW6020	05/20/18 02:14 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 10:59 / jag
Molybdenum	2	mg/kg		1		SW6020	05/20/18 02:14 / rlh
Selenium	ND	mg/kg		1		SW6020	05/20/18 02:14 / rlh
Thallium	ND	mg/kg		1		SW6020	05/20/18 02:14 / rlh
RADIONUCLIDES							
Radium 226	0.7	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 226 precision (±)	0.2	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 MDC	0.2	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-049
Client Sample ID: TLN-1805-112

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 16:05
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.8	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.7	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	2.7	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	29.0	meq/L		0.05		SW6010B	05/19/18 10:10 / rjh
Magnesium, sat. paste	10.9	meq/L		0.08		SW6010B	05/19/18 10:10 / rjh
Potassium, sat. paste	1.56	meq/L		0.03		SW6010B	05/19/18 10:10 / rjh
Sodium, sat. paste	0.70	meq/L		0.04		SW6010B	05/19/18 10:10 / rjh
Sodium Adsorption Ratio (SAR)	0.16	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	96	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L	D	1		E300.0	05/20/18 17:58 / ens
Chloride	9	mg/L		1		E300.0	05/20/18 17:58 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/20/18 17:58 / ens
Sulfate	1980	mg/L	D	5		E300.0	05/22/18 07:53 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/20/18 02:19 / rlh
Arsenic	6	mg/kg		1		SW6020	05/20/18 02:19 / rlh
Barium	217	mg/kg		1		SW6020	05/25/18 07:25 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 07:25 / rlh
Boron	49	mg/kg		1		SW6010B	06/02/18 16:06 / by
Cadmium	ND	mg/kg		1		SW6020	05/20/18 02:19 / rlh
Chromium	16	mg/kg		1		SW6020	05/20/18 02:19 / rlh
Cobalt	6	mg/kg		1		SW6020	05/20/18 02:19 / rlh
Lead	12	mg/kg		1		SW6020	05/20/18 02:19 / rlh
Lithium	16	mg/kg	D	5		SW6010B	06/02/18 16:06 / by
Manganese	284	mg/kg		1		SW6020	05/20/18 02:19 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 09:35 / jag
Molybdenum	1	mg/kg		1		SW6020	05/20/18 02:19 / rlh
Selenium	ND	mg/kg		1		SW6020	05/20/18 02:19 / rlh
Thallium	ND	mg/kg		1		SW6020	05/20/18 02:19 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 MDC	0.2	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-050
Client Sample ID: TLN-1805-113

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 16:10
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	21.4	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	8.1	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	6.6	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	16.0	meq/L		0.05		SW6010B	05/19/18 10:14 / rjh
Magnesium, sat. paste	89.6	meq/L		0.08		SW6010B	05/19/18 10:14 / rjh
Potassium, sat. paste	3.23	meq/L	D	0.09		SW6010B	05/22/18 20:17 / rjh
Sodium, sat. paste	30.9	meq/L	D	0.2		SW6010B	05/22/18 20:17 / rjh
Sodium Adsorption Ratio (SAR)	4.25	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	210	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L	D	5		E300.0	05/20/18 18:37 / ens
Chloride	40	mg/L	D	2		E300.0	05/20/18 18:37 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/20/18 18:37 / ens
Sulfate	6970	mg/L	D	10		E300.0	05/20/18 18:37 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/20/18 02:38 / rlh
Arsenic	5	mg/kg		1		SW6020	05/20/18 02:38 / rlh
Barium	314	mg/kg		1		SW6020	05/25/18 07:28 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 07:28 / rlh
Boron	155	mg/kg		1		SW6010B	06/02/18 16:10 / by
Cadmium	ND	mg/kg		1		SW6020	05/20/18 02:38 / rlh
Chromium	18	mg/kg		1		SW6020	05/20/18 02:38 / rlh
Cobalt	6	mg/kg		1		SW6020	05/20/18 02:38 / rlh
Lead	12	mg/kg		1		SW6020	05/20/18 02:38 / rlh
Lithium	30	mg/kg	D	5		SW6010B	06/02/18 16:10 / by
Manganese	327	mg/kg		1		SW6020	05/20/18 02:38 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 09:37 / jag
Molybdenum	1	mg/kg		1		SW6020	05/25/18 07:28 / rlh
Selenium	ND	mg/kg		1		SW6020	05/20/18 02:38 / rlh
Thallium	ND	mg/kg		1		SW6020	05/20/18 02:38 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 228	0.8	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 MDC	0.2	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-050
Client Sample ID: TLN-1805-113

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 16:10
DateReceived: 05/11/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Barium	ND	mg/L		0.05		SW6020	08/03/18 05:16 / car
Boron	5.81	mg/L		0.05		SW6010B	08/03/18 20:10 / jcg

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-051
Client Sample ID: TLN-1805-114

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 16:15
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.0	wt%		0.2		D2974	05/18/18 16:38 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	8.0	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	6.2	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	20.9	meq/L		0.05		SW6010B	05/19/18 10:18 / rjh
Magnesium, sat. paste	86.0	meq/L		0.08		SW6010B	05/19/18 10:18 / rjh
Potassium, sat. paste	1.59	meq/L	D	0.09		SW6010B	05/22/18 20:21 / rjh
Sodium, sat. paste	22.2	meq/L	D	0.2		SW6010B	05/22/18 20:21 / rjh
Sodium Adsorption Ratio (SAR)	3.04	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	83	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	14	mg/L	D	5		E300.0	05/20/18 18:56 / ens
Chloride	169	mg/L	D	2		E300.0	05/20/18 18:56 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/20/18 18:56 / ens
Sulfate	6570	mg/L	D	10		E300.0	05/20/18 18:56 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/20/18 02:42 / rlh
Arsenic	2	mg/kg		1		SW6020	05/20/18 02:42 / rlh
Barium	46	mg/kg		1		SW6020	05/20/18 02:42 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 07:31 / rlh
Boron	29	mg/kg		1		SW6010B	06/02/18 16:14 / by
Cadmium	ND	mg/kg		1		SW6020	05/20/18 02:42 / rlh
Chromium	15	mg/kg		1		SW6020	05/20/18 02:42 / rlh
Cobalt	7	mg/kg		1		SW6020	05/20/18 02:42 / rlh
Lead	15	mg/kg		1		SW6020	05/20/18 02:42 / rlh
Lithium	18	mg/kg	D	5		SW6010B	06/02/18 16:14 / by
Manganese	464	mg/kg		1		SW6020	05/20/18 02:42 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 09:39 / jag
Molybdenum	3	mg/kg		1		SW6020	05/25/18 07:31 / rlh
Selenium	ND	mg/kg		1		SW6020	05/20/18 02:42 / rlh
Thallium	ND	mg/kg		1		SW6020	05/20/18 02:42 / rlh
RADIONUCLIDES							
Radium 226	0.8	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 226 precision (±)	0.2	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 MDC	0.2	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-052
Client Sample ID: TLN-1805-115

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 16:20
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.0	wt%		0.2		D2974	05/22/18 18:05 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	8.1	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	5.0	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	21.8	meq/L		0.05		SW6010B	05/19/18 10:23 / rjh
Magnesium, sat. paste	53.0	meq/L		0.08		SW6010B	05/19/18 10:23 / rjh
Potassium, sat. paste	3.22	meq/L	D	0.04		SW6010B	05/22/18 20:25 / rjh
Sodium, sat. paste	14.0	meq/L	D	0.09		SW6010B	05/22/18 20:25 / rjh
Sodium Adsorption Ratio (SAR)	2.29	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	188	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L	D	2		E300.0	05/20/18 19:16 / ens
Chloride	40	mg/L		1		E300.0	05/20/18 19:16 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/20/18 19:16 / ens
Sulfate	4470	mg/L	D	10		E300.0	05/22/18 08:13 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/20/18 02:47 / rlh
Arsenic	7	mg/kg		1		SW6020	05/20/18 02:47 / rlh
Barium	429	mg/kg		1		SW6020	05/25/18 07:34 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 07:34 / rlh
Boron	125	mg/kg		1		SW6010B	06/02/18 16:18 / by
Cadmium	ND	mg/kg		1		SW6020	05/20/18 02:47 / rlh
Chromium	14	mg/kg		1		SW6020	05/20/18 02:47 / rlh
Cobalt	6	mg/kg		1		SW6020	05/20/18 02:47 / rlh
Lead	12	mg/kg		1		SW6020	05/20/18 02:47 / rlh
Lithium	23	mg/kg	D	5		SW6010B	06/02/18 16:18 / by
Manganese	315	mg/kg		1		SW6020	05/20/18 02:47 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 09:40 / jag
Molybdenum	2	mg/kg		1		SW6020	05/25/18 07:34 / rlh
Selenium	ND	mg/kg		1		SW6020	05/20/18 02:47 / rlh
Thallium	ND	mg/kg		1		SW6020	05/20/18 02:47 / rlh
RADIONUCLIDES							
Radium 226	0.2	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 226 precision (±)	0.05	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 226 MDC	0.05	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-052
Client Sample ID: TLN-1805-115

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 16:20
DateReceived: 05/11/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Barium	0.07	mg/L		0.05		SW6020	08/03/18 05:20 / car
Boron	3.76	mg/L		0.05		SW6010B	08/03/18 20:22 / jcg

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-053
Client Sample ID: TLN-1805-116

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 16:25
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.2	wt%		0.2		D2974	05/22/18 18:05 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	8.3	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	9.5	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	20.1	meq/L		0.05		SW6010B	05/19/18 10:31 / rjh
Magnesium, sat. paste	204	meq/L		0.08		SW6010B	05/22/18 20:41 / rjh
Potassium, sat. paste	2.40	meq/L	D	0.09		SW6010B	05/22/18 20:41 / rjh
Sodium, sat. paste	50.1	meq/L	D	0.2		SW6010B	05/22/18 20:41 / rjh
Sodium Adsorption Ratio (SAR)	4.74	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	157	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	20	mg/L	D	5		E300.0	05/20/18 19:55 / ens
Chloride	412	mg/L	D	2		E300.0	05/20/18 19:55 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/20/18 19:55 / ens
Sulfate	13200	mg/L	D	20		E300.0	05/22/18 08:32 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/20/18 02:51 / rlh
Arsenic	3	mg/kg		1		SW6020	05/20/18 02:51 / rlh
Barium	46	mg/kg		1		SW6020	05/20/18 02:51 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 07:38 / rlh
Boron	33	mg/kg		1		SW6010B	06/02/18 16:23 / by
Cadmium	ND	mg/kg		1		SW6020	05/20/18 02:51 / rlh
Chromium	13	mg/kg		1		SW6020	05/20/18 02:51 / rlh
Cobalt	5	mg/kg		1		SW6020	05/20/18 02:51 / rlh
Lead	10	mg/kg		1		SW6020	05/20/18 02:51 / rlh
Lithium	16	mg/kg	D	5		SW6010B	06/02/18 16:23 / by
Manganese	206	mg/kg		1		SW6020	05/20/18 02:51 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 09:42 / jag
Molybdenum	1	mg/kg		1		SW6020	05/25/18 07:38 / rlh
Selenium	ND	mg/kg		1		SW6020	05/20/18 02:51 / rlh
Thallium	ND	mg/kg		1		SW6020	05/20/18 02:51 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 MDC	0.2	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-054
Client Sample ID: TLN-1805-117

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 16:30
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	12.3	wt%		0.2		D2974	05/22/18 18:05 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	0.7	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	3.36	meq/L		0.05		SW6010B	05/19/18 10:39 / rjh
Magnesium, sat. paste	2.88	meq/L		0.08		SW6010B	05/19/18 10:39 / rjh
Potassium, sat. paste	1.03	meq/L		0.03		SW6010B	05/22/18 20:48 / rjh
Sodium, sat. paste	0.74	meq/L		0.04		SW6010B	05/22/18 20:48 / rjh
Sodium Adsorption Ratio (SAR)	0.42	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	143	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	0.5	mg/L		0.5		E300.0	05/20/18 20:53 / ens
Chloride	18	mg/L		1		E300.0	05/20/18 20:53 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/20/18 20:53 / ens
Sulfate	88	mg/L		1		E300.0	05/20/18 20:53 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/20/18 02:56 / rlh
Arsenic	6	mg/kg		1		SW6020	05/20/18 02:56 / rlh
Barium	287	mg/kg		1		SW6020	05/20/18 02:56 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 07:41 / rlh
Boron	19	mg/kg		1		SW6010B	06/02/18 16:35 / by
Cadmium	ND	mg/kg		1		SW6020	05/20/18 02:56 / rlh
Chromium	16	mg/kg		1		SW6020	05/20/18 02:56 / rlh
Cobalt	6	mg/kg		1		SW6020	05/20/18 02:56 / rlh
Lead	12	mg/kg		1		SW6020	05/20/18 02:56 / rlh
Lithium	17	mg/kg	D	5		SW6010B	06/02/18 16:35 / by
Manganese	313	mg/kg		1		SW6020	05/20/18 02:56 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 09:44 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 07:41 / rlh
Selenium	ND	mg/kg		1		SW6020	05/20/18 02:56 / rlh
Thallium	ND	mg/kg		1		SW6020	05/20/18 02:56 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/18/18 10:10 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 MDC	0.2	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-055
Client Sample ID: TLN-1805-118

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 16:35
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	18.4	wt%		0.2		D2974	05/22/18 18:05 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.9	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	4.5	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	22.6	meq/L		0.05		SW6010B	05/19/18 10:43 / rjh
Magnesium, sat. paste	50.8	meq/L		0.08		SW6010B	05/19/18 10:43 / rjh
Potassium, sat. paste	3.55	meq/L	D	0.04		SW6010B	05/22/18 20:52 / rjh
Sodium, sat. paste	5.85	meq/L	D	0.09		SW6010B	05/22/18 20:52 / rjh
Sodium Adsorption Ratio (SAR)	0.97	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	131	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L	D	2		E300.0	05/20/18 21:13 / ens
Chloride	11	mg/L		1		E300.0	05/20/18 21:13 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/20/18 21:13 / ens
Sulfate	4290	mg/L	D	5		E300.0	05/20/18 21:13 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/20/18 03:01 / rlh
Arsenic	6	mg/kg		1		SW6020	05/20/18 03:01 / rlh
Barium	208	mg/kg		1		SW6020	05/25/18 07:44 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 07:44 / rlh
Boron	62	mg/kg		1		SW6010B	06/02/18 16:39 / by
Cadmium	ND	mg/kg		1		SW6020	05/20/18 03:01 / rlh
Chromium	15	mg/kg		1		SW6020	05/20/18 03:01 / rlh
Cobalt	6	mg/kg		1		SW6020	05/20/18 03:01 / rlh
Lead	11	mg/kg		1		SW6020	05/20/18 03:01 / rlh
Lithium	17	mg/kg	D	5		SW6010B	06/02/18 16:39 / by
Manganese	305	mg/kg		1		SW6020	05/20/18 03:01 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 09:46 / jag
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 07:44 / rlh
Selenium	ND	mg/kg		1		SW6020	05/20/18 03:01 / rlh
Thallium	ND	mg/kg		1		SW6020	05/20/18 03:01 / rlh
RADIONUCLIDES							
Radium 226	0.3	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 226 precision (±)	0.08	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 226 MDC	0.05	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 228	0.3	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-056
Client Sample ID: TLN-1805-119

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 16:40
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.8	wt%		0.2		D2974	05/22/18 18:05 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.8	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	0.7	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	3.58	meq/L		0.05		SW6010B	05/19/18 10:55 / rjh
Magnesium, sat. paste	2.78	meq/L		0.08		SW6010B	05/19/18 10:55 / rjh
Potassium, sat. paste	0.91	meq/L		0.03		SW6010B	05/22/18 20:56 / rjh
Sodium, sat. paste	0.34	meq/L		0.04		SW6010B	05/22/18 20:56 / rjh
Sodium Adsorption Ratio (SAR)	0.19	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	306	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L		0.5		E300.0	05/20/18 21:32 / ens
Chloride	8	mg/L		1		E300.0	05/20/18 21:32 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/20/18 21:32 / ens
Sulfate	120	mg/L		1		E300.0	05/20/18 21:32 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/20/18 03:05 / rlh
Arsenic	9	mg/kg		1		SW6020	05/20/18 03:05 / rlh
Barium	190	mg/kg		1		SW6020	05/25/18 07:47 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 07:47 / rlh
Boron	29	mg/kg		1		SW6010B	06/02/18 16:43 / by
Cadmium	ND	mg/kg		1		SW6020	05/20/18 03:05 / rlh
Chromium	14	mg/kg		1		SW6020	05/20/18 03:05 / rlh
Cobalt	8	mg/kg		1		SW6020	05/20/18 03:05 / rlh
Lead	13	mg/kg		1		SW6020	05/20/18 03:05 / rlh
Lithium	17	mg/kg	D	5		SW6010B	06/02/18 16:43 / by
Manganese	398	mg/kg		1		SW6020	05/20/18 03:05 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 09:51 / jag
Molybdenum	2	mg/kg		1		SW6020	05/25/18 07:47 / rlh
Selenium	ND	mg/kg		1		SW6020	05/20/18 03:05 / rlh
Thallium	ND	mg/kg		1		SW6020	05/20/18 03:05 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 228	1.1	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca
Radium 228 MDC	0.2	pCi/g-dry				RA-05	06/13/18 12:54 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-057
Client Sample ID: TLN-1805-120

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 16:42
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.3	wt%		0.2		D2974	05/22/18 18:05 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.7	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	0.7	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	3.64	meq/L		0.05		SW6010B	05/19/18 10:59 / rjh
Magnesium, sat. paste	2.88	meq/L		0.08		SW6010B	05/19/18 10:59 / rjh
Potassium, sat. paste	0.89	meq/L		0.03		SW6010B	05/22/18 21:00 / rjh
Sodium, sat. paste	0.30	meq/L		0.04		SW6010B	05/22/18 21:00 / rjh
Sodium Adsorption Ratio (SAR)	0.17	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	316	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L		0.5		E300.0	05/20/18 21:52 / ens
Chloride	8	mg/L		1		E300.0	05/20/18 21:52 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/20/18 21:52 / ens
Sulfate	119	mg/L		1		E300.0	05/20/18 21:52 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/20/18 03:10 / rlh
Arsenic	7	mg/kg		1		SW6020	05/20/18 03:10 / rlh
Barium	223	mg/kg		1		SW6020	05/20/18 03:10 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 07:50 / rlh
Boron	31	mg/kg		1		SW6010B	06/02/18 16:47 / by
Cadmium	ND	mg/kg		1		SW6020	05/20/18 03:10 / rlh
Chromium	15	mg/kg		1		SW6020	05/20/18 03:10 / rlh
Cobalt	8	mg/kg		1		SW6020	05/20/18 03:10 / rlh
Lead	12	mg/kg		1		SW6020	05/20/18 03:10 / rlh
Lithium	18	mg/kg	D	5		SW6010B	06/02/18 16:47 / by
Manganese	421	mg/kg		1		SW6020	05/20/18 03:10 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/22/18 09:52 / jag
Molybdenum	2	mg/kg		1		SW6020	05/25/18 07:50 / rlh
Selenium	ND	mg/kg		1		SW6020	05/20/18 03:10 / rlh
Thallium	ND	mg/kg		1		SW6020	05/20/18 03:10 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	06/13/18 14:29 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/13/18 14:29 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/13/18 14:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-058
Client Sample ID: TLN-1805-121

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 16:45
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	17.8	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.8	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	4.2	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	23.0	meq/L		0.05		SW6010B	05/19/18 11:02 / rjh
Magnesium, sat. paste	42.4	meq/L		0.08		SW6010B	05/19/18 11:02 / rjh
Potassium, sat. paste	2.35	meq/L	D	0.04		SW6010B	05/22/18 21:04 / rjh
Sodium, sat. paste	7.16	meq/L	D	0.09		SW6010B	05/22/18 21:04 / rjh
Sodium Adsorption Ratio (SAR)	1.25	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	86	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L	D	2		E300.0	05/20/18 22:12 / ens
Chloride	14	mg/L		1		E300.0	05/20/18 22:12 / ens
Fluoride	6	mg/L	D	5		E300.0	05/20/18 22:12 / ens
Sulfate	3840	mg/L	D	5		E300.0	05/20/18 22:12 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/20/18 03:15 / rlh
Arsenic	5	mg/kg		1		SW6020	05/20/18 03:15 / rlh
Barium	60	mg/kg		1		SW6020	05/20/18 03:15 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 07:53 / rlh
Boron	46	mg/kg		1		SW6010B	06/02/18 16:51 / by
Cadmium	ND	mg/kg		1		SW6020	05/20/18 03:15 / rlh
Chromium	8	mg/kg		1		SW6020	05/20/18 03:15 / rlh
Cobalt	8	mg/kg		1		SW6020	05/20/18 03:15 / rlh
Lead	10	mg/kg		1		SW6020	05/20/18 03:15 / rlh
Lithium	15	mg/kg	D	5		SW6010B	06/02/18 16:51 / by
Manganese	491	mg/kg		1		SW6020	05/20/18 03:15 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 09:25 / by
Molybdenum	3	mg/kg		1		SW6020	05/25/18 07:53 / rlh
Selenium	ND	mg/kg		1		SW6020	05/20/18 03:15 / rlh
Thallium	ND	mg/kg		1		SW6020	05/20/18 03:15 / rlh
RADIONUCLIDES							
Radium 226	0.3	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 226 MDC	0.05	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	06/13/18 14:29 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/13/18 14:29 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/13/18 14:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-059
Client Sample ID: TLN-1805-122

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 16:50
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	18.6	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.7	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	1.1	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	5.90	meq/L		0.05		SW6010B	05/19/18 11:06 / rjh
Magnesium, sat. paste	4.89	meq/L		0.08		SW6010B	05/19/18 11:06 / rjh
Potassium, sat. paste	0.72	meq/L	D	0.04		SW6010B	05/22/18 21:07 / rjh
Sodium, sat. paste	0.38	meq/L	D	0.06		SW6010B	05/22/18 21:07 / rjh
Sodium Adsorption Ratio (SAR)	0.16	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	267	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	1.2	mg/L		0.5		E300.0	05/20/18 22:51 / ens
Chloride	29	mg/L		1		E300.0	05/20/18 22:51 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/20/18 22:51 / ens
Sulfate	343	mg/L		1		E300.0	05/20/18 22:51 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/20/18 03:19 / rlh
Arsenic	5	mg/kg		1		SW6020	05/20/18 03:19 / rlh
Barium	158	mg/kg		1		SW6020	05/20/18 03:19 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 08:02 / rlh
Boron	22	mg/kg		1		SW6010B	06/02/18 16:56 / by
Cadmium	ND	mg/kg		1		SW6020	05/20/18 03:19 / rlh
Chromium	12	mg/kg		1		SW6020	05/20/18 03:19 / rlh
Cobalt	6	mg/kg		1		SW6020	05/20/18 03:19 / rlh
Lead	10	mg/kg		1		SW6020	05/20/18 03:19 / rlh
Lithium	13	mg/kg	D	5		SW6010B	06/02/18 16:56 / by
Manganese	337	mg/kg		1		SW6020	05/20/18 03:19 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 09:27 / by
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 08:02 / rlh
Selenium	ND	mg/kg		1		SW6020	05/20/18 03:19 / rlh
Thallium	ND	mg/kg		1		SW6020	05/20/18 03:19 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 226 MDC	0.05	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	06/13/18 14:29 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/13/18 14:29 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/13/18 14:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-060
Client Sample ID: TLN-1805-123

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 16:55
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.7	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.8	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	4.3	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	23.5	meq/L		0.05		SW6010B	05/19/18 11:10 / rjh
Magnesium, sat. paste	46.6	meq/L		0.08		SW6010B	05/19/18 11:10 / rjh
Potassium, sat. paste	2.62	meq/L	D	0.04		SW6010B	05/22/18 21:11 / rjh
Sodium, sat. paste	5.73	meq/L	D	0.09		SW6010B	05/22/18 21:11 / rjh
Sodium Adsorption Ratio (SAR)	0.97	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	150	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	ND	mg/L	D	2		E300.0	05/20/18 23:10 / ens
Chloride	14	mg/L		1		E300.0	05/20/18 23:10 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/20/18 23:10 / ens
Sulfate	4040	mg/L	D	5		E300.0	05/20/18 23:10 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/20/18 03:38 / rlh
Arsenic	3	mg/kg		1		SW6020	05/20/18 03:38 / rlh
Barium	125	mg/kg		1		SW6020	05/20/18 03:38 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 08:05 / rlh
Boron	25	mg/kg		1		SW6010B	06/02/18 17:00 / by
Cadmium	ND	mg/kg		1		SW6020	05/20/18 03:38 / rlh
Chromium	11	mg/kg		1		SW6020	05/20/18 03:38 / rlh
Cobalt	7	mg/kg		1		SW6020	05/20/18 03:38 / rlh
Lead	10	mg/kg		1		SW6020	05/20/18 03:38 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/02/18 17:00 / by
Manganese	434	mg/kg		1		SW6020	05/20/18 03:38 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 09:28 / by
Molybdenum	ND	mg/kg		1		SW6020	05/25/18 08:05 / rlh
Selenium	ND	mg/kg		1		SW6020	05/20/18 03:38 / rlh
Thallium	ND	mg/kg		1		SW6020	05/20/18 03:38 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 228	0.3	pCi/g-dry				RA-05	06/13/18 14:29 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/13/18 14:29 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/13/18 14:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-061
Client Sample ID: TLN-1805-124

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 17:00
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.7	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	8.1	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	9.0	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	20.6	meq/L		0.05		SW6010B	05/19/18 11:14 / rjh
Magnesium, sat. paste	179	meq/L		0.08		SW6010B	05/22/18 21:15 / rjh
Potassium, sat. paste	2.16	meq/L	D	0.09		SW6010B	05/22/18 21:15 / rjh
Sodium, sat. paste	47.1	meq/L	D	0.2		SW6010B	05/22/18 21:15 / rjh
Sodium Adsorption Ratio (SAR)	4.71	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	114	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	10	mg/L	D	5		E300.0	05/20/18 23:30 / ens
Chloride	308	mg/L	D	2		E300.0	05/20/18 23:30 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/20/18 23:30 / ens
Sulfate	11900	mg/L	D	20		E300.0	05/22/18 08:52 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/20/18 03:51 / rlh
Arsenic	8	mg/kg		1		SW6020	05/20/18 03:51 / rlh
Barium	281	mg/kg		1		SW6020	05/25/18 08:08 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 08:08 / rlh
Boron	70	mg/kg		1		SW6010B	06/02/18 17:04 / by
Cadmium	ND	mg/kg		1		SW6020	05/20/18 03:51 / rlh
Chromium	14	mg/kg		1		SW6020	05/20/18 03:51 / rlh
Cobalt	6	mg/kg		1		SW6020	05/20/18 03:51 / rlh
Lead	13	mg/kg		1		SW6020	05/20/18 03:51 / rlh
Lithium	19	mg/kg	D	5		SW6010B	06/02/18 17:04 / by
Manganese	186	mg/kg		1		SW6020	05/20/18 03:51 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 09:30 / by
Molybdenum	1	mg/kg		1		SW6020	05/25/18 08:08 / rlh
Selenium	ND	mg/kg		1		SW6020	05/20/18 03:51 / rlh
Thallium	ND	mg/kg		1		SW6020	05/20/18 03:51 / rlh
RADIONUCLIDES							
Radium 226	0.2	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 226 precision (±)	0.06	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 226 MDC	0.05	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	06/13/18 14:29 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/13/18 14:29 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/13/18 14:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-061
Client Sample ID: TLN-1805-124

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 17:00
DateReceived: 05/11/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Boron	2.51	mg/L		0.05		SW6010B	08/03/18 20:30 / jcg

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-062
Client Sample ID: TLN-1805-125

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 17:05
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.4	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	8.2	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	9.5	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	20.5	meq/L		0.05		SW6010B	05/19/18 11:18 / rjh
Magnesium, sat. paste	200	meq/L		0.08		SW6010B	05/22/18 21:53 / rjh
Potassium, sat. paste	2.08	meq/L	D	0.09		SW6010B	05/22/18 21:53 / rjh
Sodium, sat. paste	52.0	meq/L	D	0.2		SW6010B	05/22/18 21:53 / rjh
Sodium Adsorption Ratio (SAR)	4.95	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	141	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	15	mg/L	D	5		E300.0	05/20/18 23:49 / ens
Chloride	484	mg/L	D	2		E300.0	05/20/18 23:49 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/20/18 23:49 / ens
Sulfate	12800	mg/L	D	20		E300.0	05/22/18 09:11 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/22/18 16:55 / rlh
Arsenic	5	mg/kg	D	2		SW6020	05/22/18 16:55 / rlh
Barium	137	mg/kg		1		SW6020	05/22/18 16:55 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 08:29 / rlh
Boron	32	mg/kg		1		SW6010B	06/01/18 14:00 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/22/18 16:55 / rlh
Chromium	11	mg/kg		1		SW6020	05/22/18 16:55 / rlh
Cobalt	7	mg/kg		1		SW6020	05/22/18 16:55 / rlh
Lead	10	mg/kg		1		SW6020	05/22/18 16:55 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/01/18 14:00 / rjh
Manganese	381	mg/kg		1		SW6020	05/22/18 16:55 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 09:32 / by
Molybdenum	2	mg/kg		1		SW6020	05/25/18 08:29 / rlh
Selenium	ND	mg/kg		1		SW6020	06/15/18 00:32 / jcg
Thallium	ND	mg/kg		1		SW6020	05/22/18 16:55 / rlh
RADIONUCLIDES							
Radium 226	0.2	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 226 precision (±)	0.07	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 226 MDC	0.05	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 228	0.3	pCi/g-dry				RA-05	06/13/18 14:29 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/13/18 14:29 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/13/18 14:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-063
Client Sample ID: TLN-1805-126

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 17:10
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	18.5	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.9	s.u.		0.1		ASA10-3	05/18/18 12:12 / srm
Conductivity, sat. paste	8.0	mmhos/cm		0.1		ASA10-3	05/18/18 12:12 / srm
Calcium, sat. paste	21.3	meq/L		0.05		SW6010B	05/19/18 11:26 / rjh
Magnesium, sat. paste	142	meq/L		0.08		SW6010B	05/19/18 11:26 / rjh
Potassium, sat. paste	2.05	meq/L	D	0.09		SW6010B	05/22/18 22:01 / rjh
Sodium, sat. paste	35.6	meq/L	D	0.2		SW6010B	05/22/18 22:01 / rjh
Sodium Adsorption Ratio (SAR)	3.93	unitless		0.01		Calculation	05/24/18 09:41 / srm
Bicarbonate as HCO3	236	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/17/18 11:03 / rco
Bromide	12	mg/L	D	5		E300.0	05/21/18 00:30 / ens
Chloride	311	mg/L	D	2		E300.0	05/21/18 00:30 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/21/18 00:30 / ens
Sulfate	9390	mg/L	D	20		E300.0	05/22/18 09:31 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/22/18 17:00 / rlh
Arsenic	6	mg/kg	D	2		SW6020	05/22/18 17:00 / rlh
Barium	178	mg/kg		1		SW6020	05/22/18 17:00 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 08:38 / rlh
Boron	44	mg/kg		1		SW6010B	06/01/18 14:05 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/22/18 17:00 / rlh
Chromium	11	mg/kg		1		SW6020	05/22/18 17:00 / rlh
Cobalt	6	mg/kg		1		SW6020	05/22/18 17:00 / rlh
Lead	10	mg/kg		1		SW6020	05/22/18 17:00 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/01/18 14:05 / rjh
Manganese	331	mg/kg		1		SW6020	05/22/18 17:00 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 09:34 / by
Molybdenum	2	mg/kg		1		SW6020	05/25/18 08:38 / rlh
Selenium	ND	mg/kg		1		SW6020	06/15/18 00:35 / jcg
Thallium	ND	mg/kg		1		SW6020	05/22/18 17:00 / rlh
RADIONUCLIDES							
Radium 226	0.3	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 226 precision (±)	0.08	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 226 MDC	0.05	pCi/g-dry				E903.0	06/18/18 11:51 / eli-ca
Radium 228	0.3	pCi/g-dry				RA-05	06/13/18 14:29 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/13/18 14:29 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/13/18 14:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-064
Client Sample ID: TLN-1805-127

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 17:15
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.8	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.9	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	8.5	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	23.1	meq/L	D	0.09		SW6010B	05/23/18 17:45 / rjh
Magnesium, sat. paste	160	meq/L		0.08		SW6010B	05/23/18 17:45 / rjh
Potassium, sat. paste	1.54	meq/L	D	0.09		SW6010B	05/23/18 17:45 / rjh
Sodium, sat. paste	34.4	meq/L	D	0.2		SW6010B	05/23/18 17:45 / rjh
Sodium Adsorption Ratio (SAR)	3.59	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	130	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	17	mg/L	D	5		E300.0	05/24/18 20:40 / ens
Chloride	393	mg/L	D	2		E300.0	05/24/18 20:40 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/24/18 20:40 / ens
Sulfate	11300	mg/L	D	20		E300.0	05/26/18 04:56 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/22/18 17:05 / rlh
Arsenic	3	mg/kg	D	2		SW6020	05/22/18 17:05 / rlh
Barium	58	mg/kg		1		SW6020	05/22/18 17:05 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 08:41 / rlh
Boron	22	mg/kg		1		SW6010B	06/01/18 14:09 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/22/18 17:05 / rlh
Chromium	12	mg/kg		1		SW6020	05/22/18 17:05 / rlh
Cobalt	8	mg/kg		1		SW6020	05/22/18 17:05 / rlh
Lead	10	mg/kg		1		SW6020	05/22/18 17:05 / rlh
Lithium	10	mg/kg	D	5		SW6010B	06/01/18 14:09 / rjh
Manganese	319	mg/kg		1		SW6020	05/22/18 17:05 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 09:35 / by
Molybdenum	1	mg/kg		1		SW6020	05/25/18 08:41 / rlh
Selenium	ND	mg/kg		1		SW6020	06/15/18 00:38 / jcg
Thallium	ND	mg/kg		1		SW6020	05/22/18 17:05 / rlh
RADIONUCLIDES							
Radium 226	0.2	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 226 precision (±)	0.06	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 228	0.3	pCi/g-dry	U			RA-05	06/08/18 12:00 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-065
Client Sample ID: TLN-1805-128

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 17:20
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	13.2	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	2.0	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	7.52	meq/L		0.05		SW6010B	05/23/18 17:53 / rjh
Magnesium, sat. paste	13.1	meq/L		0.08		SW6010B	05/23/18 17:53 / rjh
Potassium, sat. paste	0.73	meq/L		0.03		SW6010B	05/23/18 17:53 / rjh
Sodium, sat. paste	3.88	meq/L		0.04		SW6010B	05/23/18 17:53 / rjh
Sodium Adsorption Ratio (SAR)	1.21	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	241	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	1	mg/L	D	1		E300.0	05/24/18 21:19 / ens
Chloride	32	mg/L		1		E300.0	05/24/18 21:19 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/24/18 21:19 / ens
Sulfate	1110	mg/L	D	2		E300.0	05/24/18 21:19 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/22/18 17:18 / rlh
Arsenic	7	mg/kg	D	2		SW6020	05/22/18 17:18 / rlh
Barium	218	mg/kg		1		SW6020	05/22/18 17:18 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 08:44 / rlh
Boron	17	mg/kg		1		SW6010B	06/01/18 14:13 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/22/18 17:18 / rlh
Chromium	13	mg/kg		1		SW6020	05/23/18 20:42 / rlh
Cobalt	8	mg/kg		1		SW6020	05/22/18 17:18 / rlh
Lead	11	mg/kg		1		SW6020	05/23/18 20:42 / rlh
Lithium	14	mg/kg	D	5		SW6010B	06/01/18 14:13 / rjh
Manganese	357	mg/kg		1		SW6020	05/23/18 20:42 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 09:37 / by
Molybdenum	2	mg/kg		1		SW6020	05/25/18 08:44 / rlh
Selenium	ND	mg/kg		1		SW6020	06/15/18 00:41 / jcg
Thallium	ND	mg/kg		1		SW6020	05/22/18 17:18 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 228	0.8	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-066
Client Sample ID: TLN-1805-129

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 17:22
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.0	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.3	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	1.8	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	6.59	meq/L		0.05		SW6010B	05/23/18 18:05 / rjh
Magnesium, sat. paste	11.5	meq/L		0.08		SW6010B	05/23/18 18:05 / rjh
Potassium, sat. paste	0.69	meq/L		0.03		SW6010B	05/23/18 18:05 / rjh
Sodium, sat. paste	3.67	meq/L		0.04		SW6010B	05/23/18 18:05 / rjh
Sodium Adsorption Ratio (SAR)	1.22	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	211	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	1	mg/L	D	1		E300.0	05/24/18 21:39 / ens
Chloride	28	mg/L		1		E300.0	05/24/18 21:39 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/24/18 21:39 / ens
Sulfate	967	mg/L	D	2		E300.0	05/24/18 21:39 / ens
METALS, TOTAL - EPA SW846							
Antimony	1	mg/kg		1		SW6020	05/22/18 17:23 / rlh
Arsenic	15	mg/kg	D	2		SW6020	05/22/18 17:23 / rlh
Barium	223	mg/kg		1		SW6020	05/22/18 17:23 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 08:47 / rlh
Boron	20	mg/kg		1		SW6010B	06/01/18 14:17 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/22/18 17:23 / rlh
Chromium	14	mg/kg		1		SW6020	05/23/18 20:46 / rlh
Cobalt	8	mg/kg		1		SW6020	05/22/18 17:23 / rlh
Lead	14	mg/kg		1		SW6020	05/23/18 20:46 / rlh
Lithium	13	mg/kg	D	5		SW6010B	06/01/18 14:17 / rjh
Manganese	265	mg/kg		1		SW6020	05/23/18 20:46 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 09:39 / by
Molybdenum	2	mg/kg		1		SW6020	05/25/18 08:47 / rlh
Selenium	ND	mg/kg		1		SW6020	06/15/18 00:46 / jcg
Thallium	ND	mg/kg		1		SW6020	05/22/18 17:23 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 228	0.8	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-067
Client Sample ID: TLN-1805-130

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 17:25
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.0	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	3.3	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	12.4	meq/L		0.05		SW6010B	05/23/18 18:09 / rjh
Magnesium, sat. paste	11.3	meq/L		0.08		SW6010B	05/23/18 18:09 / rjh
Potassium, sat. paste	0.68	meq/L		0.03		SW6010B	05/23/18 18:09 / rjh
Sodium, sat. paste	1.25	meq/L		0.04		SW6010B	05/23/18 18:09 / rjh
Sodium Adsorption Ratio (SAR)	0.36	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	134	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	2		E300.0	05/24/18 21:58 / ens
Chloride	34	mg/L		1		E300.0	05/24/18 21:58 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/24/18 21:58 / ens
Sulfate	2770	mg/L	D	5		E300.0	05/24/18 21:58 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/22/18 17:28 / rlh
Arsenic	8	mg/kg	D	2		SW6020	05/22/18 17:28 / rlh
Barium	91	mg/kg		1		SW6020	05/22/18 17:28 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 08:50 / rlh
Boron	29	mg/kg		1		SW6010B	06/01/18 14:22 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/22/18 17:28 / rlh
Chromium	12	mg/kg		1		SW6020	05/23/18 20:51 / rlh
Cobalt	6	mg/kg		1		SW6020	05/22/18 17:28 / rlh
Lead	9	mg/kg		1		SW6020	05/23/18 20:51 / rlh
Lithium	14	mg/kg	D	5		SW6010B	06/01/18 14:22 / rjh
Manganese	162	mg/kg		1		SW6020	05/23/18 20:51 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 09:40 / by
Molybdenum	1	mg/kg		1		SW6020	05/25/18 08:50 / rlh
Selenium	ND	mg/kg		1		SW6020	06/15/18 00:49 / jcg
Thallium	ND	mg/kg		1		SW6020	05/22/18 17:28 / rlh
RADIONUCLIDES							
Radium 226	0.2	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 226 precision (±)	0.06	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-068
Client Sample ID: TLN-1805-131

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 17:30
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	13.8	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	3.4	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	22.5	meq/L		0.05		SW6010B	05/23/18 18:12 / rjh
Magnesium, sat. paste	22.7	meq/L		0.08		SW6010B	05/23/18 18:12 / rjh
Potassium, sat. paste	0.71	meq/L		0.03		SW6010B	05/23/18 18:12 / rjh
Sodium, sat. paste	2.27	meq/L		0.04		SW6010B	05/23/18 18:12 / rjh
Sodium Adsorption Ratio (SAR)	0.48	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	170	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	2		E300.0	05/24/18 22:18 / ens
Chloride	12	mg/L		1		E300.0	05/24/18 22:18 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/24/18 22:18 / ens
Sulfate	2890	mg/L	D	5		E300.0	05/24/18 22:18 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/22/18 17:32 / rlh
Arsenic	5	mg/kg	D	2		SW6020	05/22/18 17:32 / rlh
Barium	169	mg/kg		1		SW6020	05/22/18 17:32 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 08:53 / rlh
Boron	32	mg/kg		1		SW6010B	06/01/18 14:26 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/22/18 17:32 / rlh
Chromium	13	mg/kg		1		SW6020	05/23/18 20:55 / rlh
Cobalt	7	mg/kg		1		SW6020	05/22/18 17:32 / rlh
Lead	10	mg/kg		1		SW6020	05/23/18 20:55 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/01/18 14:26 / rjh
Manganese	305	mg/kg		1		SW6020	05/23/18 20:55 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 09:46 / by
Molybdenum	1	mg/kg		1		SW6020	05/25/18 08:53 / rlh
Selenium	ND	mg/kg		1		SW6020	06/15/18 00:52 / jcg
Thallium	ND	mg/kg		1		SW6020	05/22/18 17:32 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-069
Client Sample ID: TLN-1805-132

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/09/18 17:35
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.1	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.7	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	6.0	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	22.5	meq/L		0.05		SW6010B	05/23/18 18:24 / rjh
Magnesium, sat. paste	80.3	meq/L		0.08		SW6010B	05/23/18 18:24 / rjh
Potassium, sat. paste	0.89	meq/L	D	0.04		SW6010B	05/23/18 18:24 / rjh
Sodium, sat. paste	22.0	meq/L	D	0.06		SW6010B	05/23/18 18:24 / rjh
Sodium Adsorption Ratio (SAR)	3.07	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	124	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	5		E300.0	05/24/18 22:37 / ens
Chloride	54	mg/L	D	2		E300.0	05/24/18 22:37 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/24/18 22:37 / ens
Sulfate	6550	mg/L	D	10		E300.0	05/24/18 22:37 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/22/18 17:37 / rlh
Arsenic	4	mg/kg		1		SW6020	05/22/18 17:37 / rlh
Barium	34	mg/kg		1		SW6020	05/22/18 17:37 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 08:56 / rlh
Boron	22	mg/kg		1		SW6010B	06/01/18 14:30 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/22/18 17:37 / rlh
Chromium	8	mg/kg		1		SW6020	05/23/18 21:00 / rlh
Cobalt	4	mg/kg		1		SW6020	05/22/18 17:37 / rlh
Lead	7	mg/kg		1		SW6020	05/23/18 21:00 / rlh
Lithium	8	mg/kg	D	5		SW6010B	06/01/18 14:30 / rjh
Manganese	229	mg/kg		1		SW6020	05/23/18 21:00 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 09:47 / by
Molybdenum	2	mg/kg		1		SW6020	05/25/18 08:56 / rlh
Selenium	ND	mg/kg		1		SW6020	06/15/18 00:55 / jcg
Thallium	ND	mg/kg		1		SW6020	05/22/18 17:37 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 228	0.4	pCi/g-dry	U			RA-05	06/08/18 12:00 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-070
Client Sample ID: TLN-1805-133

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 08:00
DateReceived: 05/11/18
Matrix: Aqueous

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL PROPERTIES							
pH	6.0	s.u.	H	0.1		A4500-H B	05/15/18 14:20 / cjm
pH Measurement Temp	20	°C				A4500-H B	05/15/18 14:20 / cjm
Conductivity @ 25 C	ND	umhos/cm		5		A2510 B	05/15/18 14:20 / cjm
INORGANICS							
Bicarbonate as HCO3	ND	mg/L		4		A2320 B	05/19/18 17:55 / rco
Carbonate as CO3	ND	mg/L		4		A2320 B	05/19/18 17:55 / rco
Chloride	ND	mg/L		1		E300.0	05/16/18 03:06 / ens
Sulfate	ND	mg/L		1		E300.0	05/16/18 03:06 / ens
Bromide	ND	mg/L		0.5		E300.0	05/16/18 03:06 / ens
Fluoride	ND	mg/L		0.1		A4500-F C	05/16/18 17:17 / rco
Sodium Adsorption Ratio (SAR)	ND	unitless		0.01		Calculation	05/22/18 02:04 / jbm
METALS, TOTAL							
Antimony	ND	mg/L		0.001		E200.8	05/22/18 12:45 / rlh
Arsenic	ND	mg/L		0.001		E200.8	05/25/18 22:29 / rlh
Barium	ND	mg/L		0.05		E200.7	05/22/18 02:04 / rjh
Beryllium	ND	mg/L		0.001		E200.8	05/22/18 12:45 / rlh
Boron	ND	mg/L		0.05		E200.7	06/04/18 15:24 / rjh
Cadmium	ND	mg/L		0.001		E200.8	05/22/18 12:45 / rlh
Calcium	ND	mg/L		1		E200.7	05/22/18 02:04 / rjh
Chromium	ND	mg/L		0.005		E200.8	05/22/18 12:45 / rlh
Cobalt	ND	mg/L		0.005		E200.8	05/22/18 12:45 / rlh
Lead	ND	mg/L		0.001		E200.8	05/22/18 12:45 / rlh
Lithium	ND	mg/L		0.1		E200.7	05/22/18 02:04 / rjh
Magnesium	ND	mg/L		1		E200.7	05/22/18 02:04 / rjh
Manganese	ND	mg/L		0.001		E200.8	05/22/18 12:45 / rlh
Mercury	ND	mg/L		0.0001		E245.1	05/24/18 14:08 / jag
Molybdenum	ND	mg/L		0.001		E200.8	06/12/18 17:01 / rlh
Potassium	ND	mg/L		1		E200.7	05/22/18 02:04 / rjh
Selenium	ND	mg/L		0.001		E200.8	06/12/18 17:01 / rlh
Sodium	ND	mg/L		1		E200.8	05/22/18 12:45 / rlh
Thallium	ND	mg/L		0.0005		E200.8	05/22/18 12:45 / rlh
RADIONUCLIDES - TOTAL							
Radium 226	0.3	pCi/L				E903.0	06/04/18 11:20 / eli-ca
Radium 226 precision (±)	0.2	pCi/L				E903.0	06/04/18 11:20 / eli-ca
Radium 226 MDC	0.2	pCi/L				E903.0	06/04/18 11:20 / eli-ca
Radium 228	-0.4	pCi/L	U			RA-05	05/29/18 12:26 / eli-ca
Radium 228 precision (±)	1.1	pCi/L				RA-05	05/29/18 12:26 / eli-ca
Radium 228 MDC	1.9	pCi/L				RA-05	05/29/18 12:26 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
H - Analysis performed past recommended holding time.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-071
Client Sample ID: TLN-1805-134

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 08:20
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	12.6	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	3.0	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	22.7	meq/L		0.05		SW6010B	05/23/18 18:28 / rjh
Magnesium, sat. paste	14.7	meq/L		0.08		SW6010B	05/23/18 18:28 / rjh
Potassium, sat. paste	0.77	meq/L		0.03		SW6010B	05/23/18 18:28 / rjh
Sodium, sat. paste	2.13	meq/L		0.04		SW6010B	05/23/18 18:28 / rjh
Sodium Adsorption Ratio (SAR)	0.49	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	147	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	2		E300.0	05/24/18 23:17 / ens
Chloride	13	mg/L		1		E300.0	05/24/18 23:17 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/24/18 23:17 / ens
Sulfate	2460	mg/L	D	5		E300.0	05/24/18 23:17 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/22/18 18:32 / rlh
Arsenic	9	mg/kg	D	2		SW6020	05/22/18 18:32 / rlh
Barium	124	mg/kg		1		SW6020	05/22/18 18:32 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/25/18 09:00 / rlh
Boron	19	mg/kg		1		SW6010B	06/01/18 14:35 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/22/18 18:32 / rlh
Chromium	19	mg/kg		1		SW6020	05/23/18 21:18 / rlh
Cobalt	8	mg/kg		1		SW6020	05/22/18 18:32 / rlh
Lead	14	mg/kg		1		SW6020	05/23/18 21:18 / rlh
Lithium	16	mg/kg	D	5		SW6010B	06/01/18 14:35 / rjh
Manganese	158	mg/kg		1		SW6020	05/23/18 21:18 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 09:49 / by
Molybdenum	3	mg/kg		1		SW6020	05/25/18 09:00 / rlh
Selenium	ND	mg/kg		1		SW6020	06/15/18 01:09 / jcg
Thallium	ND	mg/kg		1		SW6020	05/22/18 18:32 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-072
Client Sample ID: TLN-1805-135

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 08:25
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	17.0	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.3	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	3.1	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	24.0	meq/L		0.05		SW6010B	05/23/18 18:32 / rjh
Magnesium, sat. paste	19.1	meq/L		0.08		SW6010B	05/23/18 18:32 / rjh
Potassium, sat. paste	0.64	meq/L		0.03		SW6010B	05/23/18 18:32 / rjh
Sodium, sat. paste	2.73	meq/L		0.04		SW6010B	05/23/18 18:32 / rjh
Sodium Adsorption Ratio (SAR)	0.59	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	124	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	2		E300.0	05/24/18 23:36 / ens
Chloride	13	mg/L		1		E300.0	05/24/18 23:36 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/24/18 23:36 / ens
Sulfate	2590	mg/L	D	5		E300.0	05/24/18 23:36 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/22/18 17:42 / rlh
Arsenic	7	mg/kg	D	2		SW6020	05/22/18 17:42 / rlh
Barium	139	mg/kg		1		SW6020	05/22/18 17:42 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 02:21 / rlh
Boron	15	mg/kg		1		SW6010B	06/01/18 15:03 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/22/18 17:42 / rlh
Chromium	13	mg/kg		1		SW6020	05/23/18 21:05 / rlh
Cobalt	7	mg/kg		1		SW6020	05/22/18 17:42 / rlh
Lead	12	mg/kg		1		SW6020	05/23/18 21:05 / rlh
Lithium	13	mg/kg	D	5		SW6010B	06/01/18 15:03 / rjh
Manganese	272	mg/kg		1		SW6020	05/23/18 21:05 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 09:51 / by
Molybdenum	1	mg/kg		1		SW6020	05/25/18 09:23 / rlh
Selenium	ND	mg/kg		1		SW6020	06/15/18 01:31 / jcg
Thallium	ND	mg/kg		1		SW6020	05/22/18 17:42 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/13/18 14:20 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-073
Client Sample ID: TLN-1805-136

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 08:30
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	19.2	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	4.7	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	25.2	meq/L		0.05		SW6010B	05/23/18 18:35 / rjh
Magnesium, sat. paste	59.7	meq/L		0.08		SW6010B	05/23/18 18:35 / rjh
Potassium, sat. paste	1.20	meq/L	D	0.04		SW6010B	05/23/18 18:35 / rjh
Sodium, sat. paste	9.48	meq/L	D	0.06		SW6010B	05/23/18 18:35 / rjh
Sodium Adsorption Ratio (SAR)	1.45	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	103	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	2		E300.0	05/24/18 23:56 / ens
Chloride	30	mg/L		1		E300.0	05/24/18 23:56 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/24/18 23:56 / ens
Sulfate	4650	mg/L	D	10		E300.0	05/26/18 05:35 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/22/18 18:23 / rlh
Arsenic	16	mg/kg	D	2		SW6020	05/22/18 18:23 / rlh
Barium	79	mg/kg		1		SW6010B	05/22/18 15:55 / rjh
Beryllium	ND	mg/kg		1		SW6010B	05/22/18 15:55 / rjh
Boron	14	mg/kg	D	5		SW6010B	05/22/18 15:55 / rjh
Cadmium	ND	mg/kg		1		SW6010B	05/22/18 15:55 / rjh
Chromium	18	mg/kg		1		SW6020	05/24/18 13:54 / rlh
Cobalt	4	mg/kg		1		SW6020	05/22/18 18:23 / rlh
Lead	27	mg/kg		1		SW6020	05/24/18 13:54 / rlh
Lithium	14	mg/kg	D	5		SW6010B	06/04/18 15:44 / rjh
Manganese	117	mg/kg		1		SW6010B	05/22/18 15:55 / rjh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 09:52 / by
Molybdenum	ND	mg/kg		1		SW6020	05/24/18 13:54 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/22/18 18:23 / rlh
Thallium	ND	mg/kg		1		SW6020	05/22/18 18:23 / rlh
RADIONUCLIDES							
Radium 226	0.7	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 228	1	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-074
Client Sample ID: TLN-1805-137

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 08:40
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.4	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	1.2	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	4.38	meq/L		0.05		SW6010B	05/23/18 18:39 / rjh
Magnesium, sat. paste	4.69	meq/L		0.08		SW6010B	05/23/18 18:39 / rjh
Potassium, sat. paste	0.48	meq/L		0.03		SW6010B	05/23/18 18:39 / rjh
Sodium, sat. paste	1.33	meq/L		0.04		SW6010B	05/23/18 18:39 / rjh
Sodium Adsorption Ratio (SAR)	0.62	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	274	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	0.8	mg/L		0.5		E300.0	05/25/18 00:16 / ens
Chloride	14	mg/L		1		E300.0	05/25/18 00:16 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/25/18 00:16 / ens
Sulfate	530	mg/L		1		E300.0	05/25/18 00:16 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/22/18 18:27 / rlh
Arsenic	4	mg/kg	D	2		SW6020	05/22/18 18:27 / rlh
Barium	125	mg/kg		1		SW6010B	05/22/18 15:59 / rjh
Beryllium	ND	mg/kg		1		SW6010B	05/22/18 15:59 / rjh
Boron	8	mg/kg	D	5		SW6010B	05/22/18 15:59 / rjh
Cadmium	ND	mg/kg		1		SW6010B	05/22/18 15:59 / rjh
Chromium	15	mg/kg		1		SW6020	05/24/18 13:59 / rlh
Cobalt	9	mg/kg		1		SW6020	05/22/18 18:27 / rlh
Lead	11	mg/kg		1		SW6020	05/24/18 13:59 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/04/18 15:48 / rjh
Manganese	268	mg/kg		1		SW6010B	05/22/18 15:59 / rjh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 09:54 / by
Molybdenum	ND	mg/kg		1		SW6020	05/24/18 13:59 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/22/18 18:27 / rlh
Thallium	ND	mg/kg		1		SW6020	05/22/18 18:27 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-075
Client Sample ID: TLN-1805-138

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 08:45
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	11.8	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.3	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	3.0	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	27.5	meq/L		0.05		SW6010B	05/23/18 18:43 / rjh
Magnesium, sat. paste	18.0	meq/L		0.08		SW6010B	05/23/18 18:43 / rjh
Potassium, sat. paste	0.84	meq/L		0.03		SW6010B	05/23/18 18:43 / rjh
Sodium, sat. paste	2.07	meq/L		0.04		SW6010B	05/23/18 18:43 / rjh
Sodium Adsorption Ratio (SAR)	0.43	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	110	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	2		E300.0	05/25/18 01:14 / ens
Chloride	10	mg/L		1		E300.0	05/25/18 01:14 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/25/18 01:14 / ens
Sulfate	2440	mg/L	D	5		E300.0	05/25/18 01:14 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/22/18 19:09 / rlh
Arsenic	8	mg/kg	D	2		SW6020	05/22/18 19:09 / rlh
Barium	116	mg/kg		1		SW6010B	05/22/18 16:04 / rjh
Beryllium	ND	mg/kg		1		SW6010B	05/22/18 16:04 / rjh
Boron	12	mg/kg	D	5		SW6010B	05/23/18 08:29 / rjh
Cadmium	ND	mg/kg		1		SW6010B	05/22/18 16:04 / rjh
Chromium	13	mg/kg		1		SW6020	05/22/18 19:09 / rlh
Cobalt	7	mg/kg		1		SW6020	05/22/18 19:09 / rlh
Lead	12	mg/kg		1		SW6020	05/24/18 14:04 / rlh
Lithium	13	mg/kg	D	5		SW6010B	06/04/18 15:53 / rjh
Manganese	356	mg/kg		1		SW6010B	05/22/18 16:04 / rjh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 09:56 / by
Molybdenum	ND	mg/kg		1		SW6020	05/24/18 14:04 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/22/18 19:09 / rlh
Thallium	ND	mg/kg		1		SW6020	05/22/18 19:09 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 228	0.9	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-076
Client Sample ID: TLN-1805-139

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 08:50
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	21.0	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	1.5	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	4.90	meq/L		0.05		SW6010B	05/23/18 18:55 / rjh
Magnesium, sat. paste	6.04	meq/L		0.08		SW6010B	05/23/18 18:55 / rjh
Potassium, sat. paste	0.23	meq/L		0.03		SW6010B	05/23/18 18:55 / rjh
Sodium, sat. paste	1.67	meq/L		0.04		SW6010B	05/23/18 18:55 / rjh
Sodium Adsorption Ratio (SAR)	0.72	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	115	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	1		E300.0	05/25/18 01:54 / ens
Chloride	6	mg/L		1		E300.0	05/25/18 01:54 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/25/18 01:54 / ens
Sulfate	845	mg/L	D	2		E300.0	05/25/18 01:54 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/22/18 19:13 / rlh
Arsenic	3	mg/kg	D	2		SW6020	05/22/18 19:13 / rlh
Barium	113	mg/kg		1		SW6010B	05/22/18 16:08 / rjh
Beryllium	ND	mg/kg		1		SW6010B	05/22/18 16:08 / rjh
Boron	12	mg/kg	D	5		SW6010B	05/22/18 16:08 / rjh
Cadmium	ND	mg/kg		1		SW6010B	05/22/18 16:08 / rjh
Chromium	14	mg/kg		1		SW6020	05/22/18 19:13 / rlh
Cobalt	5	mg/kg		1		SW6020	05/22/18 19:13 / rlh
Lead	11	mg/kg		1		SW6020	05/24/18 14:08 / rlh
Lithium	18	mg/kg	D	5		SW6010B	06/04/18 15:57 / rjh
Manganese	233	mg/kg		1		SW6010B	05/22/18 16:08 / rjh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 09:58 / by
Molybdenum	ND	mg/kg		1		SW6020	05/24/18 14:08 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/22/18 19:13 / rlh
Thallium	ND	mg/kg		1		SW6020	05/22/18 19:13 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 228	0.8	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-077
Client Sample ID: TLN-1805-140

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 08:55
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	17.9	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.2	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	0.7	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	4.74	meq/L		0.05		SW6010B	05/23/18 19:37 / rjh
Magnesium, sat. paste	2.35	meq/L		0.08		SW6010B	05/23/18 19:37 / rjh
Potassium, sat. paste	1.29	meq/L		0.03		SW6010B	05/23/18 19:37 / rjh
Sodium, sat. paste	0.30	meq/L		0.04		SW6010B	05/23/18 19:37 / rjh
Sodium Adsorption Ratio (SAR)	0.16	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	383	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	0.8	mg/L		0.5		E300.0	05/25/18 02:13 / ens
Chloride	15	mg/L		1		E300.0	05/25/18 02:13 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/25/18 02:13 / ens
Sulfate	36	mg/L		1		E300.0	05/25/18 02:13 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/22/18 19:18 / rlh
Arsenic	5	mg/kg		1		SW6020	05/22/18 19:18 / rlh
Barium	130	mg/kg		1		SW6010B	05/22/18 16:13 / rjh
Beryllium	ND	mg/kg		1		SW6010B	05/22/18 16:13 / rjh
Boron	12	mg/kg	D	5		SW6010B	05/22/18 16:13 / rjh
Cadmium	ND	mg/kg		1		SW6010B	05/22/18 16:13 / rjh
Chromium	12	mg/kg		1		SW6020	05/22/18 19:18 / rlh
Cobalt	5	mg/kg		1		SW6020	05/22/18 19:18 / rlh
Lead	12	mg/kg		1		SW6020	05/24/18 14:13 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/04/18 16:09 / rjh
Manganese	334	mg/kg		1		SW6010B	05/22/18 16:13 / rjh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 09:59 / by
Molybdenum	ND	mg/kg		1		SW6020	05/24/18 14:13 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/22/18 19:18 / rlh
Thallium	ND	mg/kg		1		SW6020	05/22/18 19:18 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 228	1	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 precision (±)	0.4	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/08/18 12:00 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-078
Client Sample ID: TLN-1805-141

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 09:00
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.3	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	0.5	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	2.80	meq/L		0.05		SW6010B	05/23/18 19:41 / rjh
Magnesium, sat. paste	1.35	meq/L		0.08		SW6010B	05/23/18 19:41 / rjh
Potassium, sat. paste	0.48	meq/L		0.03		SW6010B	05/23/18 19:41 / rjh
Sodium, sat. paste	0.31	meq/L		0.04		SW6010B	05/23/18 19:41 / rjh
Sodium Adsorption Ratio (SAR)	0.21	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	161	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/25/18 02:33 / ens
Chloride	12	mg/L		1		E300.0	05/25/18 02:33 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/25/18 02:33 / ens
Sulfate	61	mg/L		1		E300.0	05/25/18 02:33 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/22/18 19:23 / rlh
Arsenic	5	mg/kg	D	2		SW6020	05/22/18 19:23 / rlh
Barium	119	mg/kg		1		SW6020	05/22/18 19:23 / rlh
Beryllium	ND	mg/kg		1		SW6010B	05/23/18 08:50 / rjh
Boron	8	mg/kg	D	5		SW6010B	05/23/18 08:50 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/22/18 19:23 / rlh
Chromium	12	mg/kg		1		SW6020	05/22/18 19:23 / rlh
Cobalt	6	mg/kg		1		SW6020	05/22/18 19:23 / rlh
Lead	11	mg/kg		1		SW6020	05/24/18 14:27 / rlh
Lithium	10	mg/kg	D	5		SW6010B	05/23/18 08:50 / rjh
Manganese	446	mg/kg		1		SW6020	05/22/18 19:23 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 10:01 / by
Molybdenum	ND	mg/kg		1		SW6020	05/24/18 14:27 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/22/18 19:23 / rlh
Thallium	ND	mg/kg		1		SW6020	05/22/18 19:23 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	06/08/18 13:34 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/08/18 13:34 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/08/18 13:34 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-079
Client Sample ID: TLN-1805-142

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 09:10
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	18.5	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	3.4	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	15.3	meq/L		0.05		SW6010B	05/23/18 19:44 / rjh
Magnesium, sat. paste	20.5	meq/L		0.08		SW6010B	05/23/18 19:44 / rjh
Potassium, sat. paste	0.43	meq/L		0.03		SW6010B	05/23/18 19:44 / rjh
Sodium, sat. paste	5.57	meq/L		0.04		SW6010B	05/23/18 19:44 / rjh
Sodium Adsorption Ratio (SAR)	1.32	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	90	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	2		E300.0	05/25/18 02:52 / ens
Chloride	25	mg/L		1		E300.0	05/25/18 02:52 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/25/18 02:52 / ens
Sulfate	2780	mg/L	D	5		E300.0	05/25/18 02:52 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/22/18 19:27 / rlh
Arsenic	5	mg/kg	D	2		SW6020	05/22/18 19:27 / rlh
Barium	125	mg/kg		1		SW6020	05/22/18 19:27 / rlh
Beryllium	ND	mg/kg		1		SW6010B	05/23/18 08:54 / rjh
Boron	10	mg/kg	D	5		SW6010B	05/23/18 08:54 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/22/18 19:27 / rlh
Chromium	11	mg/kg		1		SW6020	05/22/18 19:27 / rlh
Cobalt	6	mg/kg		1		SW6020	05/22/18 19:27 / rlh
Lead	9	mg/kg		1		SW6020	05/24/18 21:03 / rlh
Lithium	11	mg/kg	D	5		SW6010B	05/23/18 08:54 / rjh
Manganese	272	mg/kg		1		SW6020	05/22/18 19:27 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 11:00 / by
Molybdenum	ND	mg/kg		1		SW6020	05/24/18 14:40 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/22/18 19:27 / rlh
Thallium	ND	mg/kg		1		SW6020	05/22/18 19:27 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	06/08/18 13:34 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/08/18 13:34 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/08/18 13:34 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-080
Client Sample ID: TLN-1805-143

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 09:20
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	11.7	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	0.7	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	2.88	meq/L		0.05		SW6010B	05/23/18 19:48 / rjh
Magnesium, sat. paste	3.22	meq/L		0.08		SW6010B	05/23/18 19:48 / rjh
Potassium, sat. paste	0.45	meq/L		0.03		SW6010B	05/23/18 19:48 / rjh
Sodium, sat. paste	1.25	meq/L		0.04		SW6010B	05/23/18 19:48 / rjh
Sodium Adsorption Ratio (SAR)	0.71	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	274	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/25/18 03:31 / ens
Chloride	9	mg/L		1		E300.0	05/25/18 03:31 / ens
Fluoride	0.8	mg/L	D	0.5		E300.0	05/25/18 03:31 / ens
Sulfate	127	mg/L		1		E300.0	05/25/18 03:31 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/22/18 20:27 / rlh
Arsenic	6	mg/kg		1		SW6020	05/22/18 20:27 / rlh
Barium	510	mg/kg		1		SW6020	05/24/18 21:08 / rlh
Beryllium	ND	mg/kg		1		SW6010B	05/23/18 08:58 / rjh
Boron	12	mg/kg	D	5		SW6010B	05/23/18 08:58 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/22/18 20:27 / rlh
Chromium	14	mg/kg		1		SW6020	05/22/18 20:27 / rlh
Cobalt	6	mg/kg		1		SW6020	05/22/18 20:27 / rlh
Lead	10	mg/kg		1		SW6020	05/24/18 21:08 / rlh
Lithium	14	mg/kg	D	5		SW6010B	05/23/18 08:58 / rjh
Manganese	376	mg/kg		1		SW6020	05/22/18 20:27 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 11:05 / by
Molybdenum	ND	mg/kg		1		SW6020	05/24/18 14:59 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/22/18 20:27 / rlh
Thallium	ND	mg/kg		1		SW6020	05/22/18 20:27 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	06/08/18 13:34 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/08/18 13:34 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/08/18 13:34 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-080
Client Sample ID: TLN-1805-143

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 09:20
DateReceived: 05/11/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Barium	0.12	mg/L		0.05		SW6020	08/03/18 06:39 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-081
Client Sample ID: TLN-1805-144

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 09:25
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.2	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	0.7	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	2.79	meq/L		0.05		SW6010B	05/23/18 19:52 / rjh
Magnesium, sat. paste	2.20	meq/L		0.08		SW6010B	05/23/18 19:52 / rjh
Potassium, sat. paste	0.33	meq/L		0.03		SW6010B	05/23/18 19:52 / rjh
Sodium, sat. paste	2.40	meq/L		0.04		SW6010B	05/23/18 19:52 / rjh
Sodium Adsorption Ratio (SAR)	1.52	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	183	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/25/18 03:51 / ens
Chloride	8	mg/L		1		E300.0	05/25/18 03:51 / ens
Fluoride	0.8	mg/L	D	0.5		E300.0	05/25/18 03:51 / ens
Sulfate	172	mg/L		1		E300.0	05/25/18 03:51 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 04:42 / rlh
Arsenic	6	mg/kg		1		SW6020	05/26/18 04:42 / rlh
Barium	174	mg/kg		1		SW6020	05/26/18 04:42 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 02:29 / rlh
Boron	ND	mg/kg	D	5		SW6010B	06/04/18 16:43 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 04:42 / rlh
Chromium	15	mg/kg		1		SW6020	05/26/18 04:42 / rlh
Cobalt	6	mg/kg		1		SW6020	05/26/18 04:42 / rlh
Lead	9	mg/kg		1		SW6020	05/26/18 04:42 / rlh
Lithium	ND	mg/kg	D	5		SW6010B	06/04/18 16:43 / rjh
Manganese	385	mg/kg		1		SW6020	05/26/18 04:42 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 11:06 / by
Molybdenum	2	mg/kg		1		SW6020	05/26/18 04:42 / rlh
Selenium	ND	mg/kg		1		SW6020	06/12/18 22:11 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 04:42 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 228	0.9	pCi/g-dry				RA-05	06/08/18 13:34 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/08/18 13:34 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/08/18 13:34 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-082
Client Sample ID: TLN-1805-145

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 09:35
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.4	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	1.6	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	6.02	meq/L		0.05		SW6010B	05/23/18 19:56 / rjh
Magnesium, sat. paste	6.00	meq/L		0.08		SW6010B	05/23/18 19:56 / rjh
Potassium, sat. paste	0.32	meq/L		0.03		SW6010B	05/23/18 19:56 / rjh
Sodium, sat. paste	2.63	meq/L		0.04		SW6010B	05/23/18 19:56 / rjh
Sodium Adsorption Ratio (SAR)	1.07	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	154	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	1		E300.0	05/25/18 04:10 / ens
Chloride	14	mg/L		1		E300.0	05/25/18 04:10 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/25/18 04:10 / ens
Sulfate	935	mg/L	D	2		E300.0	05/25/18 04:10 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 04:45 / rlh
Arsenic	5	mg/kg	D	2		SW6020	05/26/18 04:45 / rlh
Barium	107	mg/kg		1		SW6020	05/26/18 04:45 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 02:31 / rlh
Boron	6	mg/kg	D	5		SW6010B	06/04/18 16:47 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 04:45 / rlh
Chromium	14	mg/kg		1		SW6020	05/26/18 04:45 / rlh
Cobalt	8	mg/kg		1		SW6020	05/26/18 04:45 / rlh
Lead	12	mg/kg		1		SW6020	05/26/18 04:45 / rlh
Lithium	8	mg/kg	D	5		SW6010B	06/04/18 16:47 / rjh
Manganese	320	mg/kg		1		SW6020	05/26/18 04:45 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 11:13 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 04:45 / rlh
Selenium	ND	mg/kg		1		SW6020	06/12/18 22:14 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 04:45 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	06/08/18 13:34 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/08/18 13:34 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/08/18 13:34 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-083
Client Sample ID: TLN-1805-146

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 09:35
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.8	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	0.6	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	2.85	meq/L		0.05		SW6010B	05/23/18 20:03 / rjh
Magnesium, sat. paste	3.29	meq/L		0.08		SW6010B	05/23/18 20:03 / rjh
Potassium, sat. paste	0.50	meq/L		0.03		SW6010B	05/23/18 20:03 / rjh
Sodium, sat. paste	1.38	meq/L		0.04		SW6010B	05/23/18 20:03 / rjh
Sodium Adsorption Ratio (SAR)	0.79	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	91	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/25/18 04:30 / ens
Chloride	5	mg/L		1		E300.0	05/25/18 04:30 / ens
Fluoride	0.6	mg/L	D	0.5		E300.0	05/25/18 04:30 / ens
Sulfate	74	mg/L		1		E300.0	05/25/18 04:30 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 04:47 / rlh
Arsenic	5	mg/kg	D	2		SW6020	05/26/18 04:47 / rlh
Barium	144	mg/kg		1		SW6020	05/26/18 04:47 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 02:34 / rlh
Boron	10	mg/kg	D	5		SW6010B	06/04/18 16:59 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 04:47 / rlh
Chromium	12	mg/kg		1		SW6020	05/26/18 04:47 / rlh
Cobalt	6	mg/kg		1		SW6020	05/26/18 04:47 / rlh
Lead	9	mg/kg		1		SW6020	05/26/18 04:47 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/04/18 16:59 / rjh
Manganese	294	mg/kg		1		SW6020	05/26/18 04:47 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 11:54 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 04:47 / rlh
Selenium	ND	mg/kg		1		SW6020	06/12/18 22:25 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 04:47 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	06/08/18 13:34 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/08/18 13:34 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/08/18 13:34 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-084
Client Sample ID: TLN-1805-147

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 09:37
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	17.1	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	0.7	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	2.81	meq/L		0.05		SW6010B	05/23/18 20:07 / rjh
Magnesium, sat. paste	3.40	meq/L		0.08		SW6010B	05/23/18 20:07 / rjh
Potassium, sat. paste	0.49	meq/L		0.03		SW6010B	05/23/18 20:07 / rjh
Sodium, sat. paste	1.34	meq/L		0.04		SW6010B	05/23/18 20:07 / rjh
Sodium Adsorption Ratio (SAR)	0.76	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	288	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/25/18 04:49 / ens
Chloride	6	mg/L		1		E300.0	05/25/18 04:49 / ens
Fluoride	0.7	mg/L	D	0.5		E300.0	05/25/18 04:49 / ens
Sulfate	83	mg/L		1		E300.0	05/25/18 04:49 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 04:50 / rlh
Arsenic	5	mg/kg	D	2		SW6020	05/26/18 04:50 / rlh
Barium	127	mg/kg		1		SW6020	05/26/18 04:50 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 02:36 / rlh
Boron	10	mg/kg	D	5		SW6010B	06/04/18 17:04 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 04:50 / rlh
Chromium	12	mg/kg		1		SW6020	05/26/18 04:50 / rlh
Cobalt	5	mg/kg		1		SW6020	05/26/18 04:50 / rlh
Lead	9	mg/kg		1		SW6020	05/26/18 04:50 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/04/18 17:04 / rjh
Manganese	288	mg/kg		1		SW6020	05/26/18 04:50 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 12:06 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 04:50 / rlh
Selenium	ND	mg/kg		1		SW6020	06/12/18 22:27 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 04:50 / rlh
RADIONUCLIDES							
Radium 226	0.3	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 precision (±)	0.07	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/13/18 16:24 / eli-ca
Radium 228	0.4	pCi/g-dry	U			RA-05	06/08/18 13:34 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/08/18 13:34 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/08/18 13:34 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-085
Client Sample ID: TLN-1805-148

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 09:40
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	17.3	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	1.7	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	7.29	meq/L		0.05		SW6010B	05/23/18 20:11 / rjh
Magnesium, sat. paste	5.99	meq/L		0.08		SW6010B	05/23/18 20:11 / rjh
Potassium, sat. paste	0.59	meq/L		0.03		SW6010B	05/23/18 20:11 / rjh
Sodium, sat. paste	6.33	meq/L		0.04		SW6010B	05/23/18 20:11 / rjh
Sodium Adsorption Ratio (SAR)	2.45	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	227	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	1		E300.0	05/25/18 05:48 / ens
Chloride	9	mg/L		1		E300.0	05/25/18 05:48 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/25/18 05:48 / ens
Sulfate	840	mg/L	D	2		E300.0	05/25/18 05:48 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 04:53 / rlh
Arsenic	6	mg/kg	D	2		SW6020	05/26/18 04:53 / rlh
Barium	217	mg/kg		1		SW6020	05/31/18 02:39 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 02:39 / rlh
Boron	14	mg/kg	D	5		SW6010B	06/04/18 17:08 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 04:53 / rlh
Chromium	13	mg/kg		1		SW6020	05/26/18 04:53 / rlh
Cobalt	6	mg/kg		1		SW6020	05/26/18 04:53 / rlh
Lead	10	mg/kg		1		SW6020	05/26/18 04:53 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/04/18 17:08 / rjh
Manganese	327	mg/kg		1		SW6020	05/26/18 04:53 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 12:08 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 04:53 / rlh
Selenium	ND	mg/kg		1		SW6020	06/12/18 22:33 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 04:53 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 228	0.8	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-086
Client Sample ID: TLN-1805-149

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 09:50
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.9	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.2	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	0.7	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	4.44	meq/L		0.05		SW6010B	05/23/18 20:26 / rjh
Magnesium, sat. paste	2.80	meq/L		0.08		SW6010B	05/23/18 20:26 / rjh
Potassium, sat. paste	0.56	meq/L		0.03		SW6010B	05/23/18 20:26 / rjh
Sodium, sat. paste	0.44	meq/L		0.04		SW6010B	05/23/18 20:26 / rjh
Sodium Adsorption Ratio (SAR)	0.23	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	275	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/25/18 06:27 / ens
Chloride	10	mg/L		1		E300.0	05/25/18 06:27 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/25/18 06:27 / ens
Sulfate	33	mg/L		1		E300.0	05/25/18 06:27 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 04:56 / rlh
Arsenic	6	mg/kg	D	2		SW6020	05/26/18 04:56 / rlh
Barium	194	mg/kg		1		SW6020	05/26/18 04:56 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 02:41 / rlh
Boron	10	mg/kg	D	5		SW6010B	06/04/18 17:12 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 04:56 / rlh
Chromium	11	mg/kg		1		SW6020	05/26/18 04:56 / rlh
Cobalt	6	mg/kg		1		SW6020	05/26/18 04:56 / rlh
Lead	9	mg/kg		1		SW6020	05/26/18 04:56 / rlh
Lithium	10	mg/kg	D	5		SW6010B	06/04/18 17:12 / rjh
Manganese	296	mg/kg		1		SW6020	05/26/18 04:56 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 12:10 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 04:56 / rlh
Selenium	ND	mg/kg		1		SW6020	06/12/18 22:35 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 04:56 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 228	1	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-087
Client Sample ID: TLN-1805-150

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 09:55
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.8	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.3	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	0.7	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	3.58	meq/L		0.05		SW6010B	05/23/18 20:34 / rjh
Magnesium, sat. paste	1.53	meq/L		0.08		SW6010B	05/23/18 20:34 / rjh
Potassium, sat. paste	0.47	meq/L		0.03		SW6010B	05/23/18 20:34 / rjh
Sodium, sat. paste	2.17	meq/L		0.04		SW6010B	05/23/18 20:34 / rjh
Sodium Adsorption Ratio (SAR)	1.36	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	308	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/25/18 06:46 / ens
Chloride	7	mg/L		1		E300.0	05/25/18 06:46 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/25/18 06:46 / ens
Sulfate	87	mg/L		1		E300.0	05/25/18 06:46 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 04:59 / rlh
Arsenic	5	mg/kg	D	2		SW6020	05/26/18 04:59 / rlh
Barium	221	mg/kg		1		SW6020	05/26/18 04:59 / rlh
Beryllium	ND	mg/kg		1		SW6010B	06/04/18 17:17 / rjh
Boron	10	mg/kg	D	5		SW6010B	06/04/18 17:17 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 04:59 / rlh
Chromium	13	mg/kg		1		SW6020	05/26/18 04:59 / rlh
Cobalt	6	mg/kg		1		SW6020	05/26/18 04:59 / rlh
Lead	10	mg/kg		1		SW6020	05/26/18 04:59 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/04/18 17:17 / rjh
Manganese	365	mg/kg		1		SW6020	05/26/18 04:59 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 12:12 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 04:59 / rlh
Selenium	ND	mg/kg		1		SW6020	06/12/18 22:38 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 04:59 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 228	1.9	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 precision (±)	0.4	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-088
Client Sample ID: TLN-1805-151

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 10:25
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	13.3	wt%		0.2		D2974	05/22/18 18:06 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.1	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	0.7	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	5.29	meq/L		0.05		SW6010B	05/23/18 20:38 / rjh
Magnesium, sat. paste	2.21	meq/L		0.08		SW6010B	05/23/18 20:38 / rjh
Potassium, sat. paste	0.52	meq/L		0.03		SW6010B	05/23/18 20:38 / rjh
Sodium, sat. paste	0.17	meq/L		0.04		SW6010B	05/23/18 20:38 / rjh
Sodium Adsorption Ratio (SAR)	0.09	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	347	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	0.5	mg/L		0.5		E300.0	05/25/18 07:06 / ens
Chloride	8	mg/L		1		E300.0	05/25/18 07:06 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/25/18 07:06 / ens
Sulfate	22	mg/L		1		E300.0	05/25/18 07:06 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 05:01 / rlh
Arsenic	5	mg/kg		1		SW6020	05/26/18 05:01 / rlh
Barium	114	mg/kg		1		SW6020	05/26/18 05:01 / rlh
Beryllium	ND	mg/kg		1		SW6010B	06/04/18 17:21 / rjh
Boron	13	mg/kg	D	5		SW6010B	06/04/18 17:21 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 05:01 / rlh
Chromium	16	mg/kg		1		SW6020	05/26/18 05:01 / rlh
Cobalt	8	mg/kg		1		SW6020	05/26/18 05:01 / rlh
Lead	13	mg/kg		1		SW6020	05/26/18 05:01 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/04/18 17:21 / rjh
Manganese	436	mg/kg		1		SW6020	05/26/18 05:01 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 12:13 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 05:01 / rlh
Selenium	ND	mg/kg		1		SW6020	06/12/18 22:41 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 05:01 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 228	1.1	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-089
Client Sample ID: TLN-1805-152

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 10:30
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	13.9	wt%		0.2		D2974	05/23/18 17:16 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.1	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	2.4	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	24.3	meq/L		0.05		SW6010B	05/23/18 20:42 / rjh
Magnesium, sat. paste	5.29	meq/L		0.08		SW6010B	05/23/18 20:42 / rjh
Potassium, sat. paste	0.68	meq/L		0.03		SW6010B	05/23/18 20:42 / rjh
Sodium, sat. paste	0.28	meq/L		0.04		SW6010B	05/23/18 20:42 / rjh
Sodium Adsorption Ratio (SAR)	0.07	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	115	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	1		E300.0	05/25/18 07:49 / ens
Chloride	9	mg/L		1		E300.0	05/25/18 07:49 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/25/18 07:49 / ens
Sulfate	1750	mg/L	D	5		E300.0	05/29/18 16:56 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 05:04 / rlh
Arsenic	3	mg/kg	D	2		SW6020	05/26/18 05:04 / rlh
Barium	55	mg/kg		1		SW6020	05/26/18 05:04 / rlh
Beryllium	ND	mg/kg		1		SW6010B	06/04/18 17:25 / rjh
Boron	14	mg/kg	D	5		SW6010B	06/04/18 17:25 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 05:04 / rlh
Chromium	11	mg/kg		1		SW6020	05/26/18 05:04 / rlh
Cobalt	5	mg/kg		1		SW6020	05/26/18 05:04 / rlh
Lead	8	mg/kg		1		SW6020	05/26/18 05:04 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/04/18 17:25 / rjh
Manganese	330	mg/kg		1		SW6020	05/26/18 05:04 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 12:15 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 05:04 / rlh
Selenium	ND	mg/kg		1		SW6020	06/12/18 22:46 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 05:04 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-090
Client Sample ID: TLN-1805-153

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 10:35
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	13.6	wt%		0.2		D2974	05/23/18 17:16 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.2	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	0.7	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	5.11	meq/L		0.05		SW6010B	05/23/18 20:49 / rjh
Magnesium, sat. paste	2.20	meq/L		0.08		SW6010B	05/23/18 20:49 / rjh
Potassium, sat. paste	0.45	meq/L		0.03		SW6010B	05/23/18 20:49 / rjh
Sodium, sat. paste	0.22	meq/L		0.04		SW6010B	05/23/18 20:49 / rjh
Sodium Adsorption Ratio (SAR)	0.12	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	362	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	0.6	mg/L		0.5		E300.0	05/25/18 08:08 / ens
Chloride	7	mg/L		1		E300.0	05/25/18 08:08 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/25/18 08:08 / ens
Sulfate	49	mg/L		1		E300.0	05/25/18 08:08 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 05:13 / rlh
Arsenic	4	mg/kg	D	2		SW6020	05/26/18 05:13 / rlh
Barium	115	mg/kg		1		SW6020	05/26/18 05:13 / rlh
Beryllium	ND	mg/kg		1		SW6010B	06/04/18 17:30 / rjh
Boron	13	mg/kg	D	5		SW6010B	06/04/18 17:30 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 05:13 / rlh
Chromium	15	mg/kg		1		SW6020	05/26/18 05:13 / rlh
Cobalt	7	mg/kg		1		SW6020	05/26/18 05:13 / rlh
Lead	12	mg/kg		1		SW6020	05/26/18 05:13 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/04/18 17:30 / rjh
Manganese	348	mg/kg		1		SW6020	05/26/18 05:13 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 12:17 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 05:13 / rlh
Selenium	ND	mg/kg		1		SW6020	06/12/18 22:49 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 05:13 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 228	1.1	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-091
Client Sample ID: TLN-1805-154

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 10:40
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	13.1	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.3	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	2.6	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	27.0	meq/L		0.05		SW6010B	05/23/18 20:53 / rjh
Magnesium, sat. paste	10.1	meq/L		0.08		SW6010B	05/23/18 20:53 / rjh
Potassium, sat. paste	0.37	meq/L		0.03		SW6010B	05/23/18 20:53 / rjh
Sodium, sat. paste	0.82	meq/L		0.04		SW6010B	05/23/18 20:53 / rjh
Sodium Adsorption Ratio (SAR)	0.19	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	156	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	1		E300.0	05/25/18 08:28 / ens
Chloride	5	mg/L		1		E300.0	05/25/18 08:28 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/25/18 08:28 / ens
Sulfate	1960	mg/L	D	5		E300.0	05/29/18 17:35 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 05:15 / rlh
Arsenic	4	mg/kg		1		SW6020	05/26/18 05:15 / rlh
Barium	83	mg/kg		1		SW6020	05/26/18 05:15 / rlh
Beryllium	ND	mg/kg		1		SW6010B	06/04/18 17:34 / rjh
Boron	14	mg/kg	D	5		SW6010B	06/04/18 17:34 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 05:15 / rlh
Chromium	13	mg/kg		1		SW6020	05/26/18 05:15 / rlh
Cobalt	6	mg/kg		1		SW6020	05/26/18 05:15 / rlh
Lead	9	mg/kg		1		SW6020	05/26/18 05:15 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/04/18 17:34 / rjh
Manganese	316	mg/kg		1		SW6020	05/26/18 05:15 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 12:18 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 05:15 / rlh
Selenium	ND	mg/kg		1		SW6020	06/15/18 01:46 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 05:15 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 228	1.3	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-092
Client Sample ID: TLN-1805-155

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 10:45
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.2	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	0.6	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	4.64	meq/L		0.05		SW6010B	05/23/18 20:57 / rjh
Magnesium, sat. paste	1.58	meq/L		0.08		SW6010B	05/23/18 20:57 / rjh
Potassium, sat. paste	0.34	meq/L		0.03		SW6010B	05/23/18 20:57 / rjh
Sodium, sat. paste	0.21	meq/L		0.04		SW6010B	05/23/18 20:57 / rjh
Sodium Adsorption Ratio (SAR)	0.12	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	333	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/25/18 08:47 / ens
Chloride	8	mg/L		1		E300.0	05/25/18 08:47 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/25/18 08:47 / ens
Sulfate	31	mg/L		1		E300.0	05/25/18 08:47 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 05:18 / rlh
Arsenic	5	mg/kg	D	2		SW6020	05/26/18 05:18 / rlh
Barium	128	mg/kg		1		SW6020	05/26/18 05:18 / rlh
Beryllium	ND	mg/kg		1		SW6010B	06/04/18 17:38 / rjh
Boron	14	mg/kg	D	5		SW6010B	06/04/18 17:38 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 05:18 / rlh
Chromium	16	mg/kg		1		SW6020	05/26/18 05:18 / rlh
Cobalt	7	mg/kg		1		SW6020	05/26/18 05:18 / rlh
Lead	12	mg/kg		1		SW6020	05/26/18 05:18 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/04/18 17:38 / rjh
Manganese	397	mg/kg		1		SW6020	05/26/18 05:18 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 12:20 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 05:18 / rlh
Selenium	ND	mg/kg		1		SW6020	06/15/18 01:48 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 05:18 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 228	1.1	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-093
Client Sample ID: TLN-1805-156

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 10:50
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	12.7	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	3.4	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	20.7	meq/L		0.05		SW6010B	05/23/18 21:08 / rjh
Magnesium, sat. paste	23.8	meq/L		0.08		SW6010B	05/23/18 21:08 / rjh
Potassium, sat. paste	0.23	meq/L		0.03		SW6010B	05/23/18 21:08 / rjh
Sodium, sat. paste	1.99	meq/L		0.04		SW6010B	05/23/18 21:08 / rjh
Sodium Adsorption Ratio (SAR)	0.42	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	171	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	2		E300.0	05/25/18 09:07 / ens
Chloride	7	mg/L		1		E300.0	05/25/18 09:07 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/25/18 09:07 / ens
Sulfate	2980	mg/L	D	5		E300.0	05/25/18 09:07 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 05:21 / rlh
Arsenic	3	mg/kg	D	2		SW6020	05/26/18 05:21 / rlh
Barium	66	mg/kg		1		SW6020	05/26/18 05:21 / rlh
Beryllium	ND	mg/kg		1		SW6010B	06/04/18 17:50 / rjh
Boron	17	mg/kg	D	5		SW6010B	06/04/18 17:50 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 05:21 / rlh
Chromium	12	mg/kg		1		SW6020	05/26/18 05:21 / rlh
Cobalt	5	mg/kg		1		SW6020	05/26/18 05:21 / rlh
Lead	8	mg/kg		1		SW6020	05/26/18 05:21 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/04/18 17:50 / rjh
Manganese	315	mg/kg		1		SW6020	05/26/18 05:21 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 12:22 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 05:21 / rlh
Selenium	ND	mg/kg		1		SW6020	06/15/18 01:51 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 05:21 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-094
Client Sample ID: TLN-1805-157

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 10:55
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	12.8	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	0.5	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	3.96	meq/L		0.05		SW6010B	05/23/18 21:12 / rjh
Magnesium, sat. paste	1.20	meq/L		0.08		SW6010B	05/23/18 21:12 / rjh
Potassium, sat. paste	0.27	meq/L		0.03		SW6010B	05/23/18 21:12 / rjh
Sodium, sat. paste	0.15	meq/L		0.04		SW6010B	05/23/18 21:12 / rjh
Sodium Adsorption Ratio (SAR)	0.09	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	306	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/25/18 09:26 / ens
Chloride	5	mg/L		1		E300.0	05/25/18 09:26 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/25/18 09:26 / ens
Sulfate	35	mg/L		1		E300.0	05/25/18 09:26 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 05:24 / rlh
Arsenic	3	mg/kg		1		SW6020	05/26/18 05:24 / rlh
Barium	74	mg/kg		1		SW6020	05/26/18 05:24 / rlh
Beryllium	ND	mg/kg		1		SW6010B	06/05/18 17:05 / rjh
Boron	13	mg/kg	D	5		SW6010B	06/05/18 17:05 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 05:24 / rlh
Chromium	13	mg/kg		1		SW6020	05/26/18 05:24 / rlh
Cobalt	7	mg/kg		1		SW6020	05/26/18 05:24 / rlh
Lead	11	mg/kg		1		SW6020	05/26/18 05:24 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/05/18 17:05 / rjh
Manganese	413	mg/kg		1		SW6020	05/26/18 05:24 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 12:27 / by
Molybdenum	1	mg/kg		1		SW6020	05/26/18 05:24 / rlh
Selenium	ND	mg/kg		1		SW6020	06/15/18 01:54 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 05:24 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/19/18 09:53 / eli-ca
Radium 228	0.8	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-095
Client Sample ID: TLN-1805-158

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 11:00
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	11.5	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.3	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	2.2	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	19.1	meq/L		0.05		SW6010B	05/23/18 21:16 / rjh
Magnesium, sat. paste	1.76	meq/L		0.08		SW6010B	05/23/18 21:16 / rjh
Potassium, sat. paste	0.30	meq/L		0.03		SW6010B	05/23/18 21:16 / rjh
Sodium, sat. paste	0.13	meq/L		0.04		SW6010B	05/23/18 21:16 / rjh
Sodium Adsorption Ratio (SAR)	0.04	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	84	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	1		E300.0	05/29/18 17:54 / ens
Chloride	8	mg/L		1		E300.0	05/30/18 15:23 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/30/18 15:23 / ens
Sulfate	1650	mg/L	D	2		E300.0	05/30/18 15:23 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 05:27 / rlh
Arsenic	2	mg/kg		1		SW6020	05/26/18 05:27 / rlh
Barium	28	mg/kg		1		SW6020	05/26/18 05:27 / rlh
Beryllium	ND	mg/kg		1		SW6010B	06/04/18 17:58 / rjh
Boron	6	mg/kg	D	5		SW6010B	06/04/18 17:58 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 05:27 / rlh
Chromium	8	mg/kg		1		SW6020	05/26/18 05:27 / rlh
Cobalt	4	mg/kg		1		SW6020	05/26/18 05:27 / rlh
Lead	5	mg/kg		1		SW6020	05/26/18 05:27 / rlh
Lithium	9	mg/kg	D	5		SW6010B	06/04/18 17:58 / rjh
Manganese	302	mg/kg		1		SW6020	05/26/18 05:27 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 12:29 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 05:27 / rlh
Selenium	ND	mg/kg		1		SW6020	06/15/18 02:05 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 05:27 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 228	1.8	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 precision (±)	0.4	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-096
Client Sample ID: TLN-1805-159

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 11:25
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	17.9	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	6.6	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	0.5	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	2.18	meq/L		0.05		SW6010B	05/23/18 21:24 / rjh
Magnesium, sat. paste	1.84	meq/L		0.08		SW6010B	05/23/18 21:24 / rjh
Potassium, sat. paste	0.99	meq/L		0.03		SW6010B	05/23/18 21:24 / rjh
Sodium, sat. paste	0.39	meq/L		0.04		SW6010B	05/23/18 21:24 / rjh
Sodium Adsorption Ratio (SAR)	0.27	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	164	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	0.8	mg/L		0.5		E300.0	05/25/18 11:03 / ens
Chloride	13	mg/L		1		E300.0	05/25/18 11:03 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/25/18 11:03 / ens
Sulfate	53	mg/L		1		E300.0	05/25/18 11:03 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 05:30 / rlh
Arsenic	7	mg/kg	D	2		SW6020	05/26/18 05:30 / rlh
Barium	139	mg/kg		1		SW6020	05/26/18 05:30 / rlh
Beryllium	ND	mg/kg		1		SW6010B	06/04/18 18:03 / rjh
Boron	14	mg/kg	D	5		SW6010B	06/05/18 17:11 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 05:30 / rlh
Chromium	17	mg/kg		1		SW6020	05/26/18 05:30 / rlh
Cobalt	6	mg/kg		1		SW6020	05/26/18 05:30 / rlh
Lead	13	mg/kg		1		SW6020	05/26/18 05:30 / rlh
Lithium	ND	mg/kg	D	5		SW6010B	06/04/18 18:03 / rjh
Manganese	230	mg/kg		1		SW6020	05/26/18 05:30 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 12:30 / by
Molybdenum	1	mg/kg		1		SW6020	05/26/18 05:30 / rlh
Selenium	ND	mg/kg		1		SW6020	06/15/18 02:08 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 05:30 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 228	3.4	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 precision (±)	0.7	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-097
Client Sample ID: TLN-1805-160

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 11:30
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.5	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	1.9	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	9.17	meq/L		0.05		SW6010B	05/23/18 21:35 / rjh
Magnesium, sat. paste	9.46	meq/L		0.08		SW6010B	05/23/18 21:35 / rjh
Potassium, sat. paste	1.22	meq/L		0.03		SW6010B	05/23/18 21:35 / rjh
Sodium, sat. paste	0.60	meq/L		0.04		SW6010B	05/23/18 21:35 / rjh
Sodium Adsorption Ratio (SAR)	0.20	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	183	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	1		E300.0	05/25/18 11:23 / ens
Chloride	11	mg/L		1		E300.0	05/25/18 11:23 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/25/18 11:23 / ens
Sulfate	1190	mg/L	D	2		E300.0	05/25/18 11:23 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 05:32 / rlh
Arsenic	8	mg/kg		1		SW6020	05/26/18 05:32 / rlh
Barium	174	mg/kg		1		SW6020	05/26/18 05:32 / rlh
Beryllium	ND	mg/kg		1		SW6010B	06/04/18 18:07 / rjh
Boron	52	mg/kg	D	5		SW6010B	06/04/18 18:07 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 05:32 / rlh
Chromium	16	mg/kg		1		SW6020	05/26/18 05:32 / rlh
Cobalt	6	mg/kg		1		SW6020	05/26/18 05:32 / rlh
Lead	12	mg/kg		1		SW6020	05/26/18 05:32 / rlh
Lithium	19	mg/kg	D	5		SW6010B	06/04/18 18:07 / rjh
Manganese	279	mg/kg		1		SW6020	05/26/18 05:32 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 12:32 / by
Molybdenum	2	mg/kg		1		SW6020	05/26/18 05:32 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/26/18 05:32 / rlh
Thallium	ND	mg/kg		1		SW6020	05/26/18 05:32 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 228	2.3	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 precision (±)	0.5	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-098
Client Sample ID: TLN-1805-161

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 11:35
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.7	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.0	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	0.7	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	2.50	meq/L		0.05		SW6010B	05/23/18 21:39 / rjh
Magnesium, sat. paste	2.50	meq/L		0.08		SW6010B	05/23/18 21:39 / rjh
Potassium, sat. paste	1.94	meq/L		0.03		SW6010B	05/23/18 21:39 / rjh
Sodium, sat. paste	0.44	meq/L		0.04		SW6010B	05/23/18 21:39 / rjh
Sodium Adsorption Ratio (SAR)	0.28	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	296	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	0.8	mg/L		0.5		E300.0	05/25/18 12:02 / ens
Chloride	24	mg/L		1		E300.0	05/25/18 12:02 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/25/18 12:02 / ens
Sulfate	48	mg/L		1		E300.0	05/25/18 12:02 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 05:35 / rlh
Arsenic	12	mg/kg	D	2		SW6020	05/26/18 05:35 / rlh
Barium	122	mg/kg		1		SW6020	05/26/18 05:35 / rlh
Beryllium	ND	mg/kg		1		SW6010B	06/04/18 18:11 / rjh
Boron	11	mg/kg	D	5		SW6010B	06/04/18 18:11 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 05:35 / rlh
Chromium	16	mg/kg		1		SW6020	05/26/18 05:35 / rlh
Cobalt	7	mg/kg		1		SW6020	05/26/18 05:35 / rlh
Lead	13	mg/kg		1		SW6020	05/26/18 05:35 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/04/18 18:11 / rjh
Manganese	319	mg/kg		1		SW6020	05/26/18 05:35 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 12:34 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 05:35 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 00:02 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 05:35 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 228	3.1	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 precision (±)	0.7	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/14/18 11:49 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-099
Client Sample ID: TLN-1805-162

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 11:40
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.0	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	1.0	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	3.91	meq/L		0.05		SW6010B	05/23/18 21:43 / rjh
Magnesium, sat. paste	5.86	meq/L		0.08		SW6010B	05/23/18 21:43 / rjh
Potassium, sat. paste	0.75	meq/L		0.03		SW6010B	05/23/18 21:43 / rjh
Sodium, sat. paste	1.18	meq/L		0.04		SW6010B	05/23/18 21:43 / rjh
Sodium Adsorption Ratio (SAR)	0.53	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	244	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	2.3	mg/L		0.5		E300.0	05/25/18 12:22 / ens
Chloride	33	mg/L		1		E300.0	05/25/18 12:22 / ens
Fluoride	1	mg/L	D	1		E300.0	05/25/18 12:22 / ens
Sulfate	266	mg/L		1		E300.0	05/25/18 12:22 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 06:00 / rlh
Arsenic	16	mg/kg	D	2		SW6020	05/26/18 06:00 / rlh
Barium	249	mg/kg		1		SW6020	05/26/18 06:00 / rlh
Beryllium	ND	mg/kg		1		SW6010B	06/04/18 18:47 / rjh
Boron	28	mg/kg	D	5		SW6010B	06/04/18 18:47 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 06:00 / rlh
Chromium	13	mg/kg		1		SW6020	05/26/18 06:00 / rlh
Cobalt	7	mg/kg		1		SW6020	05/26/18 06:00 / rlh
Lead	12	mg/kg		1		SW6020	05/26/18 06:00 / rlh
Lithium	23	mg/kg	D	5		SW6010B	06/04/18 18:47 / rjh
Manganese	315	mg/kg		1		SW6020	05/26/18 06:00 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 12:36 / by
Molybdenum	2	mg/kg		1		SW6020	05/26/18 06:00 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 00:34 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 06:00 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	06/14/18 13:29 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/14/18 13:29 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/14/18 13:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-100
Client Sample ID: TLN-1805-163

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 11:45
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.6	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	8.0	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	8.9	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	22.1	meq/L	D	0.09		SW6010B	05/23/18 21:54 / rjh
Magnesium, sat. paste	197	meq/L		0.08		SW6010B	05/23/18 21:54 / rjh
Potassium, sat. paste	2.84	meq/L	D	0.09		SW6010B	05/23/18 21:54 / rjh
Sodium, sat. paste	38.7	meq/L	D	0.2		SW6010B	05/23/18 21:54 / rjh
Sodium Adsorption Ratio (SAR)	3.69	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	166	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	7	mg/L	D	5		E300.0	05/25/18 12:41 / ens
Chloride	298	mg/L	D	2		E300.0	05/25/18 12:41 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/25/18 12:41 / ens
Sulfate	12600	mg/L	D	20		E300.0	05/29/18 18:33 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 06:02 / rlh
Arsenic	15	mg/kg	D	2		SW6020	05/26/18 06:02 / rlh
Barium	206	mg/kg		1		SW6020	05/26/18 06:02 / rlh
Beryllium	ND	mg/kg		1		SW6010B	06/04/18 18:52 / rjh
Boron	61	mg/kg	D	5		SW6010B	06/04/18 18:52 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 06:02 / rlh
Chromium	15	mg/kg		1		SW6020	05/26/18 06:02 / rlh
Cobalt	7	mg/kg		1		SW6020	05/26/18 06:02 / rlh
Lead	15	mg/kg		1		SW6020	05/26/18 06:02 / rlh
Lithium	21	mg/kg	D	5		SW6010B	06/04/18 18:52 / rjh
Manganese	263	mg/kg		1		SW6020	05/26/18 06:02 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 12:37 / by
Molybdenum	2	mg/kg		1		SW6020	05/26/18 06:02 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 00:36 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 06:02 / rlh
RADIONUCLIDES							
Radium 226	0.3	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 226 precision (±)	0.07	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 228	0.9	pCi/g-dry				RA-05	06/14/18 13:29 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/14/18 13:29 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/14/18 13:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-101
Client Sample ID: TLN-1805-164

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 11:50
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	13.2	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	6.8	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	0.6	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	2.98	meq/L		0.05		SW6010B	05/23/18 21:58 / rjh
Magnesium, sat. paste	2.37	meq/L		0.08		SW6010B	05/23/18 21:58 / rjh
Potassium, sat. paste	0.80	meq/L		0.03		SW6010B	05/23/18 21:58 / rjh
Sodium, sat. paste	0.44	meq/L		0.04		SW6010B	05/23/18 21:58 / rjh
Sodium Adsorption Ratio (SAR)	0.27	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	324	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	0.7	mg/L		0.5		E300.0	05/25/18 13:01 / ens
Chloride	11	mg/L		1		E300.0	05/25/18 13:01 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/25/18 13:01 / ens
Sulfate	42	mg/L		1		E300.0	05/25/18 13:01 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 06:05 / rlh
Arsenic	10	mg/kg	D	2		SW6020	05/26/18 06:05 / rlh
Barium	101	mg/kg		1		SW6020	05/26/18 06:05 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 03:49 / rlh
Boron	9	mg/kg	D	5		SW6010B	06/04/18 18:56 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 06:05 / rlh
Chromium	16	mg/kg		1		SW6020	05/26/18 06:05 / rlh
Cobalt	7	mg/kg		1		SW6020	05/26/18 06:05 / rlh
Lead	13	mg/kg		1		SW6020	05/26/18 06:05 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/04/18 18:56 / rjh
Manganese	394	mg/kg		1		SW6020	05/26/18 06:05 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 12:39 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 06:05 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 00:39 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 06:05 / rlh
RADIONUCLIDES							
Radium 226	0.7	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 226 precision (±)	0.2	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 228	0.8	pCi/g-dry				RA-05	06/14/18 13:29 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/14/18 13:29 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/14/18 13:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-102
Client Sample ID: TLN-1805-165

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 11:55
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.1	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	2.8	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	16.4	meq/L		0.05		SW6010B	05/23/18 22:02 / rjh
Magnesium, sat. paste	18.8	meq/L		0.08		SW6010B	05/23/18 22:02 / rjh
Potassium, sat. paste	0.26	meq/L		0.03		SW6010B	05/23/18 22:02 / rjh
Sodium, sat. paste	3.07	meq/L		0.04		SW6010B	05/23/18 22:02 / rjh
Sodium Adsorption Ratio (SAR)	0.73	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	123	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	2		E300.0	05/25/18 13:20 / ens
Chloride	15	mg/L		1		E300.0	05/25/18 13:20 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/25/18 13:20 / ens
Sulfate	2140	mg/L	D	5		E300.0	05/25/18 13:20 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 06:08 / rlh
Arsenic	11	mg/kg	D	2		SW6020	05/26/18 06:08 / rlh
Barium	130	mg/kg		1		SW6020	05/26/18 06:08 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 03:51 / rlh
Boron	22	mg/kg	D	5		SW6010B	06/04/18 19:00 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 06:08 / rlh
Chromium	14	mg/kg		1		SW6020	05/26/18 06:08 / rlh
Cobalt	7	mg/kg		1		SW6020	05/26/18 06:08 / rlh
Lead	13	mg/kg		1		SW6020	05/26/18 06:08 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/04/18 19:00 / rjh
Manganese	460	mg/kg		1		SW6020	05/26/18 06:08 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 12:41 / by
Molybdenum	1	mg/kg		1		SW6020	05/26/18 06:08 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 00:42 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 06:08 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/19/18 11:47 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	06/14/18 13:29 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/14/18 13:29 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/14/18 13:29 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-103
Client Sample ID: TLN-1805-166

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 11:57
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.8	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	2.9	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	14.6	meq/L		0.05		SW6010B	05/23/18 22:06 / rjh
Magnesium, sat. paste	17.4	meq/L		0.08		SW6010B	05/23/18 22:06 / rjh
Potassium, sat. paste	0.24	meq/L		0.03		SW6010B	05/23/18 22:06 / rjh
Sodium, sat. paste	3.58	meq/L		0.04		SW6010B	05/23/18 22:06 / rjh
Sodium Adsorption Ratio (SAR)	0.89	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	148	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	2		E300.0	05/25/18 13:40 / ens
Chloride	37	mg/L		1		E300.0	05/25/18 13:40 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/25/18 13:40 / ens
Sulfate	2240	mg/L	D	5		E300.0	05/25/18 13:40 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 06:11 / rlh
Arsenic	12	mg/kg	D	2		SW6020	05/26/18 06:11 / rlh
Barium	155	mg/kg		1		SW6020	05/26/18 06:11 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 03:54 / rlh
Boron	19	mg/kg	D	5		SW6010B	06/04/18 19:05 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 06:11 / rlh
Chromium	15	mg/kg		1		SW6020	05/26/18 06:11 / rlh
Cobalt	7	mg/kg		1		SW6020	05/26/18 06:11 / rlh
Lead	13	mg/kg		1		SW6020	05/26/18 06:11 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/04/18 19:05 / rjh
Manganese	395	mg/kg		1		SW6020	05/26/18 06:11 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 12:58 / by
Molybdenum	1	mg/kg		1		SW6020	05/26/18 06:11 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 00:47 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 06:11 / rlh
RADIONUCLIDES							
Radium 226	0.8	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 226 precision (±)	0.2	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	06/14/18 13:32 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/14/18 13:32 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/14/18 13:32 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-104
Client Sample ID: TLN-1805-167

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 12:00
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	12.4	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	0.6	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	4.68	meq/L		0.05		SW6010B	05/23/18 22:09 / rjh
Magnesium, sat. paste	1.41	meq/L		0.08		SW6010B	05/23/18 22:09 / rjh
Potassium, sat. paste	0.52	meq/L		0.03		SW6010B	05/23/18 22:09 / rjh
Sodium, sat. paste	0.23	meq/L		0.04		SW6010B	05/23/18 22:09 / rjh
Sodium Adsorption Ratio (SAR)	0.13	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	303	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/25/18 13:59 / ens
Chloride	5	mg/L		1		E300.0	05/25/18 13:59 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/25/18 13:59 / ens
Sulfate	16	mg/L		1		E300.0	05/25/18 13:59 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 06:19 / rlh
Arsenic	10	mg/kg	D	2		SW6020	05/26/18 06:19 / rlh
Barium	123	mg/kg		1		SW6020	05/26/18 06:19 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 03:56 / rlh
Boron	11	mg/kg	D	5		SW6010B	06/04/18 19:09 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 06:19 / rlh
Chromium	14	mg/kg		1		SW6020	05/26/18 06:19 / rlh
Cobalt	7	mg/kg		1		SW6020	05/26/18 06:19 / rlh
Lead	13	mg/kg		1		SW6020	05/26/18 06:19 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/04/18 19:09 / rjh
Manganese	367	mg/kg		1		SW6020	05/26/18 06:19 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:00 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 06:19 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 00:50 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 06:19 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	06/14/18 13:32 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/14/18 13:32 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/14/18 13:32 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-105
Client Sample ID: TLN-1805-168

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 12:05
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.1	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	0.5	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	2.30	meq/L		0.05		SW6010B	05/23/18 22:13 / rjh
Magnesium, sat. paste	2.31	meq/L		0.08		SW6010B	05/23/18 22:13 / rjh
Potassium, sat. paste	0.28	meq/L		0.03		SW6010B	05/23/18 22:13 / rjh
Sodium, sat. paste	0.34	meq/L		0.04		SW6010B	05/23/18 22:13 / rjh
Sodium Adsorption Ratio (SAR)	0.22	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	204	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/30/18 16:02 / ens
Chloride	11	mg/L		1		E300.0	05/30/18 16:02 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/29/18 18:53 / ens
Sulfate	45	mg/L		1		E300.0	05/30/18 16:02 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 06:22 / rlh
Arsenic	11	mg/kg	D	2		SW6020	05/26/18 06:22 / rlh
Barium	171	mg/kg		1		SW6020	05/26/18 06:22 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 03:59 / rlh
Boron	14	mg/kg	D	5		SW6010B	06/05/18 17:15 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 06:22 / rlh
Chromium	16	mg/kg		1		SW6020	05/26/18 06:22 / rlh
Cobalt	7	mg/kg		1		SW6020	05/26/18 06:22 / rlh
Lead	12	mg/kg		1		SW6020	05/26/18 06:22 / rlh
Lithium	13	mg/kg	D	5		SW6010B	06/05/18 17:15 / rjh
Manganese	359	mg/kg		1		SW6020	05/26/18 06:22 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:01 / by
Molybdenum	1	mg/kg		1		SW6020	05/26/18 06:22 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 00:53 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 06:22 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	06/14/18 13:32 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/14/18 13:32 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/14/18 13:32 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-106
Client Sample ID: TLN-1805-169

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 12:10
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.7	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.0	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	0.6	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	3.55	meq/L		0.05		SW6010B	05/23/18 22:25 / rjh
Magnesium, sat. paste	1.83	meq/L		0.08		SW6010B	05/23/18 22:25 / rjh
Potassium, sat. paste	1.04	meq/L		0.03		SW6010B	05/23/18 22:25 / rjh
Sodium, sat. paste	0.37	meq/L		0.04		SW6010B	05/23/18 22:25 / rjh
Sodium Adsorption Ratio (SAR)	0.23	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	279	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/25/18 15:37 / ens
Chloride	20	mg/L		1		E300.0	05/25/18 15:37 / ens
Fluoride	0.7	mg/L	D	0.5		E300.0	05/25/18 15:37 / ens
Sulfate	36	mg/L		1		E300.0	05/25/18 15:37 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 06:25 / rlh
Arsenic	10	mg/kg	D	2		SW6020	05/26/18 06:25 / rlh
Barium	107	mg/kg		1		SW6020	05/26/18 06:25 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 04:01 / rlh
Boron	13	mg/kg	D	5		SW6010B	06/04/18 19:17 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 06:25 / rlh
Chromium	16	mg/kg		1		SW6020	05/26/18 06:25 / rlh
Cobalt	8	mg/kg		1		SW6020	05/26/18 06:25 / rlh
Lead	13	mg/kg		1		SW6020	05/26/18 06:25 / rlh
Lithium	13	mg/kg	D	5		SW6010B	06/04/18 19:17 / rjh
Manganese	290	mg/kg		1		SW6020	05/26/18 06:25 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:03 / by
Molybdenum	2	mg/kg		1		SW6020	05/26/18 06:25 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 00:55 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 06:25 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 228	0.9	pCi/g-dry				RA-05	06/14/18 13:32 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/14/18 13:32 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/14/18 13:32 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-107
Client Sample ID: TLN-1805-170

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 12:15
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	13.8	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/23/18 10:11 / srm
Conductivity, sat. paste	2.8	mmhos/cm		0.1		ASA10-3	05/23/18 10:11 / srm
Calcium, sat. paste	23.2	meq/L		0.05		SW6010B	05/23/18 22:40 / rjh
Magnesium, sat. paste	14.8	meq/L		0.08		SW6010B	05/23/18 22:40 / rjh
Potassium, sat. paste	0.71	meq/L		0.03		SW6010B	05/23/18 22:40 / rjh
Sodium, sat. paste	0.77	meq/L		0.04		SW6010B	05/23/18 22:40 / rjh
Sodium Adsorption Ratio (SAR)	0.18	unitless		0.01		Calculation	05/25/18 12:43 / srm
Bicarbonate as HCO3	137	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	2		E300.0	05/25/18 16:16 / ens
Chloride	9	mg/L		1		E300.0	05/25/18 16:16 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/25/18 16:16 / ens
Sulfate	2230	mg/L	D	5		E300.0	05/25/18 16:16 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 06:28 / rlh
Arsenic	11	mg/kg	D	2		SW6020	05/26/18 06:28 / rlh
Barium	116	mg/kg		1		SW6020	05/26/18 06:28 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 04:04 / rlh
Boron	31	mg/kg	D	5		SW6010B	06/04/18 19:56 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 06:28 / rlh
Chromium	16	mg/kg		1		SW6020	05/26/18 06:28 / rlh
Cobalt	7	mg/kg		1		SW6020	05/26/18 06:28 / rlh
Lead	13	mg/kg		1		SW6020	05/26/18 06:28 / rlh
Lithium	15	mg/kg	D	5		SW6010B	06/04/18 19:56 / rjh
Manganese	350	mg/kg		1		SW6020	05/26/18 06:28 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:05 / by
Molybdenum	2	mg/kg		1		SW6020	05/26/18 06:28 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 01:09 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 06:28 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 228	0.9	pCi/g-dry				RA-05	06/14/18 13:32 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/14/18 13:32 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/14/18 13:32 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
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MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-108
Client Sample ID: TLN-1805-171

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 12:20
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	13.5	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	6.5	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.4	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	1.91	meq/L		0.05		SW6010B	05/29/18 18:37 / rjh
Magnesium, sat. paste	2.10	meq/L		0.08		SW6010B	05/29/18 18:37 / rjh
Potassium, sat. paste	0.35	meq/L		0.03		SW6010B	05/29/18 18:37 / rjh
Sodium, sat. paste	0.42	meq/L		0.04		SW6010B	05/29/18 18:37 / rjh
Sodium Adsorption Ratio (SAR)	0.30	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	174	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	0.7	mg/L		0.5		E300.0	05/25/18 13:01 / ens
Chloride	8	mg/L		1		E300.0	05/25/18 13:01 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/25/18 13:01 / ens
Sulfate	32	mg/L		1		E300.0	05/25/18 13:01 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 06:30 / rlh
Arsenic	16	mg/kg	D	2		SW6020	05/26/18 06:30 / rlh
Barium	217	mg/kg		1		SW6020	05/26/18 06:30 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 04:06 / rlh
Boron	12	mg/kg	D	5		SW6010B	06/04/18 20:01 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 06:30 / rlh
Chromium	19	mg/kg		1		SW6020	05/26/18 06:30 / rlh
Cobalt	8	mg/kg		1		SW6020	05/26/18 06:30 / rlh
Lead	15	mg/kg		1		SW6020	05/26/18 06:30 / rlh
Lithium	15	mg/kg	D	5		SW6010B	06/04/18 20:01 / rjh
Manganese	558	mg/kg		1		SW6020	05/26/18 06:30 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:07 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 06:30 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 01:12 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 06:30 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 228	1	pCi/g-dry				RA-05	06/14/18 13:32 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/14/18 13:32 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/14/18 13:32 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-109
Client Sample ID: TLN-1805-172

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 12:25
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	13.8	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.3	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	3.4	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	26.2	meq/L		0.05		SW6010B	05/29/18 18:45 / rjh
Magnesium, sat. paste	27.9	meq/L		0.08		SW6010B	05/29/18 18:45 / rjh
Potassium, sat. paste	0.20	meq/L		0.03		SW6010B	05/29/18 18:45 / rjh
Sodium, sat. paste	2.60	meq/L		0.04		SW6010B	05/29/18 18:45 / rjh
Sodium Adsorption Ratio (SAR)	0.50	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	113	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	2		E300.0	05/25/18 13:41 / ens
Chloride	7	mg/L		1		E300.0	05/25/18 13:41 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/25/18 13:41 / ens
Sulfate	2730	mg/L	D	5		E300.0	05/25/18 13:41 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 06:33 / rlh
Arsenic	17	mg/kg	D	2		SW6020	05/26/18 06:33 / rlh
Barium	204	mg/kg		1		SW6020	05/26/18 06:33 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 04:09 / rlh
Boron	27	mg/kg	D	5		SW6010B	06/04/18 20:05 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 06:33 / rlh
Chromium	15	mg/kg		1		SW6020	05/26/18 06:33 / rlh
Cobalt	7	mg/kg		1		SW6020	05/26/18 06:33 / rlh
Lead	13	mg/kg		1		SW6020	05/26/18 06:33 / rlh
Lithium	15	mg/kg	D	5		SW6010B	06/04/18 20:05 / rjh
Manganese	406	mg/kg		1		SW6020	05/26/18 06:33 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:08 / by
Molybdenum	2	mg/kg		1		SW6020	05/26/18 06:33 / rlh
Selenium	1	mg/kg		1		SW6020	06/13/18 01:14 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 06:33 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-109
Client Sample ID: TLN-1805-172

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 12:25
DateReceived: 05/11/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Arsenic	ND	mg/L		0.001		SW6020	08/03/18 06:43 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-110
Client Sample ID: TLN-1805-173

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 12:30
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	12.6	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	6.4	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.6	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	3.09	meq/L		0.05		SW6010B	05/29/18 18:53 / rjh
Magnesium, sat. paste	2.13	meq/L		0.08		SW6010B	05/29/18 18:53 / rjh
Potassium, sat. paste	0.10	meq/L		0.03		SW6010B	05/29/18 18:53 / rjh
Sodium, sat. paste	0.37	meq/L		0.04		SW6010B	05/29/18 18:53 / rjh
Sodium Adsorption Ratio (SAR)	0.23	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	268	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/25/18 14:20 / ens
Chloride	24	mg/L		1		E300.0	05/25/18 14:20 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/25/18 14:20 / ens
Sulfate	40	mg/L		1		E300.0	05/25/18 14:20 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 06:36 / rlh
Arsenic	10	mg/kg	D	2		SW6020	05/26/18 06:36 / rlh
Barium	519	mg/kg		1		SW6020	05/26/18 06:36 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 04:11 / rlh
Boron	14	mg/kg	D	5		SW6010B	06/04/18 20:09 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 06:36 / rlh
Chromium	15	mg/kg		1		SW6020	05/26/18 06:36 / rlh
Cobalt	7	mg/kg		1		SW6020	05/26/18 06:36 / rlh
Lead	14	mg/kg		1		SW6020	05/26/18 06:36 / rlh
Lithium	15	mg/kg	D	5		SW6010B	06/04/18 20:09 / rjh
Manganese	232	mg/kg		1		SW6020	05/26/18 06:36 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:10 / by
Molybdenum	3	mg/kg		1		SW6020	05/26/18 06:36 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 01:17 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 06:36 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-110
Client Sample ID: TLN-1805-173

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 12:30
DateReceived: 05/11/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Barium	0.64	mg/L		0.05		SW6020	08/03/18 06:47 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-111
Client Sample ID: TLN-1805-174

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 12:35
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.9	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.3	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.5	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	2.31	meq/L		0.05		SW6010B	05/29/18 18:57 / rjh
Magnesium, sat. paste	2.87	meq/L		0.08		SW6010B	05/29/18 18:57 / rjh
Potassium, sat. paste	0.10	meq/L		0.03		SW6010B	05/29/18 18:57 / rjh
Sodium, sat. paste	0.44	meq/L		0.04		SW6010B	05/29/18 18:57 / rjh
Sodium Adsorption Ratio (SAR)	0.27	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	189	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/25/18 14:39 / ens
Chloride	14	mg/L		1		E300.0	05/25/18 14:39 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/25/18 14:39 / ens
Sulfate	78	mg/L		1		E300.0	05/25/18 14:39 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 06:39 / rlh
Arsenic	5	mg/kg	D	2		SW6020	05/26/18 06:39 / rlh
Barium	143	mg/kg		1		SW6020	05/26/18 06:39 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 04:19 / rlh
Boron	8	mg/kg	D	5		SW6010B	06/04/18 20:13 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 06:39 / rlh
Chromium	10	mg/kg		1		SW6020	05/26/18 06:39 / rlh
Cobalt	5	mg/kg		1		SW6020	05/26/18 06:39 / rlh
Lead	7	mg/kg		1		SW6020	05/26/18 06:39 / rlh
Lithium	10	mg/kg	D	5		SW6010B	06/04/18 20:13 / rjh
Manganese	247	mg/kg		1		SW6020	05/26/18 06:39 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:12 / by
Molybdenum	1	mg/kg		1		SW6020	05/26/18 06:39 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 01:22 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 06:39 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/19/18 11:43 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-112
Client Sample ID: TLN-1805-175

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 12:40
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.1	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	6.9	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.6	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	4.34	meq/L		0.05		SW6010B	05/29/18 19:00 / rjh
Magnesium, sat. paste	1.66	meq/L		0.08		SW6010B	05/29/18 19:00 / rjh
Potassium, sat. paste	0.66	meq/L		0.03		SW6010B	05/29/18 19:00 / rjh
Sodium, sat. paste	0.32	meq/L		0.04		SW6010B	05/29/18 19:00 / rjh
Sodium Adsorption Ratio (SAR)	0.18	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	322	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/25/18 14:59 / ens
Chloride	16	mg/L		1		E300.0	05/25/18 14:59 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/25/18 14:59 / ens
Sulfate	18	mg/L		1		E300.0	05/25/18 14:59 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 06:42 / rlh
Arsenic	10	mg/kg	D	2		SW6020	05/26/18 06:42 / rlh
Barium	130	mg/kg		1		SW6020	05/26/18 06:42 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 04:21 / rlh
Boron	13	mg/kg	D	5		SW6010B	06/04/18 20:18 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 06:42 / rlh
Chromium	16	mg/kg		1		SW6020	05/26/18 06:42 / rlh
Cobalt	7	mg/kg		1		SW6020	05/26/18 06:42 / rlh
Lead	13	mg/kg		1		SW6020	05/26/18 06:42 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/04/18 20:18 / rjh
Manganese	400	mg/kg		1		SW6020	05/26/18 06:42 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:14 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 06:42 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 01:25 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 06:42 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 228	0.3	pCi/g-dry	U			RA-05	06/14/18 15:15 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-113
Client Sample ID: TLN-1805-176

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 12:45
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	13.9	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.1	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.5	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	3.04	meq/L		0.05		SW6010B	05/29/18 19:04 / rjh
Magnesium, sat. paste	1.72	meq/L		0.08		SW6010B	05/29/18 19:04 / rjh
Potassium, sat. paste	0.51	meq/L		0.03		SW6010B	05/29/18 19:04 / rjh
Sodium, sat. paste	0.33	meq/L		0.04		SW6010B	05/29/18 19:04 / rjh
Sodium Adsorption Ratio (SAR)	0.22	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	177	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/25/18 15:57 / ens
Chloride	7	mg/L		1		E300.0	05/25/18 15:57 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/25/18 15:57 / ens
Sulfate	73	mg/L		1		E300.0	05/25/18 15:57 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 06:45 / rlh
Arsenic	10	mg/kg	D	2		SW6020	05/26/18 06:45 / rlh
Barium	162	mg/kg		1		SW6020	05/26/18 06:45 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 04:24 / rlh
Boron	13	mg/kg	D	5		SW6010B	06/04/18 20:22 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 06:45 / rlh
Chromium	14	mg/kg		1		SW6020	05/26/18 06:45 / rlh
Cobalt	6	mg/kg		1		SW6020	05/26/18 06:45 / rlh
Lead	11	mg/kg		1		SW6020	05/26/18 06:45 / rlh
Lithium	13	mg/kg	D	5		SW6010B	06/04/18 20:22 / rjh
Manganese	312	mg/kg		1		SW6020	05/26/18 06:45 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:19 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 06:45 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 01:28 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 06:45 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 228	0.3	pCi/g-dry	U			RA-05	06/14/18 15:15 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-114
Client Sample ID: TLN-1805-177

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 12:50
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.5	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	7.2	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	22.1	meq/L		0.05		SW6010B	05/29/18 19:16 / rjh
Magnesium, sat. paste	93.6	meq/L		0.08		SW6010B	05/29/18 19:16 / rjh
Potassium, sat. paste	0.72	meq/L	D	0.04		SW6010B	05/29/18 19:16 / rjh
Sodium, sat. paste	35.8	meq/L	D	0.06		SW6010B	05/29/18 19:16 / rjh
Sodium Adsorption Ratio (SAR)	4.71	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	53	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	5		E300.0	05/25/18 16:17 / ens
Chloride	105	mg/L	D	2		E300.0	05/25/18 16:17 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/25/18 16:17 / ens
Sulfate	7540	mg/L	D	10		E300.0	05/25/18 16:17 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 06:53 / rlh
Arsenic	8	mg/kg	D	2		SW6020	05/26/18 06:53 / rlh
Barium	73	mg/kg		1		SW6020	05/26/18 06:53 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 04:27 / rlh
Boron	22	mg/kg	D	5		SW6010B	06/04/18 20:27 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 06:53 / rlh
Chromium	13	mg/kg		1		SW6020	05/26/18 06:53 / rlh
Cobalt	6	mg/kg		1		SW6020	05/26/18 06:53 / rlh
Lead	11	mg/kg		1		SW6020	05/26/18 06:53 / rlh
Lithium	13	mg/kg	D	5		SW6010B	06/04/18 20:27 / rjh
Manganese	303	mg/kg		1		SW6020	05/26/18 06:53 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:20 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 06:53 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 01:30 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 06:53 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 228	0.2	pCi/g-dry	U			RA-05	06/14/18 15:15 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-115
Client Sample ID: TLN-1805-178

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 12:55
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.5	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.3	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.6	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	3.07	meq/L		0.05		SW6010B	05/29/18 19:20 / rjh
Magnesium, sat. paste	2.52	meq/L		0.08		SW6010B	05/29/18 19:20 / rjh
Potassium, sat. paste	0.42	meq/L		0.03		SW6010B	05/29/18 19:20 / rjh
Sodium, sat. paste	0.39	meq/L		0.04		SW6010B	05/29/18 19:20 / rjh
Sodium Adsorption Ratio (SAR)	0.24	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	242	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/25/18 16:36 / ens
Chloride	6	mg/L		1		E300.0	05/25/18 16:36 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/25/18 16:36 / ens
Sulfate	60	mg/L		1		E300.0	05/25/18 16:36 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 06:56 / rlh
Arsenic	6	mg/kg	D	2		SW6020	05/26/18 06:56 / rlh
Barium	115	mg/kg		1		SW6020	05/26/18 06:56 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 04:29 / rlh
Boron	13	mg/kg	D	5		SW6010B	06/04/18 20:31 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 06:56 / rlh
Chromium	13	mg/kg		1		SW6020	05/26/18 06:56 / rlh
Cobalt	7	mg/kg		1		SW6020	05/26/18 06:56 / rlh
Lead	11	mg/kg		1		SW6020	05/26/18 06:56 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/04/18 20:31 / rjh
Manganese	402	mg/kg		1		SW6020	05/26/18 06:56 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:22 / by
Molybdenum	1	mg/kg		1		SW6020	05/26/18 06:56 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 01:44 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 06:56 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-116
Client Sample ID: TLN-1805-179

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 13:00
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.6	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	8.1	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	21.9	meq/L		0.05		SW6010B	05/29/18 19:24 / rjh
Magnesium, sat. paste	99.9	meq/L		0.08		SW6010B	05/29/18 19:24 / rjh
Potassium, sat. paste	1.73	meq/L	D	0.04		SW6010B	05/29/18 19:24 / rjh
Sodium, sat. paste	50.2	meq/L	D	0.06		SW6010B	05/29/18 19:24 / rjh
Sodium Adsorption Ratio (SAR)	6.44	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	202	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	5		E300.0	05/25/18 16:56 / ens
Chloride	129	mg/L	D	2		E300.0	05/25/18 16:56 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/25/18 16:56 / ens
Sulfate	8070	mg/L	D	10		E300.0	05/25/18 16:56 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 06:59 / rlh
Arsenic	6	mg/kg	D	2		SW6020	05/26/18 06:59 / rlh
Barium	107	mg/kg		1		SW6020	05/26/18 06:59 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 04:32 / rlh
Boron	14	mg/kg	D	5		SW6010B	06/04/18 20:35 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 06:59 / rlh
Chromium	14	mg/kg		1		SW6020	05/26/18 06:59 / rlh
Cobalt	7	mg/kg		1		SW6020	05/26/18 06:59 / rlh
Lead	11	mg/kg		1		SW6020	05/26/18 06:59 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/04/18 20:35 / rjh
Manganese	413	mg/kg		1		SW6020	05/26/18 06:59 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:24 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 06:59 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 01:47 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 06:59 / rlh
RADIONUCLIDES							
Radium 226	0.3	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 226 precision (±)	0.08	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 228	0.3	pCi/g-dry	U			RA-05	06/14/18 15:15 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-117
Client Sample ID: TLN-1805-180

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 13:02
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.4	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	7.0	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	22.7	meq/L		0.05		SW6010B	05/29/18 19:28 / rjh
Magnesium, sat. paste	78.0	meq/L		0.08		SW6010B	05/29/18 19:28 / rjh
Potassium, sat. paste	1.67	meq/L	D	0.04		SW6010B	05/29/18 19:28 / rjh
Sodium, sat. paste	38.1	meq/L	D	0.06		SW6010B	05/29/18 19:28 / rjh
Sodium Adsorption Ratio (SAR)	5.37	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	153	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	5		E300.0	05/25/18 17:15 / ens
Chloride	96	mg/L	D	2		E300.0	05/25/18 17:15 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/25/18 17:15 / ens
Sulfate	6420	mg/L	D	10		E300.0	05/25/18 17:15 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 07:01 / rlh
Arsenic	6	mg/kg	D	2		SW6020	05/26/18 07:01 / rlh
Barium	93	mg/kg		1		SW6020	05/26/18 07:01 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 04:34 / rlh
Boron	13	mg/kg	D	5		SW6010B	06/04/18 20:47 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 07:01 / rlh
Chromium	13	mg/kg		1		SW6020	05/26/18 07:01 / rlh
Cobalt	6	mg/kg		1		SW6020	05/26/18 07:01 / rlh
Lead	11	mg/kg		1		SW6020	05/26/18 07:01 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/04/18 20:47 / rjh
Manganese	377	mg/kg		1		SW6020	05/26/18 07:01 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:26 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 07:01 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 01:49 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 07:01 / rlh
RADIONUCLIDES							
Radium 226	0.3	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 226 precision (±)	0.09	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 228	0.2	pCi/g-dry	U			RA-05	06/14/18 15:15 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-118
Client Sample ID: TLN-1805-181

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 13:05
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	17.6	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.7	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	4.00	meq/L		0.05		SW6010B	05/29/18 19:32 / rjh
Magnesium, sat. paste	2.63	meq/L		0.08		SW6010B	05/29/18 19:32 / rjh
Potassium, sat. paste	0.49	meq/L		0.03		SW6010B	05/29/18 19:32 / rjh
Sodium, sat. paste	0.34	meq/L		0.04		SW6010B	05/29/18 19:32 / rjh
Sodium Adsorption Ratio (SAR)	0.19	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	222	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/25/18 17:54 / ens
Chloride	7	mg/L		1		E300.0	05/25/18 17:54 / ens
Fluoride	0.5	mg/L	D	0.5		E300.0	05/25/18 17:54 / ens
Sulfate	133	mg/L		1		E300.0	05/25/18 17:54 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/26/18 07:04 / rlh
Arsenic	8	mg/kg	D	2		SW6020	05/26/18 07:04 / rlh
Barium	107	mg/kg		1		SW6020	05/26/18 07:04 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 04:37 / rlh
Boron	15	mg/kg	D	5		SW6010B	06/04/18 20:52 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/26/18 07:04 / rlh
Chromium	13	mg/kg		1		SW6020	05/26/18 07:04 / rlh
Cobalt	7	mg/kg		1		SW6020	05/26/18 07:04 / rlh
Lead	12	mg/kg		1		SW6020	05/26/18 07:04 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/04/18 20:52 / rjh
Manganese	375	mg/kg		1		SW6020	05/26/18 07:04 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:27 / by
Molybdenum	ND	mg/kg		1		SW6020	05/26/18 07:04 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 01:52 / jcg
Thallium	ND	mg/kg		1		SW6020	05/26/18 07:04 / rlh
RADIONUCLIDES							
Radium 226	0.4	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-119
Client Sample ID: TLN-1805-182

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 13:10
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.9	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.2	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	2.8	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	28.0	meq/L		0.05		SW6010B	05/29/18 19:39 / rjh
Magnesium, sat. paste	13.9	meq/L		0.08		SW6010B	05/29/18 19:39 / rjh
Potassium, sat. paste	0.35	meq/L		0.03		SW6010B	05/29/18 19:39 / rjh
Sodium, sat. paste	1.79	meq/L		0.04		SW6010B	05/29/18 19:39 / rjh
Sodium Adsorption Ratio (SAR)	0.39	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	107	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	2		E300.0	05/25/18 18:33 / ens
Chloride	6	mg/L		1		E300.0	05/25/18 18:33 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/25/18 18:33 / ens
Sulfate	1990	mg/L	D	5		E300.0	05/25/18 18:33 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/29/18 17:13 / rlh
Arsenic	12	mg/kg	D	2		SW6020	05/29/18 17:13 / rlh
Barium	268	mg/kg		1		SW6020	05/29/18 17:13 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/29/18 17:13 / rlh
Boron	15	mg/kg	D	5		SW6010B	06/04/18 21:22 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/29/18 17:13 / rlh
Chromium	15	mg/kg		1		SW6020	05/29/18 17:13 / rlh
Cobalt	9	mg/kg		1		SW6020	05/29/18 17:13 / rlh
Lead	17	mg/kg		1		SW6020	05/29/18 17:13 / rlh
Lithium	14	mg/kg	D	5		SW6010B	06/04/18 21:22 / rjh
Manganese	619	mg/kg		1		SW6020	05/29/18 17:13 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:29 / by
Molybdenum	2	mg/kg		1		SW6020	05/29/18 17:13 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 02:27 / jcg
Thallium	ND	mg/kg		1		SW6020	05/29/18 17:13 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-119
Client Sample ID: TLN-1805-182

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 13:10
DateReceived: 05/11/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Manganese	0.023	mg/L		0.001		SW6020	08/04/18 20:34 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-120
Client Sample ID: TLN-1805-183

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 13:15
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.4	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	1.9	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	10.8	meq/L		0.05		SW6010B	05/29/18 19:47 / rjh
Magnesium, sat. paste	9.85	meq/L		0.08		SW6010B	05/29/18 19:47 / rjh
Potassium, sat. paste	0.36	meq/L		0.03		SW6010B	05/29/18 19:47 / rjh
Sodium, sat. paste	3.75	meq/L		0.04		SW6010B	05/29/18 19:47 / rjh
Sodium Adsorption Ratio (SAR)	1.17	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	132	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	1		E300.0	05/25/18 18:53 / ens
Chloride	10	mg/L		1		E300.0	05/25/18 18:53 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/25/18 18:53 / ens
Sulfate	1090	mg/L	D	2		E300.0	05/25/18 18:53 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/29/18 17:16 / rlh
Arsenic	10	mg/kg	D	2		SW6020	05/29/18 17:16 / rlh
Barium	394	mg/kg		1		SW6020	05/29/18 17:16 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/29/18 17:16 / rlh
Boron	15	mg/kg	D	5		SW6010B	06/04/18 21:26 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/29/18 17:16 / rlh
Chromium	15	mg/kg		1		SW6020	05/29/18 17:16 / rlh
Cobalt	9	mg/kg		1		SW6020	05/29/18 17:16 / rlh
Lead	16	mg/kg		1		SW6020	05/29/18 17:16 / rlh
Lithium	14	mg/kg	D	5		SW6010B	06/04/18 21:26 / rjh
Manganese	455	mg/kg		1		SW6020	05/29/18 17:16 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:31 / by
Molybdenum	1	mg/kg		1		SW6020	05/29/18 17:16 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 02:30 / jcg
Thallium	ND	mg/kg		1		SW6020	05/29/18 17:16 / rlh
RADIONUCLIDES							
Radium 226	0.7	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 226 precision (±)	0.2	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/19/18 14:06 / eli-ca
Radium 228	0.4	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/14/18 15:15 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-120
Client Sample ID: TLN-1805-183

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 13:15
DateReceived: 05/11/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Barium	0.22	mg/L		0.05		SW6020	08/04/18 20:43 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-121
Client Sample ID: TLN-1805-184

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 13:20
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.6	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	2.0	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	12.1	meq/L		0.05		SW6010B	05/29/18 19:51 / rjh
Magnesium, sat. paste	10.6	meq/L		0.08		SW6010B	05/29/18 19:51 / rjh
Potassium, sat. paste	0.34	meq/L		0.03		SW6010B	05/29/18 19:51 / rjh
Sodium, sat. paste	4.14	meq/L		0.04		SW6010B	05/29/18 19:51 / rjh
Sodium Adsorption Ratio (SAR)	1.23	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	114	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	1		E300.0	05/25/18 19:12 / ens
Chloride	11	mg/L		1		E300.0	05/25/18 19:12 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/25/18 19:12 / ens
Sulfate	1210	mg/L	D	2		E300.0	05/25/18 19:12 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/29/18 17:19 / rlh
Arsenic	6	mg/kg	D	2		SW6020	05/29/18 17:19 / rlh
Barium	158	mg/kg		1		SW6020	05/29/18 17:19 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/29/18 17:19 / rlh
Boron	10	mg/kg	D	5		SW6010B	06/04/18 21:38 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/29/18 17:19 / rlh
Chromium	12	mg/kg		1		SW6020	05/29/18 17:19 / rlh
Cobalt	6	mg/kg		1		SW6020	05/29/18 17:19 / rlh
Lead	12	mg/kg		1		SW6020	05/29/18 17:19 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/04/18 21:38 / rjh
Manganese	559	mg/kg		1		SW6020	05/29/18 17:19 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:32 / by
Molybdenum	ND	mg/kg		1		SW6020	05/29/18 17:19 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 02:33 / jcg
Thallium	ND	mg/kg		1		SW6020	05/29/18 17:19 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-122
Client Sample ID: TLN-1805-185

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 13:25
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.0	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.2	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.6	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	3.76	meq/L		0.05		SW6010B	05/30/18 16:12 / rjh
Magnesium, sat. paste	1.87	meq/L		0.08		SW6010B	05/30/18 16:12 / rjh
Potassium, sat. paste	0.46	meq/L		0.03		SW6010B	05/30/18 16:12 / rjh
Sodium, sat. paste	0.25	meq/L		0.04		SW6010B	05/30/18 16:12 / rjh
Sodium Adsorption Ratio (SAR)	0.15	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	295	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/25/18 19:32 / ens
Chloride	6	mg/L		1		E300.0	05/25/18 19:32 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/25/18 19:32 / ens
Sulfate	16	mg/L		1		E300.0	05/25/18 19:32 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/29/18 17:22 / rlh
Arsenic	11	mg/kg	D	2		SW6020	05/29/18 17:22 / rlh
Barium	121	mg/kg		1		SW6020	05/29/18 17:22 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/29/18 17:22 / rlh
Boron	12	mg/kg	D	5		SW6010B	06/04/18 21:43 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/29/18 17:22 / rlh
Chromium	16	mg/kg		1		SW6020	05/29/18 17:22 / rlh
Cobalt	7	mg/kg		1		SW6020	05/29/18 17:22 / rlh
Lead	12	mg/kg		1		SW6020	05/29/18 17:22 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/04/18 21:43 / rjh
Manganese	393	mg/kg		1		SW6020	05/29/18 17:22 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:34 / by
Molybdenum	1	mg/kg		1		SW6020	05/29/18 17:22 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 02:36 / jcg
Thallium	ND	mg/kg		1		SW6020	05/29/18 17:22 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 228	0.8	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-123
Client Sample ID: TLN-1805-186

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 13:30
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	13.8	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	2.9	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	26.4	meq/L		0.05		SW6010B	05/30/18 16:16 / rjh
Magnesium, sat. paste	22.3	meq/L		0.08		SW6010B	05/30/18 16:16 / rjh
Potassium, sat. paste	0.42	meq/L		0.03		SW6010B	05/30/18 16:16 / rjh
Sodium, sat. paste	1.90	meq/L		0.04		SW6010B	05/30/18 16:16 / rjh
Sodium Adsorption Ratio (SAR)	0.38	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	91	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	2		E300.0	05/25/18 20:30 / ens
Chloride	5	mg/L		1		E300.0	05/25/18 20:30 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/25/18 20:30 / ens
Sulfate	2270	mg/L	D	5		E300.0	05/25/18 20:30 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/29/18 17:25 / rlh
Arsenic	9	mg/kg	D	2		SW6020	05/29/18 17:25 / rlh
Barium	94	mg/kg		1		SW6020	05/29/18 17:25 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/29/18 17:25 / rlh
Boron	15	mg/kg	D	5		SW6010B	06/04/18 21:47 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/29/18 17:25 / rlh
Chromium	15	mg/kg		1		SW6020	05/29/18 17:25 / rlh
Cobalt	7	mg/kg		1		SW6020	05/29/18 17:25 / rlh
Lead	12	mg/kg		1		SW6020	05/29/18 17:25 / rlh
Lithium	14	mg/kg	D	5		SW6010B	06/04/18 21:47 / rjh
Manganese	359	mg/kg		1		SW6020	05/29/18 17:25 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:48 / by
Molybdenum	1	mg/kg		1		SW6020	05/29/18 17:25 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 02:41 / jcg
Thallium	ND	mg/kg		1		SW6020	05/29/18 17:25 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 228	0.9	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-124
Client Sample ID: TLN-1805-187

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 13:45
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	18.6	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.2	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	2.1	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	13.9	meq/L		0.05		SW6010B	05/30/18 16:20 / rjh
Magnesium, sat. paste	11.8	meq/L		0.08		SW6010B	05/30/18 16:20 / rjh
Potassium, sat. paste	0.73	meq/L		0.03		SW6010B	05/30/18 16:20 / rjh
Sodium, sat. paste	3.98	meq/L		0.04		SW6010B	05/30/18 16:20 / rjh
Sodium Adsorption Ratio (SAR)	1.11	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	148	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	1		E300.0	05/25/18 20:49 / ens
Chloride	17	mg/L		1		E300.0	05/25/18 20:49 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/25/18 20:49 / ens
Sulfate	1150	mg/L	D	2		E300.0	05/25/18 20:49 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/29/18 17:27 / rlh
Arsenic	7	mg/kg	D	2		SW6020	05/29/18 17:27 / rlh
Barium	111	mg/kg		1		SW6020	05/29/18 17:27 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/29/18 17:27 / rlh
Boron	16	mg/kg	D	5		SW6010B	06/04/18 21:51 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/29/18 17:27 / rlh
Chromium	17	mg/kg		1		SW6020	05/29/18 17:27 / rlh
Cobalt	9	mg/kg		1		SW6020	05/29/18 17:27 / rlh
Lead	17	mg/kg		1		SW6020	05/29/18 17:27 / rlh
Lithium	17	mg/kg	D	5		SW6010B	06/04/18 21:51 / rjh
Manganese	299	mg/kg		1		SW6020	05/29/18 17:27 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:50 / by
Molybdenum	ND	mg/kg		1		SW6020	05/29/18 17:27 / rlh
Selenium	ND	mg/kg		1		SW6020	06/13/18 02:44 / jcg
Thallium	ND	mg/kg		1		SW6020	05/29/18 17:27 / rlh
RADIONUCLIDES							
Radium 226	0.7	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 226 precision (±)	0.2	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-125
Client Sample ID: TLN-1805-188

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 13:50
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	17.0	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.3	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	2.6	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	18.3	meq/L		0.05		SW6010B	05/30/18 16:24 / rjh
Magnesium, sat. paste	16.0	meq/L		0.08		SW6010B	05/30/18 16:24 / rjh
Potassium, sat. paste	0.50	meq/L		0.03		SW6010B	05/30/18 16:24 / rjh
Sodium, sat. paste	5.63	meq/L		0.04		SW6010B	05/30/18 16:24 / rjh
Sodium Adsorption Ratio (SAR)	1.36	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	171	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	1		E300.0	05/25/18 21:09 / ens
Chloride	22	mg/L		1		E300.0	05/25/18 21:09 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/25/18 21:09 / ens
Sulfate	1720	mg/L	D	2		E300.0	05/25/18 21:09 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/29/18 17:30 / rlh
Arsenic	6	mg/kg	D	2		SW6020	05/29/18 17:30 / rlh
Barium	194	mg/kg		1		SW6020	05/29/18 17:30 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/29/18 17:30 / rlh
Boron	10	mg/kg	D	5		SW6010B	06/04/18 21:56 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/29/18 17:30 / rlh
Chromium	11	mg/kg		1		SW6020	05/29/18 17:30 / rlh
Cobalt	6	mg/kg		1		SW6020	05/29/18 17:30 / rlh
Lead	11	mg/kg		1		SW6020	05/29/18 17:30 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/04/18 21:56 / rjh
Manganese	561	mg/kg		1		SW6020	05/29/18 17:30 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:51 / by
Molybdenum	1	mg/kg		1		SW6020	05/29/18 17:30 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/29/18 17:30 / rlh
Thallium	ND	mg/kg		1		SW6020	05/29/18 17:30 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 228	0.8	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-126
Client Sample ID: TLN-1805-189

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 13:55
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	20.1	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	1.9	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	14.6	meq/L		0.05		SW6010B	05/30/18 16:27 / rjh
Magnesium, sat. paste	8.50	meq/L		0.08		SW6010B	05/30/18 16:27 / rjh
Potassium, sat. paste	1.31	meq/L		0.03		SW6010B	05/30/18 16:27 / rjh
Sodium, sat. paste	0.71	meq/L		0.04		SW6010B	05/30/18 16:27 / rjh
Sodium Adsorption Ratio (SAR)	0.21	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	236	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	1		E300.0	05/25/18 21:28 / ens
Chloride	11	mg/L		1		E300.0	05/25/18 21:28 / ens
Fluoride	ND	mg/L	D	2		E300.0	05/25/18 21:28 / ens
Sulfate	1020	mg/L	D	2		E300.0	05/25/18 21:28 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/29/18 17:33 / rlh
Arsenic	6	mg/kg	D	2		SW6020	05/29/18 17:33 / rlh
Barium	89	mg/kg		1		SW6020	05/29/18 17:33 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/29/18 17:33 / rlh
Boron	17	mg/kg	D	5		SW6010B	06/04/18 22:00 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/29/18 17:33 / rlh
Chromium	14	mg/kg		1		SW6020	05/29/18 17:33 / rlh
Cobalt	7	mg/kg		1		SW6020	05/29/18 17:33 / rlh
Lead	14	mg/kg		1		SW6020	05/29/18 17:33 / rlh
Lithium	13	mg/kg	D	5		SW6010B	06/04/18 22:00 / rjh
Manganese	265	mg/kg		1		SW6020	05/29/18 17:33 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:53 / by
Molybdenum	ND	mg/kg		1		SW6020	05/29/18 17:33 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/29/18 17:33 / rlh
Thallium	ND	mg/kg		1		SW6020	05/29/18 17:33 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-127
Client Sample ID: TLN-1805-190

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 14:00
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	20.4	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.3	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	3.3	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	28.7	meq/L		0.05		SW6010B	05/30/18 16:31 / rjh
Magnesium, sat. paste	24.1	meq/L		0.08		SW6010B	05/30/18 16:31 / rjh
Potassium, sat. paste	0.63	meq/L		0.03		SW6010B	05/30/18 16:31 / rjh
Sodium, sat. paste	4.32	meq/L		0.04		SW6010B	05/30/18 16:31 / rjh
Sodium Adsorption Ratio (SAR)	0.84	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	175	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	2		E300.0	05/25/18 22:07 / ens
Chloride	20	mg/L		1		E300.0	05/25/18 22:07 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/25/18 22:07 / ens
Sulfate	2570	mg/L	D	5		E300.0	05/25/18 22:07 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/29/18 17:41 / rlh
Arsenic	8	mg/kg		1		SW6020	05/29/18 17:41 / rlh
Barium	231	mg/kg		1		SW6020	05/29/18 17:41 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/29/18 17:41 / rlh
Boron	14	mg/kg	D	5		SW6010B	06/04/18 22:05 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/29/18 17:41 / rlh
Chromium	12	mg/kg		1		SW6020	05/29/18 17:41 / rlh
Cobalt	9	mg/kg		1		SW6020	05/29/18 17:41 / rlh
Lead	15	mg/kg		1		SW6020	05/29/18 17:41 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/04/18 22:05 / rjh
Manganese	484	mg/kg		1		SW6020	05/29/18 17:41 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:55 / by
Molybdenum	1	mg/kg		1		SW6020	05/29/18 17:41 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/29/18 17:41 / rlh
Thallium	ND	mg/kg		1		SW6020	05/29/18 17:41 / rlh
RADIONUCLIDES							
Radium 226	0.9	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 226 precision (±)	0.2	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-128
Client Sample ID: TLN-1805-191

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 14:05
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	19.2	wt%		0.2		D2974	05/23/18 17:15 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.2	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.8	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	4.42	meq/L		0.05		SW6010B	05/30/18 16:35 / rjh
Magnesium, sat. paste	3.47	meq/L		0.08		SW6010B	05/30/18 16:35 / rjh
Potassium, sat. paste	0.87	meq/L		0.03		SW6010B	05/30/18 16:35 / rjh
Sodium, sat. paste	0.21	meq/L		0.04		SW6010B	05/30/18 16:35 / rjh
Sodium Adsorption Ratio (SAR)	0.10	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	310	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	1.0	mg/L		0.5		E300.0	05/25/18 22:27 / ens
Chloride	21	mg/L		1		E300.0	05/25/18 22:27 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/25/18 22:27 / ens
Sulfate	56	mg/L		1		E300.0	05/25/18 22:27 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/29/18 17:44 / rlh
Arsenic	7	mg/kg	D	2		SW6020	05/29/18 17:44 / rlh
Barium	118	mg/kg		1		SW6020	05/29/18 17:44 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/29/18 17:44 / rlh
Boron	9	mg/kg	D	5		SW6010B	06/04/18 22:09 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/29/18 17:44 / rlh
Chromium	13	mg/kg		1		SW6020	05/29/18 17:44 / rlh
Cobalt	7	mg/kg		1		SW6020	05/29/18 17:44 / rlh
Lead	12	mg/kg		1		SW6020	05/29/18 17:44 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/04/18 22:09 / rjh
Manganese	327	mg/kg		1		SW6020	05/29/18 17:44 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:56 / by
Molybdenum	ND	mg/kg		1		SW6020	05/29/18 17:44 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/29/18 17:44 / rlh
Thallium	ND	mg/kg		1		SW6020	05/29/18 17:44 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 228	1.5	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 precision (±)	0.4	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-129
Client Sample ID: TLN-1805-192

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 14:10
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	17.6	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.3	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.7	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	2.86	meq/L		0.05		SW6010B	05/30/18 16:43 / rjh
Magnesium, sat. paste	3.84	meq/L		0.08		SW6010B	05/30/18 16:43 / rjh
Potassium, sat. paste	0.24	meq/L		0.03		SW6010B	05/30/18 16:43 / rjh
Sodium, sat. paste	0.81	meq/L		0.04		SW6010B	05/30/18 16:43 / rjh
Sodium Adsorption Ratio (SAR)	0.44	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	295	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/25/18 23:06 / ens
Chloride	16	mg/L		1		E300.0	05/25/18 23:06 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/25/18 23:06 / ens
Sulfate	67	mg/L		1		E300.0	05/25/18 23:06 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/29/18 17:47 / rlh
Arsenic	7	mg/kg	D	2		SW6020	05/29/18 17:47 / rlh
Barium	128	mg/kg		1		SW6020	05/29/18 17:47 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/29/18 17:47 / rlh
Boron	10	mg/kg	D	5		SW6010B	06/04/18 22:14 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/29/18 17:47 / rlh
Chromium	13	mg/kg		1		SW6020	05/29/18 17:47 / rlh
Cobalt	7	mg/kg		1		SW6020	05/29/18 17:47 / rlh
Lead	15	mg/kg		1		SW6020	05/29/18 17:47 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/04/18 22:14 / rjh
Manganese	328	mg/kg		1		SW6020	05/29/18 17:47 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 13:58 / by
Molybdenum	ND	mg/kg		1		SW6020	05/29/18 17:47 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/29/18 17:47 / rlh
Thallium	ND	mg/kg		1		SW6020	05/29/18 17:47 / rlh
RADIONUCLIDES							
Radium 226	0.7	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 228	1.0	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-130
Client Sample ID: TLN-1805-193

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 14:15
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	81.6	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.6	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	2.14	meq/L		0.05		SW6010B	05/30/18 16:59 / rjh
Magnesium, sat. paste	3.27	meq/L		0.08		SW6010B	05/30/18 16:59 / rjh
Potassium, sat. paste	1.02	meq/L		0.03		SW6010B	05/30/18 16:59 / rjh
Sodium, sat. paste	0.25	meq/L		0.04		SW6010B	05/30/18 16:59 / rjh
Sodium Adsorption Ratio (SAR)	0.15	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	301	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/25/18 23:25 / ens
Chloride	6	mg/L		1		E300.0	05/25/18 23:25 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/25/18 23:25 / ens
Sulfate	26	mg/L		1		E300.0	05/25/18 23:25 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/29/18 17:50 / rlh
Arsenic	6	mg/kg	D	2		SW6020	05/29/18 17:50 / rlh
Barium	93	mg/kg		1		SW6020	05/29/18 17:50 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/29/18 17:50 / rlh
Boron	13	mg/kg	D	5		SW6010B	06/04/18 22:18 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/29/18 17:50 / rlh
Chromium	13	mg/kg		1		SW6020	05/29/18 17:50 / rlh
Cobalt	6	mg/kg		1		SW6020	05/29/18 17:50 / rlh
Lead	13	mg/kg		1		SW6020	05/29/18 17:50 / rlh
Lithium	13	mg/kg	D	5		SW6010B	06/04/18 22:18 / rjh
Manganese	258	mg/kg		1		SW6020	05/29/18 17:50 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 14:00 / by
Molybdenum	ND	mg/kg		1		SW6020	05/29/18 17:50 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/29/18 17:50 / rlh
Thallium	ND	mg/kg		1		SW6020	05/29/18 17:50 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/26/18 11:25 / eli-ca
Radium 228	1.6	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 precision (±)	0.4	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-131
Client Sample ID: TLN-1805-194

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 14:20
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	17.0	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	3.5	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	25.9	meq/L		0.05		SW6010B	05/30/18 17:02 / rjh
Magnesium, sat. paste	37.3	meq/L		0.08		SW6010B	05/30/18 17:02 / rjh
Potassium, sat. paste	0.70	meq/L		0.03		SW6010B	05/30/18 17:02 / rjh
Sodium, sat. paste	1.55	meq/L		0.04		SW6010B	05/30/18 17:02 / rjh
Sodium Adsorption Ratio (SAR)	0.28	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	181	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	2		E300.0	05/25/18 23:45 / ens
Chloride	8	mg/L		1		E300.0	05/25/18 23:45 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/25/18 23:45 / ens
Sulfate	2890	mg/L	D	5		E300.0	05/25/18 23:45 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/29/18 17:53 / rlh
Arsenic	7	mg/kg	D	2		SW6020	05/29/18 17:53 / rlh
Barium	131	mg/kg		1		SW6020	05/29/18 17:53 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/29/18 17:53 / rlh
Boron	20	mg/kg	D	5		SW6010B	06/04/18 22:30 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/29/18 17:53 / rlh
Chromium	14	mg/kg		1		SW6020	05/29/18 17:53 / rlh
Cobalt	7	mg/kg		1		SW6020	05/29/18 17:53 / rlh
Lead	12	mg/kg		1		SW6020	05/29/18 17:53 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/04/18 22:30 / rjh
Manganese	332	mg/kg		1		SW6020	05/29/18 17:53 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 14:02 / by
Molybdenum	ND	mg/kg		1		SW6020	05/29/18 17:53 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/29/18 17:53 / rlh
Thallium	ND	mg/kg		1		SW6020	05/29/18 17:53 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 228	1.7	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 precision (±)	0.4	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-132
Client Sample ID: TLN-1805-195

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 14:23
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	18.2	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.4	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	2.08	meq/L		0.05		SW6010B	05/30/18 17:06 / rjh
Magnesium, sat. paste	1.80	meq/L		0.08		SW6010B	05/30/18 17:06 / rjh
Potassium, sat. paste	0.50	meq/L		0.03		SW6010B	05/30/18 17:06 / rjh
Sodium, sat. paste	0.16	meq/L		0.04		SW6010B	05/30/18 17:06 / rjh
Sodium Adsorption Ratio (SAR)	0.12	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	261	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/26/18 00:05 / ens
Chloride	3	mg/L		1		E300.0	05/26/18 00:05 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/26/18 00:05 / ens
Sulfate	22	mg/L		1		E300.0	05/26/18 00:05 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/29/18 17:56 / rlh
Arsenic	6	mg/kg		1		SW6020	05/29/18 17:56 / rlh
Barium	124	mg/kg		1		SW6020	05/29/18 17:56 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/29/18 17:56 / rlh
Boron	12	mg/kg	D	5		SW6010B	06/04/18 22:35 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/29/18 17:56 / rlh
Chromium	14	mg/kg		1		SW6020	05/29/18 17:56 / rlh
Cobalt	7	mg/kg		1		SW6020	05/29/18 17:56 / rlh
Lead	14	mg/kg		1		SW6020	05/29/18 17:56 / rlh
Lithium	14	mg/kg	D	5		SW6010B	06/04/18 22:35 / rjh
Manganese	253	mg/kg		1		SW6020	05/29/18 17:56 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 14:03 / by
Molybdenum	ND	mg/kg		1		SW6020	05/29/18 17:56 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/29/18 17:56 / rlh
Thallium	ND	mg/kg		1		SW6020	05/29/18 17:56 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 228	1.9	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 precision (±)	0.5	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/21/18 12:02 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-133
Client Sample ID: TLN-1805-196

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 14:26
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.0	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.3	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.5	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	2.20	meq/L		0.05		SW6010B	05/30/18 17:14 / rjh
Magnesium, sat. paste	2.22	meq/L		0.08		SW6010B	05/30/18 17:14 / rjh
Potassium, sat. paste	0.44	meq/L		0.03		SW6010B	05/30/18 17:14 / rjh
Sodium, sat. paste	0.47	meq/L		0.04		SW6010B	05/30/18 17:14 / rjh
Sodium Adsorption Ratio (SAR)	0.31	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	214	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/26/18 01:04 / ens
Chloride	3	mg/L		1		E300.0	05/26/18 01:04 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/26/18 01:04 / ens
Sulfate	40	mg/L		1		E300.0	05/26/18 01:04 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/29/18 17:58 / rlh
Arsenic	8	mg/kg	D	2		SW6020	05/29/18 17:58 / rlh
Barium	149	mg/kg		1		SW6020	05/29/18 17:58 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/29/18 17:58 / rlh
Boron	8	mg/kg	D	5		SW6010B	06/04/18 22:39 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/29/18 17:58 / rlh
Chromium	13	mg/kg		1		SW6020	05/29/18 17:58 / rlh
Cobalt	8	mg/kg		1		SW6020	05/29/18 17:58 / rlh
Lead	12	mg/kg		1		SW6020	05/29/18 17:58 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/04/18 22:39 / rjh
Manganese	339	mg/kg		1		SW6020	05/29/18 17:58 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 14:09 / by
Molybdenum	ND	mg/kg		1		SW6020	05/29/18 17:58 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/29/18 17:58 / rlh
Thallium	ND	mg/kg		1		SW6020	05/29/18 17:58 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 226 MDC	0.03	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	06/21/18 13:35 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/21/18 13:35 / eli-ca
Radium 228 MDC	0.3	pCi/g-dry				RA-05	06/21/18 13:35 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-134
Client Sample ID: TLN-1805-197

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 14:30
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	17.2	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.2	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.8	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	3.48	meq/L		0.05		SW6010B	05/30/18 17:18 / rjh
Magnesium, sat. paste	4.13	meq/L		0.08		SW6010B	05/30/18 17:18 / rjh
Potassium, sat. paste	1.05	meq/L		0.03		SW6010B	05/30/18 17:18 / rjh
Sodium, sat. paste	0.24	meq/L		0.04		SW6010B	05/30/18 17:18 / rjh
Sodium Adsorption Ratio (SAR)	0.12	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	143	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	0.8	mg/L		0.5		E300.0	05/26/18 01:23 / ens
Chloride	24	mg/L		1		E300.0	05/26/18 01:23 / ens
Fluoride	ND	mg/L	D	1		E300.0	05/26/18 01:23 / ens
Sulfate	35	mg/L		1		E300.0	05/26/18 01:23 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/29/18 18:01 / rlh
Arsenic	7	mg/kg	D	2		SW6020	05/29/18 18:01 / rlh
Barium	112	mg/kg		1		SW6020	05/29/18 18:01 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/29/18 18:01 / rlh
Boron	11	mg/kg	D	5		SW6010B	06/04/18 22:44 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/29/18 18:01 / rlh
Chromium	14	mg/kg		1		SW6020	05/29/18 18:01 / rlh
Cobalt	7	mg/kg		1		SW6020	05/29/18 18:01 / rlh
Lead	13	mg/kg		1		SW6020	05/29/18 18:01 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/04/18 22:44 / rjh
Manganese	310	mg/kg		1		SW6020	05/29/18 18:01 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 14:10 / by
Molybdenum	ND	mg/kg		1		SW6020	05/29/18 18:01 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/29/18 18:01 / rlh
Thallium	ND	mg/kg		1		SW6020	05/29/18 18:01 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	06/21/18 13:35 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/21/18 13:35 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/21/18 13:35 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-135
Client Sample ID: TLN-1805-198

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 14:35
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	25.5	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.6	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	2.66	meq/L		0.05		SW6010B	05/30/18 17:22 / rjh
Magnesium, sat. paste	3.70	meq/L		0.08		SW6010B	05/30/18 17:22 / rjh
Potassium, sat. paste	0.40	meq/L		0.03		SW6010B	05/30/18 17:22 / rjh
Sodium, sat. paste	0.41	meq/L		0.04		SW6010B	05/30/18 17:22 / rjh
Sodium Adsorption Ratio (SAR)	0.23	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	276	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/26/18 01:43 / ens
Chloride	10	mg/L		1		E300.0	05/26/18 01:43 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/26/18 01:43 / ens
Sulfate	71	mg/L		1		E300.0	05/26/18 01:43 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/29/18 18:04 / rlh
Arsenic	6	mg/kg	D	2		SW6020	05/29/18 18:04 / rlh
Barium	126	mg/kg		1		SW6020	05/29/18 18:04 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/29/18 18:04 / rlh
Boron	9	mg/kg	D	5		SW6010B	06/04/18 22:48 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/29/18 18:04 / rlh
Chromium	12	mg/kg		1		SW6020	05/29/18 18:04 / rlh
Cobalt	6	mg/kg		1		SW6020	05/29/18 18:04 / rlh
Lead	11	mg/kg		1		SW6020	05/29/18 18:04 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/04/18 22:48 / rjh
Manganese	306	mg/kg		1		SW6020	05/29/18 18:04 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 14:12 / by
Molybdenum	ND	mg/kg		1		SW6020	05/29/18 18:04 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/29/18 18:04 / rlh
Thallium	ND	mg/kg		1		SW6020	05/29/18 18:04 / rlh
RADIONUCLIDES							
Radium 226	0.8	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 226 precision (±)	0.2	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	06/21/18 13:35 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/21/18 13:35 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/21/18 13:35 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-136
Client Sample ID: TLN-1805-199

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 14:40
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.5	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	5.2	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	24.4	meq/L		0.05		SW6010B	05/30/18 17:26 / rjh
Magnesium, sat. paste	68.6	meq/L		0.08		SW6010B	05/30/18 17:26 / rjh
Potassium, sat. paste	0.90	meq/L	D	0.04		SW6010B	05/30/18 17:26 / rjh
Sodium, sat. paste	18.0	meq/L	D	0.06		SW6010B	05/30/18 17:26 / rjh
Sodium Adsorption Ratio (SAR)	2.64	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	148	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	5		E300.0	05/26/18 02:22 / ens
Chloride	26	mg/L	D	2		E300.0	05/26/18 02:22 / ens
Fluoride	ND	mg/L	D	10		E300.0	05/26/18 02:22 / ens
Sulfate	4980	mg/L	D	10		E300.0	05/26/18 02:22 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/29/18 18:07 / rlh
Arsenic	24	mg/kg		1		SW6020	05/29/18 18:07 / rlh
Barium	256	mg/kg		1		SW6020	05/29/18 18:07 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/29/18 18:07 / rlh
Boron	17	mg/kg	D	5		SW6010B	06/04/18 22:52 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/29/18 18:07 / rlh
Chromium	14	mg/kg		1		SW6020	05/29/18 18:07 / rlh
Cobalt	13	mg/kg		1		SW6020	05/29/18 18:07 / rlh
Lead	21	mg/kg		1		SW6020	05/29/18 18:07 / rlh
Lithium	10	mg/kg	D	5		SW6010B	06/04/18 22:52 / rjh
Manganese	568	mg/kg		1		SW6020	05/29/18 18:07 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 14:14 / by
Molybdenum	2	mg/kg		1		SW6020	05/29/18 18:07 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/29/18 18:07 / rlh
Thallium	ND	mg/kg		1		SW6020	05/29/18 18:07 / rlh
RADIONUCLIDES							
Radium 226	0.7	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 226 precision (±)	0.2	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	06/21/18 13:35 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/21/18 13:35 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/21/18 13:35 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-136
Client Sample ID: TLN-1805-199

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 14:40
DateReceived: 05/11/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Arsenic	ND	mg/L		0.001		SW6020	08/04/18 20:47 / car
Cobalt	ND	mg/L		0.005		SW6020	08/04/18 20:47 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-137
Client Sample ID: TLN-1805-200

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 14:40
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	18.9	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.3	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.6	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	3.54	meq/L		0.05		SW6010B	05/30/18 17:30 / rjh
Magnesium, sat. paste	1.30	meq/L		0.08		SW6010B	05/30/18 17:30 / rjh
Potassium, sat. paste	1.09	meq/L		0.03		SW6010B	05/30/18 17:30 / rjh
Sodium, sat. paste	0.12	meq/L		0.04		SW6010B	05/30/18 17:30 / rjh
Sodium Adsorption Ratio (SAR)	0.08	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	325	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/26/18 02:41 / ens
Chloride	3	mg/L		1		E300.0	05/26/18 02:41 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/26/18 02:41 / ens
Sulfate	18	mg/L		1		E300.0	05/26/18 02:41 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/29/18 18:15 / rlh
Arsenic	6	mg/kg	D	2		SW6020	05/29/18 18:15 / rlh
Barium	110	mg/kg		1		SW6020	05/29/18 18:15 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/29/18 18:15 / rlh
Boron	7	mg/kg	D	5		SW6010B	06/04/18 22:57 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/29/18 18:15 / rlh
Chromium	13	mg/kg		1		SW6020	05/29/18 18:15 / rlh
Cobalt	6	mg/kg		1		SW6020	05/29/18 18:15 / rlh
Lead	11	mg/kg		1		SW6020	05/29/18 18:15 / rlh
Lithium	10	mg/kg	D	5		SW6010B	06/04/18 22:57 / rjh
Manganese	296	mg/kg		1		SW6020	05/29/18 18:15 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 14:15 / by
Molybdenum	ND	mg/kg		1		SW6020	05/29/18 18:15 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/29/18 18:15 / rlh
Thallium	ND	mg/kg		1		SW6020	05/29/18 18:15 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 228	1.1	pCi/g-dry				RA-05	06/21/18 13:35 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/21/18 13:35 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/21/18 13:35 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-138
Client Sample ID: TLN-1805-201

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 14:45
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.1	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.6	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	3.63	meq/L		0.05		SW6010B	05/30/18 17:34 / rjh
Magnesium, sat. paste	2.12	meq/L		0.08		SW6010B	05/30/18 17:34 / rjh
Potassium, sat. paste	0.40	meq/L		0.03		SW6010B	05/30/18 17:34 / rjh
Sodium, sat. paste	0.23	meq/L		0.04		SW6010B	05/30/18 17:34 / rjh
Sodium Adsorption Ratio (SAR)	0.13	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	233	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/26/18 03:01 / ens
Chloride	3	mg/L		1		E300.0	05/26/18 03:01 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/26/18 03:01 / ens
Sulfate	88	mg/L		1		E300.0	05/26/18 03:01 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/29/18 18:18 / rlh
Arsenic	7	mg/kg	D	2		SW6020	05/29/18 18:18 / rlh
Barium	158	mg/kg		1		SW6020	05/29/18 18:18 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/29/18 18:18 / rlh
Boron	5	mg/kg	D	5		SW6010B	06/04/18 23:01 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/29/18 18:18 / rlh
Chromium	12	mg/kg		1		SW6020	05/29/18 18:18 / rlh
Cobalt	6	mg/kg		1		SW6020	05/29/18 18:18 / rlh
Lead	10	mg/kg		1		SW6020	05/29/18 18:18 / rlh
Lithium	10	mg/kg	D	5		SW6010B	06/04/18 23:01 / rjh
Manganese	289	mg/kg		1		SW6020	05/29/18 18:18 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 14:17 / by
Molybdenum	ND	mg/kg		1		SW6020	05/29/18 18:18 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/29/18 18:18 / rlh
Thallium	ND	mg/kg		1		SW6020	05/29/18 18:18 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/26/18 13:10 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	06/21/18 13:35 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/21/18 13:35 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/21/18 13:35 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-139
Client Sample ID: TLN-1805-202

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 14:50
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.4	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.3	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.4	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	2.11	meq/L		0.05		SW6010B	05/30/18 17:49 / rjh
Magnesium, sat. paste	2.00	meq/L		0.08		SW6010B	05/30/18 17:49 / rjh
Potassium, sat. paste	0.43	meq/L		0.03		SW6010B	05/30/18 17:49 / rjh
Sodium, sat. paste	0.17	meq/L		0.04		SW6010B	05/30/18 17:49 / rjh
Sodium Adsorption Ratio (SAR)	0.12	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	214	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/26/18 03:40 / ens
Chloride	4	mg/L		1		E300.0	05/26/18 03:40 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/26/18 03:40 / ens
Sulfate	21	mg/L		1		E300.0	05/26/18 03:40 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/31/18 04:58 / rlh
Arsenic	6	mg/kg		1		SW6020	05/31/18 04:58 / rlh
Barium	74	mg/kg		1		SW6020	05/31/18 04:58 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 04:58 / rlh
Boron	13	mg/kg	D	5		SW6010B	06/04/18 23:38 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/31/18 04:58 / rlh
Chromium	21	mg/kg		1		SW6020	05/31/18 04:58 / rlh
Cobalt	8	mg/kg		1		SW6020	05/31/18 04:58 / rlh
Lead	17	mg/kg		1		SW6020	05/31/18 04:58 / rlh
Lithium	18	mg/kg	D	5		SW6010B	06/04/18 23:38 / rjh
Manganese	375	mg/kg		1		SW6020	05/31/18 04:58 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 14:19 / by
Molybdenum	1	mg/kg		1		SW6020	05/31/18 04:58 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/31/18 04:58 / rlh
Thallium	ND	mg/kg		1		SW6020	05/31/18 04:58 / rlh
RADIONUCLIDES							
Radium 226	0.7	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 228	0.8	pCi/g-dry				RA-05	06/15/18 14:17 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/15/18 14:17 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/15/18 14:17 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-140
Client Sample ID: TLN-1805-203

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 14:55
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.0	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.4	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	1.77	meq/L		0.05		SW6010B	05/30/18 17:57 / rjh
Magnesium, sat. paste	2.45	meq/L		0.08		SW6010B	05/30/18 17:57 / rjh
Potassium, sat. paste	0.34	meq/L		0.03		SW6010B	05/30/18 17:57 / rjh
Sodium, sat. paste	0.22	meq/L		0.04		SW6010B	05/30/18 17:57 / rjh
Sodium Adsorption Ratio (SAR)	0.15	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	209	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/26/18 04:00 / ens
Chloride	4	mg/L		1		E300.0	05/26/18 04:00 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/26/18 04:00 / ens
Sulfate	31	mg/L		1		E300.0	05/26/18 04:00 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/31/18 05:01 / rlh
Arsenic	10	mg/kg	D	2		SW6020	05/31/18 05:01 / rlh
Barium	161	mg/kg		1		SW6020	05/31/18 05:01 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 05:01 / rlh
Boron	8	mg/kg	D	5		SW6010B	06/04/18 23:42 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/31/18 05:01 / rlh
Chromium	17	mg/kg		1		SW6020	05/31/18 05:01 / rlh
Cobalt	8	mg/kg		1		SW6020	05/31/18 05:01 / rlh
Lead	13	mg/kg		1		SW6020	05/31/18 05:01 / rlh
Lithium	13	mg/kg	D	5		SW6010B	06/04/18 23:42 / rjh
Manganese	471	mg/kg		1		SW6020	05/31/18 05:01 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 14:21 / by
Molybdenum	1	mg/kg		1		SW6020	05/31/18 05:01 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/31/18 05:01 / rlh
Thallium	ND	mg/kg		1		SW6020	05/31/18 05:01 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 228	1.2	pCi/g-dry				RA-05	06/15/18 14:17 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/15/18 14:17 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/15/18 14:17 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-141
Client Sample ID: TLN-1805-204

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 15:00
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.8	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.5	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	1.79	meq/L		0.05		SW6010B	05/30/18 18:01 / rjh
Magnesium, sat. paste	2.73	meq/L		0.08		SW6010B	05/30/18 18:01 / rjh
Potassium, sat. paste	0.24	meq/L		0.03		SW6010B	05/30/18 18:01 / rjh
Sodium, sat. paste	0.67	meq/L		0.04		SW6010B	05/30/18 18:01 / rjh
Sodium Adsorption Ratio (SAR)	0.44	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	229	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/26/18 04:19 / ens
Chloride	7	mg/L		1		E300.0	05/26/18 04:19 / ens
Fluoride	0.7	mg/L	D	0.5		E300.0	05/26/18 04:19 / ens
Sulfate	73	mg/L		1		E300.0	05/26/18 04:19 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/31/18 05:03 / rlh
Arsenic	14	mg/kg		1		SW6020	05/31/18 05:03 / rlh
Barium	243	mg/kg		1		SW6020	05/31/18 05:03 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 05:03 / rlh
Boron	16	mg/kg	D	5		SW6010B	06/04/18 23:46 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/31/18 05:03 / rlh
Chromium	22	mg/kg		1		SW6020	05/31/18 05:03 / rlh
Cobalt	10	mg/kg		1		SW6020	05/31/18 05:03 / rlh
Lead	17	mg/kg		1		SW6020	05/31/18 05:03 / rlh
Lithium	14	mg/kg	D	5		SW6010B	06/04/18 23:46 / rjh
Manganese	890	mg/kg		1		SW6020	05/31/18 05:03 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 14:22 / by
Molybdenum	2	mg/kg		1		SW6020	05/31/18 05:03 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/31/18 05:03 / rlh
Thallium	ND	mg/kg		1		SW6020	05/31/18 05:03 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 228	0.8	pCi/g-dry				RA-05	06/15/18 14:17 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/15/18 14:17 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/15/18 14:17 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-141
Client Sample ID: TLN-1805-204

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 15:00
DateReceived: 05/11/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Cobalt	ND	mg/L		0.005		SW6020	08/04/18 20:55 / car
Manganese	0.116	mg/L	D	0.002		SW6020	08/04/18 20:55 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-142
Client Sample ID: TLN-1805-205

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 15:10
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	17.5	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.5	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	2.06	meq/L		0.05		SW6010B	05/30/18 18:04 / rjh
Magnesium, sat. paste	2.47	meq/L		0.08		SW6010B	05/30/18 18:04 / rjh
Potassium, sat. paste	0.51	meq/L		0.03		SW6010B	05/30/18 18:04 / rjh
Sodium, sat. paste	0.48	meq/L		0.04		SW6010B	05/30/18 18:04 / rjh
Sodium Adsorption Ratio (SAR)	0.32	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	213	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/26/18 04:39 / ens
Chloride	4	mg/L		1		E300.0	05/26/18 04:39 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/26/18 04:39 / ens
Sulfate	35	mg/L		1		E300.0	05/26/18 04:39 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/31/18 05:06 / rlh
Arsenic	6	mg/kg	D	2		SW6020	05/31/18 05:06 / rlh
Barium	70	mg/kg		1		SW6020	05/31/18 05:06 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 05:06 / rlh
Boron	16	mg/kg	D	5		SW6010B	06/04/18 23:51 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/31/18 05:06 / rlh
Chromium	21	mg/kg		1		SW6020	05/31/18 05:06 / rlh
Cobalt	8	mg/kg		1		SW6020	05/31/18 05:06 / rlh
Lead	18	mg/kg		1		SW6020	05/31/18 05:06 / rlh
Lithium	20	mg/kg	D	5		SW6010B	06/04/18 23:51 / rjh
Manganese	322	mg/kg		1		SW6020	05/31/18 05:06 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/26/18 14:24 / by
Molybdenum	ND	mg/kg		1		SW6020	05/31/18 05:06 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/31/18 05:06 / rlh
Thallium	ND	mg/kg		1		SW6020	05/31/18 05:06 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 228	1	pCi/g-dry				RA-05	06/15/18 14:17 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/15/18 14:17 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/15/18 14:17 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-143
Client Sample ID: TLN-1805-206

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 15:15
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.8	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	3.5	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	21.2	meq/L		0.05		SW6010B	05/30/18 18:08 / rjh
Magnesium, sat. paste	28.0	meq/L		0.08		SW6010B	05/30/18 18:08 / rjh
Potassium, sat. paste	0.77	meq/L		0.03		SW6010B	05/30/18 18:08 / rjh
Sodium, sat. paste	9.55	meq/L		0.04		SW6010B	05/30/18 18:08 / rjh
Sodium Adsorption Ratio (SAR)	1.93	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	126	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	2		E300.0	05/26/18 05:37 / ens
Chloride	11	mg/L		1		E300.0	05/26/18 05:37 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/26/18 05:37 / ens
Sulfate	2680	mg/L	D	5		E300.0	05/26/18 05:37 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/31/18 05:08 / rlh
Arsenic	7	mg/kg		1		SW6020	05/31/18 05:08 / rlh
Barium	143	mg/kg		1		SW6020	05/31/18 05:08 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 05:08 / rlh
Boron	15	mg/kg	D	5		SW6010B	06/04/18 23:55 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/31/18 05:08 / rlh
Chromium	18	mg/kg		1		SW6020	05/31/18 05:08 / rlh
Cobalt	8	mg/kg		1		SW6020	05/31/18 05:08 / rlh
Lead	15	mg/kg		1		SW6020	05/31/18 05:08 / rlh
Lithium	15	mg/kg	D	5		SW6010B	06/04/18 23:55 / rjh
Manganese	379	mg/kg		1		SW6020	05/31/18 05:08 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/30/18 15:51 / by
Molybdenum	ND	mg/kg		1		SW6020	05/31/18 05:08 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/31/18 05:08 / rlh
Thallium	ND	mg/kg		1		SW6020	05/31/18 05:08 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 228	0.8	pCi/g-dry				RA-05	06/15/18 14:17 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/15/18 14:17 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/15/18 14:17 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-144
Client Sample ID: TLN-1805-207

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 15:20
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.2	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	4.1	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	24.6	meq/L		0.05		SW6010B	05/30/18 18:12 / rjh
Magnesium, sat. paste	33.4	meq/L		0.08		SW6010B	05/30/18 18:12 / rjh
Potassium, sat. paste	0.64	meq/L		0.03		SW6010B	05/30/18 18:12 / rjh
Sodium, sat. paste	13.6	meq/L		0.04		SW6010B	05/30/18 18:12 / rjh
Sodium Adsorption Ratio (SAR)	2.52	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	90	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L	D	2		E300.0	05/26/18 05:57 / ens
Chloride	73	mg/L		1		E300.0	05/26/18 05:57 / ens
Fluoride	ND	mg/L	D	5		E300.0	05/26/18 05:57 / ens
Sulfate	3250	mg/L	D	5		E300.0	05/26/18 05:57 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/31/18 05:11 / rlh
Arsenic	15	mg/kg		1		SW6020	05/31/18 05:11 / rlh
Barium	197	mg/kg		1		SW6020	05/31/18 05:11 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 05:11 / rlh
Boron	13	mg/kg	D	5		SW6010B	06/04/18 23:59 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/31/18 05:11 / rlh
Chromium	17	mg/kg		1		SW6020	05/31/18 05:11 / rlh
Cobalt	7	mg/kg		1		SW6020	05/31/18 05:11 / rlh
Lead	11	mg/kg		1		SW6020	05/31/18 05:11 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/04/18 23:59 / rjh
Manganese	531	mg/kg		1		SW6020	05/31/18 05:11 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/30/18 15:53 / by
Molybdenum	2	mg/kg		1		SW6020	05/31/18 05:11 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/31/18 05:11 / rlh
Thallium	ND	mg/kg		1		SW6020	05/31/18 05:11 / rlh
RADIONUCLIDES							
Radium 226	0.7	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 226 precision (±)	0.2	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 228	0.7	pCi/g-dry				RA-05	06/15/18 14:17 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/15/18 14:17 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/15/18 14:17 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-145
Client Sample ID: TLN-1805-208

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 15:25
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	11.8	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.5	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	3.18	meq/L		0.05		SW6010B	05/30/18 18:16 / rjh
Magnesium, sat. paste	1.82	meq/L		0.08		SW6010B	05/30/18 18:16 / rjh
Potassium, sat. paste	0.48	meq/L		0.03		SW6010B	05/30/18 18:16 / rjh
Sodium, sat. paste	0.10	meq/L		0.04		SW6010B	05/30/18 18:16 / rjh
Sodium Adsorption Ratio (SAR)	0.07	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	284	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/26/18 06:36 / ens
Chloride	5	mg/L		1		E300.0	05/26/18 06:36 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/26/18 06:36 / ens
Sulfate	13	mg/L		1		E300.0	05/26/18 06:36 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/31/18 05:19 / rlh
Arsenic	8	mg/kg		1		SW6020	05/31/18 05:19 / rlh
Barium	146	mg/kg		1		SW6020	05/31/18 05:19 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 05:19 / rlh
Boron	6	mg/kg	D	5		SW6010B	06/05/18 00:38 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/31/18 05:19 / rlh
Chromium	15	mg/kg		1		SW6020	05/31/18 05:19 / rlh
Cobalt	6	mg/kg		1		SW6020	05/31/18 05:19 / rlh
Lead	10	mg/kg		1		SW6020	05/31/18 05:19 / rlh
Lithium	10	mg/kg	D	5		SW6010B	06/05/18 00:38 / rjh
Manganese	360	mg/kg		1		SW6020	05/31/18 05:19 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/30/18 15:55 / by
Molybdenum	ND	mg/kg		1		SW6020	05/31/18 05:19 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/31/18 05:19 / rlh
Thallium	ND	mg/kg		1		SW6020	05/31/18 05:19 / rlh
RADIONUCLIDES							
Radium 226	0.3	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 226 precision (±)	0.08	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 228	0.3	pCi/g-dry	U			RA-05	06/15/18 15:50 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-146
Client Sample ID: TLN-1805-209

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 15:30
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	13.2	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.7	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.4	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	1.71	meq/L		0.05		SW6010B	05/30/18 18:20 / rjh
Magnesium, sat. paste	1.91	meq/L		0.08		SW6010B	05/30/18 18:20 / rjh
Potassium, sat. paste	0.11	meq/L		0.03		SW6010B	05/30/18 18:20 / rjh
Sodium, sat. paste	0.13	meq/L		0.04		SW6010B	05/30/18 18:20 / rjh
Sodium Adsorption Ratio (SAR)	0.10	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	172	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/26/18 06:56 / ens
Chloride	2	mg/L		1		E300.0	05/26/18 06:56 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/26/18 06:56 / ens
Sulfate	14	mg/L		1		E300.0	05/26/18 06:56 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/31/18 05:21 / rlh
Arsenic	8	mg/kg		1		SW6020	05/31/18 05:21 / rlh
Barium	165	mg/kg		1		SW6020	05/31/18 05:21 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 05:21 / rlh
Boron	ND	mg/kg	D	5		SW6010B	06/05/18 00:43 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/31/18 05:21 / rlh
Chromium	12	mg/kg		1		SW6020	05/31/18 05:21 / rlh
Cobalt	6	mg/kg		1		SW6020	05/31/18 05:21 / rlh
Lead	10	mg/kg		1		SW6020	05/31/18 05:21 / rlh
Lithium	10	mg/kg	D	5		SW6010B	06/05/18 00:43 / rjh
Manganese	326	mg/kg		1		SW6020	05/31/18 05:21 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/30/18 15:56 / by
Molybdenum	ND	mg/kg		1		SW6020	05/31/18 05:21 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/31/18 05:21 / rlh
Thallium	ND	mg/kg		1		SW6020	05/31/18 05:21 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/20/18 12:54 / eli-ca
Radium 228	1.4	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca
Radium 228 precision (±)	0.4	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-147
Client Sample ID: TLN-1805-210

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 15:35
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	17.0	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.4	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.6	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	2.72	meq/L		0.05		SW6010B	05/30/18 18:32 / rjh
Magnesium, sat. paste	2.26	meq/L		0.08		SW6010B	05/30/18 18:32 / rjh
Potassium, sat. paste	1.06	meq/L		0.03		SW6010B	05/30/18 18:32 / rjh
Sodium, sat. paste	0.17	meq/L		0.04		SW6010B	05/30/18 18:32 / rjh
Sodium Adsorption Ratio (SAR)	0.11	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	321	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/26/18 07:15 / ens
Chloride	6	mg/L		1		E300.0	05/26/18 07:15 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/26/18 07:15 / ens
Sulfate	24	mg/L		1		E300.0	05/26/18 07:15 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/31/18 05:24 / rlh
Arsenic	10	mg/kg	D	2		SW6020	05/31/18 05:24 / rlh
Barium	115	mg/kg		1		SW6020	05/31/18 05:24 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 05:24 / rlh
Boron	9	mg/kg	D	5		SW6010B	06/05/18 00:47 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/31/18 05:24 / rlh
Chromium	17	mg/kg		1		SW6020	05/31/18 05:24 / rlh
Cobalt	8	mg/kg		1		SW6020	05/31/18 05:24 / rlh
Lead	15	mg/kg		1		SW6020	05/31/18 05:24 / rlh
Lithium	13	mg/kg	D	5		SW6010B	06/05/18 00:47 / rjh
Manganese	380	mg/kg		1		SW6020	05/31/18 05:24 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/30/18 15:58 / by
Molybdenum	1	mg/kg		1		SW6020	05/31/18 05:24 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/31/18 05:24 / rlh
Thallium	ND	mg/kg		1		SW6020	05/31/18 05:24 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/20/18 15:06 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/20/18 15:06 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/20/18 15:06 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-148
Client Sample ID: TLN-1805-211

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 15:40
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.0	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.4	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	1.55	meq/L		0.05		SW6010B	05/30/18 18:36 / rjh
Magnesium, sat. paste	2.16	meq/L		0.08		SW6010B	05/30/18 18:36 / rjh
Potassium, sat. paste	0.29	meq/L		0.03		SW6010B	05/30/18 18:36 / rjh
Sodium, sat. paste	0.28	meq/L		0.04		SW6010B	05/30/18 18:36 / rjh
Sodium Adsorption Ratio (SAR)	0.21	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	154	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/26/18 07:35 / ens
Chloride	3	mg/L		1		E300.0	05/26/18 07:35 / ens
Fluoride	0.5	mg/L	D	0.5		E300.0	05/26/18 07:35 / ens
Sulfate	30	mg/L		1		E300.0	05/26/18 07:35 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/31/18 05:26 / rlh
Arsenic	7	mg/kg	D	2		SW6020	05/31/18 05:26 / rlh
Barium	150	mg/kg		1		SW6020	05/31/18 05:26 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 05:26 / rlh
Boron	7	mg/kg	D	5		SW6010B	06/05/18 00:51 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/31/18 05:26 / rlh
Chromium	14	mg/kg		1		SW6020	05/31/18 05:26 / rlh
Cobalt	6	mg/kg		1		SW6020	05/31/18 05:26 / rlh
Lead	11	mg/kg		1		SW6020	05/31/18 05:26 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/05/18 00:51 / rjh
Manganese	332	mg/kg		1		SW6020	05/31/18 05:26 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/30/18 16:00 / by
Molybdenum	ND	mg/kg		1		SW6020	05/31/18 05:26 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/31/18 05:26 / rlh
Thallium	ND	mg/kg		1		SW6020	05/31/18 05:26 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/20/18 15:06 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/20/18 15:06 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/20/18 15:06 / eli-ca
Radium 228	0.3	pCi/g-dry	U			RA-05	06/15/18 15:50 / eli-ca
Radium 228 precision (±)	0.2	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-149
Client Sample ID: TLN-1805-212

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 15:45
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	16.6	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.4	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	2.21	meq/L		0.05		SW6010B	05/30/18 18:44 / rjh
Magnesium, sat. paste	1.76	meq/L		0.08		SW6010B	05/30/18 18:44 / rjh
Potassium, sat. paste	0.51	meq/L		0.03		SW6010B	05/30/18 18:44 / rjh
Sodium, sat. paste	0.07	meq/L		0.04		SW6010B	05/30/18 18:44 / rjh
Sodium Adsorption Ratio (SAR)	0.05	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	225	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/26/18 08:14 / ens
Chloride	3	mg/L		1		E300.0	05/26/18 08:14 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/26/18 08:14 / ens
Sulfate	16	mg/L		1		E300.0	05/26/18 08:14 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/31/18 05:29 / rlh
Arsenic	13	mg/kg	D	2		SW6020	05/31/18 05:29 / rlh
Barium	248	mg/kg		1		SW6020	05/31/18 05:29 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 05:29 / rlh
Boron	8	mg/kg	D	5		SW6010B	06/05/18 00:56 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/31/18 05:29 / rlh
Chromium	15	mg/kg		1		SW6020	05/31/18 05:29 / rlh
Cobalt	8	mg/kg		1		SW6020	05/31/18 05:29 / rlh
Lead	16	mg/kg		1		SW6020	05/31/18 05:29 / rlh
Lithium	12	mg/kg	D	5		SW6010B	06/05/18 00:56 / rjh
Manganese	519	mg/kg		1		SW6020	05/31/18 05:29 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/30/18 16:02 / by
Molybdenum	1	mg/kg		1		SW6020	05/31/18 05:29 / rlh
Selenium	ND	mg/kg	D	3		SW6020	05/31/18 05:29 / rlh
Thallium	ND	mg/kg		1		SW6020	05/31/18 05:29 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/20/18 15:06 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/20/18 15:06 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/20/18 15:06 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-150
Client Sample ID: TLN-1805-213

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 15:50
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	14.5	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.4	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	1.79	meq/L		0.05		SW6010B	05/30/18 18:51 / rjh
Magnesium, sat. paste	1.97	meq/L		0.08		SW6010B	05/30/18 18:51 / rjh
Potassium, sat. paste	0.32	meq/L		0.03		SW6010B	05/30/18 18:51 / rjh
Sodium, sat. paste	0.18	meq/L		0.04		SW6010B	05/30/18 18:51 / rjh
Sodium Adsorption Ratio (SAR)	0.13	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	269	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/26/18 08:33 / ens
Chloride	4	mg/L		1		E300.0	05/26/18 08:33 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/26/18 08:33 / ens
Sulfate	22	mg/L		1		E300.0	05/26/18 08:33 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/31/18 05:31 / rlh
Arsenic	21	mg/kg		1		SW6020	05/31/18 05:31 / rlh
Barium	583	mg/kg		1		SW6020	05/31/18 05:31 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 05:31 / rlh
Boron	9	mg/kg	D	5		SW6010B	06/05/18 01:00 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/31/18 05:31 / rlh
Chromium	19	mg/kg		1		SW6020	05/31/18 05:31 / rlh
Cobalt	10	mg/kg		1		SW6020	05/31/18 05:31 / rlh
Lead	19	mg/kg		1		SW6020	05/31/18 05:31 / rlh
Lithium	11	mg/kg	D	5		SW6010B	06/05/18 01:00 / rjh
Manganese	944	mg/kg		1		SW6020	05/31/18 05:31 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/30/18 16:03 / by
Molybdenum	2	mg/kg		1		SW6020	05/31/18 05:31 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/31/18 05:31 / rlh
Thallium	ND	mg/kg		1		SW6020	05/31/18 05:31 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/20/18 15:06 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/20/18 15:06 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/20/18 15:06 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-150
Client Sample ID: TLN-1805-213

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 15:50
DateReceived: 05/11/18
Matrix: Splp Extract

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
METALS, SPLP EXTRACTABLE							
Arsenic	0.005	mg/L	D	0.003		SW6020	08/04/18 20:59 / car
Barium	0.10	mg/L		0.05		SW6020	08/04/18 20:59 / car
Cobalt	ND	mg/L		0.005		SW6020	08/04/18 20:59 / car
Manganese	0.182	mg/L	D	0.002		SW6020	08/04/18 20:59 / car

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
D - RL increased due to sample matrix.
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-151
Client Sample ID: TLN-1805-214

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 15:55
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	18.9	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.5	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	2.33	meq/L		0.05		SW6010B	05/30/18 18:55 / rjh
Magnesium, sat. paste	2.81	meq/L		0.08		SW6010B	05/30/18 18:55 / rjh
Potassium, sat. paste	0.50	meq/L		0.03		SW6010B	05/30/18 18:55 / rjh
Sodium, sat. paste	0.14	meq/L		0.04		SW6010B	05/30/18 18:55 / rjh
Sodium Adsorption Ratio (SAR)	0.09	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	261	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/26/18 08:53 / ens
Chloride	10	mg/L		1		E300.0	05/26/18 08:53 / ens
Fluoride	ND	mg/L	D	0.5		E300.0	05/26/18 08:53 / ens
Sulfate	42	mg/L		1		E300.0	05/26/18 08:53 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/31/18 05:34 / rlh
Arsenic	10	mg/kg		1		SW6020	05/31/18 05:34 / rlh
Barium	235	mg/kg		1		SW6020	05/31/18 05:34 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 05:34 / rlh
Boron	11	mg/kg	D	5		SW6010B	06/05/18 01:04 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/31/18 05:34 / rlh
Chromium	17	mg/kg		1		SW6020	05/31/18 05:34 / rlh
Cobalt	7	mg/kg		1		SW6020	05/31/18 05:34 / rlh
Lead	16	mg/kg		1		SW6020	05/31/18 05:34 / rlh
Lithium	13	mg/kg	D	5		SW6010B	06/05/18 01:04 / rjh
Manganese	432	mg/kg		1		SW6020	05/31/18 05:34 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/30/18 16:05 / by
Molybdenum	ND	mg/kg		1		SW6020	05/31/18 05:34 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/31/18 05:34 / rlh
Thallium	ND	mg/kg		1		SW6020	05/31/18 05:34 / rlh
RADIONUCLIDES							
Radium 226	0.6	pCi/g-dry				E903.0	06/20/18 15:06 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/20/18 15:06 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/20/18 15:06 / eli-ca
Radium 228	0.6	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-152
Client Sample ID: TLN-1805-215

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 16:00
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	12.0	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.6	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.5	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	1.61	meq/L		0.05		SW6010B	05/30/18 18:59 / rjh
Magnesium, sat. paste	3.27	meq/L		0.08		SW6010B	05/30/18 18:59 / rjh
Potassium, sat. paste	0.26	meq/L		0.03		SW6010B	05/30/18 18:59 / rjh
Sodium, sat. paste	0.56	meq/L		0.04		SW6010B	05/30/18 18:59 / rjh
Sodium Adsorption Ratio (SAR)	0.36	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	213	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/26/18 09:12 / ens
Chloride	7	mg/L		1		E300.0	05/26/18 09:12 / ens
Fluoride	0.7	mg/L	D	0.5		E300.0	05/26/18 09:12 / ens
Sulfate	52	mg/L		1		E300.0	05/26/18 09:12 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/31/18 05:36 / rlh
Arsenic	9	mg/kg	D	2		SW6020	05/31/18 05:36 / rlh
Barium	164	mg/kg		1		SW6020	05/31/18 05:36 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 05:36 / rlh
Boron	6	mg/kg	D	5		SW6010B	06/05/18 01:09 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/31/18 05:36 / rlh
Chromium	12	mg/kg		1		SW6020	05/31/18 05:36 / rlh
Cobalt	7	mg/kg		1		SW6020	05/31/18 05:36 / rlh
Lead	11	mg/kg		1		SW6020	05/31/18 05:36 / rlh
Lithium	10	mg/kg	D	5		SW6010B	06/05/18 01:09 / rjh
Manganese	410	mg/kg		1		SW6020	05/31/18 05:36 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/30/18 16:07 / by
Molybdenum	1	mg/kg		1		SW6020	05/31/18 05:36 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/31/18 05:36 / rlh
Thallium	ND	mg/kg		1		SW6020	05/31/18 05:36 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/20/18 15:06 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/20/18 15:06 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/20/18 15:06 / eli-ca
Radium 228	0.3	pCi/g-dry	U			RA-05	06/15/18 15:50 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

LABORATORY ANALYTICAL REPORT

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Lab ID: B18051240-153
Client Sample ID: TLN-1805-216

Revised Date: 08/27/18
Report Date: 06/29/18
Collection Date: 05/10/18 14:47
DateReceived: 05/11/18
Matrix: Soil

Analyses	Result	Units	Qualifiers	RL	MCL/ QCL	Method	Analysis Date / By
PHYSICAL CHARACTERISTICS							
Moisture	15.0	wt%		0.2		D2974	05/29/18 16:37 / ptz
SATURATED PASTE EXTRACT							
pH, sat. paste	7.5	s.u.		0.1		ASA10-3	05/24/18 10:23 / srm
Conductivity, sat. paste	0.7	mmhos/cm		0.1		ASA10-3	05/24/18 10:23 / srm
Calcium, sat. paste	4.40	meq/L		0.05		SW6010B	05/30/18 19:03 / rjh
Magnesium, sat. paste	2.36	meq/L		0.08		SW6010B	05/30/18 19:03 / rjh
Potassium, sat. paste	0.43	meq/L		0.03		SW6010B	05/30/18 19:03 / rjh
Sodium, sat. paste	0.22	meq/L		0.04		SW6010B	05/30/18 19:03 / rjh
Sodium Adsorption Ratio (SAR)	0.12	unitless		0.01		Calculation	05/31/18 08:51 / srm
Bicarbonate as HCO3	229	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Carbonate as CO3	ND	mg/L		4		ASA10-3	05/24/18 07:59 / rco
Bromide	ND	mg/L		0.5		E300.0	05/26/18 10:11 / ens
Chloride	3	mg/L		1		E300.0	05/26/18 10:11 / ens
Fluoride	0.5	mg/L	D	0.5		E300.0	05/26/18 10:11 / ens
Sulfate	118	mg/L		1		E300.0	05/26/18 10:11 / ens
METALS, TOTAL - EPA SW846							
Antimony	ND	mg/kg		1		SW6020	05/31/18 05:39 / rlh
Arsenic	7	mg/kg	D	2		SW6020	05/31/18 05:39 / rlh
Barium	154	mg/kg		1		SW6020	05/31/18 05:39 / rlh
Beryllium	ND	mg/kg		1		SW6020	05/31/18 05:39 / rlh
Boron	ND	mg/kg	D	5		SW6010B	06/05/18 01:13 / rjh
Cadmium	ND	mg/kg		1		SW6020	05/31/18 05:39 / rlh
Chromium	13	mg/kg		1		SW6020	05/31/18 05:39 / rlh
Cobalt	6	mg/kg		1		SW6020	05/31/18 05:39 / rlh
Lead	11	mg/kg		1		SW6020	05/31/18 05:39 / rlh
Lithium	ND	mg/kg	D	5		SW6010B	06/05/18 01:13 / rjh
Manganese	319	mg/kg		1		SW6020	05/31/18 05:39 / rlh
Mercury	ND	mg/kg		1		SW7471B	05/30/18 16:12 / by
Molybdenum	ND	mg/kg		1		SW6020	05/31/18 05:39 / rlh
Selenium	ND	mg/kg	D	2		SW6020	05/31/18 05:39 / rlh
Thallium	ND	mg/kg		1		SW6020	05/31/18 05:39 / rlh
RADIONUCLIDES							
Radium 226	0.5	pCi/g-dry				E903.0	06/20/18 15:06 / eli-ca
Radium 226 precision (±)	0.1	pCi/g-dry				E903.0	06/20/18 15:06 / eli-ca
Radium 226 MDC	0.04	pCi/g-dry				E903.0	06/20/18 15:06 / eli-ca
Radium 228	0.5	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca
Radium 228 precision (±)	0.3	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca
Radium 228 MDC	0.4	pCi/g-dry				RA-05	06/15/18 15:50 / eli-ca

Report Definitions:
RL - Analyte reporting limit.
QCL - Quality control limit.
MDC - Minimum detectable concentration
MCL - Maximum contaminant level.
ND - Not detected at the reporting limit.
D - RL increased due to sample matrix.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/31/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: ASA10-3									Batch: 121697
Lab ID: B18051240-064A DUP	Sample Duplicate				Run: AR50_180524B				05/24/18 07:59
Bicarbonate as HCO3	129	mg/L	4.0				0.6	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: B18051240-075A DUP	Sample Duplicate				Run: AR50_180524B				05/24/18 07:59
Bicarbonate as HCO3	128	mg/L	4.0				15	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: B18051240-085A DUP	Sample Duplicate				Run: AR50_180524B				05/24/18 07:59
Bicarbonate as HCO3	237	mg/L	4.0				4.5	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: B18051240-095A DUP	Sample Duplicate				Run: AR50_180524B				05/24/18 07:59
Bicarbonate as HCO3	86.9	mg/L	4.0				3.9	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: B18051240-105A DUP	Sample Duplicate				Run: AR50_180524B				05/24/18 07:59
Bicarbonate as HCO3	201	mg/L	4.0				1.3	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: LCS-121697	Laboratory Control Sample				Run: AR50_180524B				05/24/18 07:59
Bicarbonate as HCO3	532	mg/L	4.0	102	70	130			
Method: ASA10-3									Batch: 121748
Lab ID: B18051240-108A DUP	Sample Duplicate				Run: AR50_180524B				05/24/18 07:59
Bicarbonate as HCO3	179	mg/L	4.0				3.0	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: B18051240-118A DUP	Sample Duplicate				Run: AR50_180524B				05/24/18 07:59
Bicarbonate as HCO3	246	mg/L	4.0				11	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: B18051240-128A DUP	Sample Duplicate				Run: AR50_180524B				05/24/18 07:59
Bicarbonate as HCO3	308	mg/L	4.0				0.6	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: B18051240-138A DUP	Sample Duplicate				Run: AR50_180524B				05/24/18 07:59
Bicarbonate as HCO3	265	mg/L	4.0				13	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: B18051240-148A DUP	Sample Duplicate				Run: AR50_180524B				05/24/18 07:59
Bicarbonate as HCO3	173	mg/L	4.0				12	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: LCS-121748	Laboratory Control Sample				Run: AR50_180524B				05/24/18 07:59
Bicarbonate as HCO3	582	mg/L	4.0	112	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/31/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: ASA10-3									Batch: 121470
Lab ID: B18051240-003A DUP	Sample Duplicate				Run: MISC-SOIL_180518A				05/18/18 12:08
Conductivity, sat. paste	0.680	mmhos/cm	0.10				3.0	30	
Lab ID: B18051240-014A DUP	Sample Duplicate				Run: MISC-SOIL_180518A				05/18/18 12:08
Conductivity, sat. paste	3.21	mmhos/cm	0.10				0.9	30	
Lab ID: LCS-1805181208	Laboratory Control Sample				Run: MISC-SOIL_180518A				05/18/18 12:08
Conductivity, sat. paste	4.12	mmhos/cm	0.10	100	70	130			
Lab ID: B18051240-003A DUP	Sample Duplicate				Run: MISC-SOIL_180518A				05/18/18 12:08
pH, sat. paste	7.90	s.u.	0.10				0.0	10	
Lab ID: B18051240-014A DUP	Sample Duplicate				Run: MISC-SOIL_180518A				05/18/18 12:08
pH, sat. paste	7.80	s.u.	0.10				1.3	10	
Lab ID: LCS-1805181208	Laboratory Control Sample				Run: MISC-SOIL_180518A				05/18/18 12:08
pH, sat. paste	7.30	s.u.	0.10	97	90	110			
Method: ASA10-3									Batch: 121538
Lab ID: B18051240-022A DUP	Sample Duplicate				Run: MISC-SOIL_180518A				05/18/18 12:12
Conductivity, sat. paste	7.49	mmhos/cm	0.10				0.5	30	
Lab ID: B18051240-032A DUP	Sample Duplicate				Run: MISC-SOIL_180518A				05/18/18 12:12
Conductivity, sat. paste	1.99	mmhos/cm	0.10				3.6	30	
Lab ID: B18051240-042A DUP	Sample Duplicate				Run: MISC-SOIL_180518A				05/18/18 12:12
Conductivity, sat. paste	0.860	mmhos/cm	0.10				1.2	30	
Lab ID: B18051240-052A DUP	Sample Duplicate				Run: MISC-SOIL_180518A				05/18/18 12:12
Conductivity, sat. paste	4.98	mmhos/cm	0.10				0.6	30	
Lab ID: B18051240-062A DUP	Sample Duplicate				Run: MISC-SOIL_180518A				05/18/18 12:12
Conductivity, sat. paste	9.49	mmhos/cm	0.10				0.3	30	
Lab ID: LCS-1805181212	Laboratory Control Sample				Run: MISC-SOIL_180518A				05/18/18 12:12
Conductivity, sat. paste	4.06	mmhos/cm	0.10	99	70	130			
Lab ID: B18051240-022A DUP	Sample Duplicate				Run: MISC-SOIL_180518A				05/18/18 12:12
pH, sat. paste	7.90	s.u.	0.10				1.3	10	
Lab ID: B18051240-032A DUP	Sample Duplicate				Run: MISC-SOIL_180518A				05/18/18 12:12
pH, sat. paste	7.40	s.u.	0.10				1.3	10	
Lab ID: B18051240-042A DUP	Sample Duplicate				Run: MISC-SOIL_180518A				05/18/18 12:12
pH, sat. paste	7.60	s.u.	0.10				1.3	10	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/31/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: ASA10-3									Batch: 121538
Lab ID: B18051240-052A DUP	Sample Duplicate				Run: MISC-SOIL_180518A				05/18/18 12:12
pH, sat. paste	8.10	s.u.	0.10				0.0	10	
Lab ID: B18051240-062A DUP	Sample Duplicate				Run: MISC-SOIL_180518A				05/18/18 12:12
pH, sat. paste	8.20	s.u.	0.10				0.0	10	
Lab ID: LCS-1805181212	Laboratory Control Sample				Run: MISC-SOIL_180518A				05/18/18 12:12
pH, sat. paste	7.30	s.u.	0.10	97	90	110			
Method: ASA10-3									Batch: 121697
Lab ID: B18051240-064A DUP	Sample Duplicate				Run: MISC-SOIL_180523A				05/23/18 10:11
Conductivity, sat. paste	8.42	mmhos/cm	0.10				0.7	30	
Lab ID: B18051240-075A DUP	Sample Duplicate				Run: MISC-SOIL_180523A				05/23/18 10:11
Conductivity, sat. paste	2.95	mmhos/cm	0.10				1.0	30	
Lab ID: B18051240-085A DUP	Sample Duplicate				Run: MISC-SOIL_180523A				05/23/18 10:11
Conductivity, sat. paste	1.68	mmhos/cm	0.10				0.6	30	
Lab ID: B18051240-095A DUP	Sample Duplicate				Run: MISC-SOIL_180523A				05/23/18 10:11
Conductivity, sat. paste	2.28	mmhos/cm	0.10				1.3	30	
Lab ID: B18051240-105A DUP	Sample Duplicate				Run: MISC-SOIL_180523A				05/23/18 10:11
Conductivity, sat. paste	0.450	mmhos/cm	0.10				4.3	30	
Lab ID: LCS-1805231011	Laboratory Control Sample				Run: MISC-SOIL_180523A				05/23/18 10:11
Conductivity, sat. paste	4.15	mmhos/cm	0.10	101	70	130			
Lab ID: B18051240-064A DUP	Sample Duplicate				Run: MISC-SOIL_180523A				05/23/18 10:11
pH, sat. paste	7.80	s.u.	0.10				1.3	10	
Lab ID: B18051240-075A DUP	Sample Duplicate				Run: MISC-SOIL_180523A				05/23/18 10:11
pH, sat. paste	7.40	s.u.	0.10				1.4	10	
Lab ID: B18051240-085A DUP	Sample Duplicate				Run: MISC-SOIL_180523A				05/23/18 10:11
pH, sat. paste	7.40	s.u.	0.10				0.0	10	
Lab ID: B18051240-095A DUP	Sample Duplicate				Run: MISC-SOIL_180523A				05/23/18 10:11
pH, sat. paste	7.30	s.u.	0.10				0.0	10	
Lab ID: B18051240-105A DUP	Sample Duplicate				Run: MISC-SOIL_180523A				05/23/18 10:11
pH, sat. paste	7.60	s.u.	0.10				0.0	10	
Lab ID: LCS-1805231011	Laboratory Control Sample				Run: MISC-SOIL_180523A				05/23/18 10:11
pH, sat. paste	7.20	s.u.	0.10	96	90	110			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/31/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: ASA10-3									Batch: 121748
Lab ID: B18051240-108A DUP	Sample Duplicate				Run: MISC-SOIL_180524A				05/24/18 10:23
Conductivity, sat. paste	0.410	mmhos/cm	0.10				2.4	30	
Lab ID: B18051240-118A DUP	Sample Duplicate				Run: MISC-SOIL_180524A				05/24/18 10:23
Conductivity, sat. paste	0.650	mmhos/cm	0.10				3.0	30	
Lab ID: B18051240-128A DUP	Sample Duplicate				Run: MISC-SOIL_180524A				05/24/18 10:23
Conductivity, sat. paste	0.800	mmhos/cm	0.10				3.7	30	
Lab ID: B18051240-138A DUP	Sample Duplicate				Run: MISC-SOIL_180524A				05/24/18 10:23
Conductivity, sat. paste	0.600	mmhos/cm	0.10				3.4	30	
Lab ID: B18051240-148A DUP	Sample Duplicate				Run: MISC-SOIL_180524A				05/24/18 10:23
Conductivity, sat. paste	0.410	mmhos/cm	0.10				2.5	30	
Lab ID: LCS-1805241023	Laboratory Control Sample				Run: MISC-SOIL_180524A				05/24/18 10:23
Conductivity, sat. paste	4.35	mmhos/cm	0.10	106	70	130			
Lab ID: B18051240-108A DUP	Sample Duplicate				Run: MISC-SOIL_180524A				05/24/18 10:23
pH, sat. paste	6.40	s.u.	0.10				1.6	10	
Lab ID: B18051240-118A DUP	Sample Duplicate				Run: MISC-SOIL_180524A				05/24/18 10:23
pH, sat. paste	7.40	s.u.	0.10				1.3	10	
Lab ID: B18051240-128A DUP	Sample Duplicate				Run: MISC-SOIL_180524A				05/24/18 10:23
pH, sat. paste	7.20	s.u.	0.10				0.0	10	
Lab ID: B18051240-138A DUP	Sample Duplicate				Run: MISC-SOIL_180524A				05/24/18 10:23
pH, sat. paste	7.50	s.u.	0.10				1.3	10	
Lab ID: B18051240-148A DUP	Sample Duplicate				Run: MISC-SOIL_180524A				05/24/18 10:23
pH, sat. paste	7.60	s.u.	0.10				0.0	10	
Lab ID: LCS-1805241023	Laboratory Control Sample				Run: MISC-SOIL_180524A				05/24/18 10:23
pH, sat. paste	7.10	s.u.	0.10	95	90	110			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/31/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: ASA10-3									Batch: ALK180517
Lab ID: B18051240-003A DUP	Sample Duplicate				Run: SOIL PH METER 1_180517A				05/17/18 08:47
Bicarbonate as HCO3	303	mg/L	4.0				1.7	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: B18051240-014A DUP	Sample Duplicate				Run: SOIL PH METER 1_180517A				05/17/18 08:47
Bicarbonate as HCO3	110	mg/L	4.0				0.6	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: LCS-121470	Laboratory Control Sample				Run: SOIL PH METER 1_180517A				05/17/18 08:47
Bicarbonate as HCO3	528	mg/L	4.0	101	70	130			
Method: ASA10-3									Batch: ALK180521
Lab ID: B18051240-022A DUP	Sample Duplicate				Run: SOIL PH METER 1_180521A				05/17/18 11:03
Bicarbonate as HCO3	82.1	mg/L	4.0				0.6	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: B18051240-032A DUP	Sample Duplicate				Run: SOIL PH METER 1_180521A				05/17/18 11:03
Bicarbonate as HCO3	185	mg/L	4.0				1.7	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: B18051240-042A DUP	Sample Duplicate				Run: SOIL PH METER 1_180521A				05/17/18 11:03
Bicarbonate as HCO3	120	mg/L	4.0				0.8	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: B18051240-052A DUP	Sample Duplicate				Run: SOIL PH METER 1_180521A				05/17/18 11:03
Bicarbonate as HCO3	183	mg/L	4.0				2.5	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: B18051240-062A DUP	Sample Duplicate				Run: SOIL PH METER 1_180521A				05/17/18 11:03
Bicarbonate as HCO3	122	mg/L	4.0				15	50	
Carbonate as CO3	ND	mg/L	4.0					50	
Lab ID: LCS-121538	Laboratory Control Sample				Run: SOIL PH METER 1_180521A				05/17/18 11:03
Bicarbonate as HCO3	512	mg/L	4.0	98	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/31/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **Calculation**									Batch: R300535
Lab ID: **B18051240-003A DUP**	Sample Duplicate				Run: MISC-SOIL_180521A				05/21/18 10:28
Sodium Adsorption Ratio (SAR)	0.250	unitless	0.010				13	30	
Lab ID: **B18051240-014A DUP**	Sample Duplicate				Run: MISC-SOIL_180521A				05/21/18 10:28
Sodium Adsorption Ratio (SAR)	0.720	unitless	0.010				7.2	30	
Lab ID: **LCS-1805211028**	Laboratory Control Sample				Run: MISC-SOIL_180521A				05/21/18 10:28
Sodium Adsorption Ratio (SAR)	7.94	unitless	0.010	85	70	130			
Method: **Calculation**									Batch: R300772
Lab ID: **B18051240-022A DUP**	Sample Duplicate				Run: MISC-SOIL_180524A				05/24/18 09:41
Sodium Adsorption Ratio (SAR)	4.43	unitless	0.010				4.6	30	
Lab ID: **B18051240-032A DUP**	Sample Duplicate				Run: MISC-SOIL_180524A				05/24/18 09:41
Sodium Adsorption Ratio (SAR)	1.89	unitless	0.010				6.6	30	
Lab ID: **B18051240-042A DUP**	Sample Duplicate				Run: MISC-SOIL_180524A				05/24/18 09:41
Sodium Adsorption Ratio (SAR)	0.880	unitless	0.010				0.0	30	
Lab ID: **B18051240-052A DUP**	Sample Duplicate				Run: MISC-SOIL_180524A				05/24/18 09:41
Sodium Adsorption Ratio (SAR)	2.26	unitless	0.010				1.3	30	
Lab ID: **B18051240-062A DUP**	Sample Duplicate				Run: MISC-SOIL_180524A				05/24/18 09:41
Sodium Adsorption Ratio (SAR)	5.10	unitless	0.010				3.0	30	
Lab ID: **LCS-1805240941**	Laboratory Control Sample				Run: MISC-SOIL_180524A				05/24/18 09:41
Sodium Adsorption Ratio (SAR)	8.63	unitless	0.010	92	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/31/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: Calculation									Batch: R300883
Lab ID: B18051240-064A DUP	Sample Duplicate				Run: MISC-SOIL_180525A			05/25/18 12:43	
Sodium Adsorption Ratio (SAR)	3.89	unitless	0.010				8.0	30	
Lab ID: B18051240-075A DUP	Sample Duplicate				Run: MISC-SOIL_180525A			05/25/18 12:43	
Sodium Adsorption Ratio (SAR)	0.390	unitless	0.010				9.8	30	
Lab ID: B18051240-085A DUP	Sample Duplicate				Run: MISC-SOIL_180525A			05/25/18 12:43	
Sodium Adsorption Ratio (SAR)	2.47	unitless	0.010				0.8	30	
Lab ID: B18051240-095A DUP	Sample Duplicate				Run: MISC-SOIL_180525A			05/25/18 12:43	
Sodium Adsorption Ratio (SAR)	0.0400	unitless	0.010				0.0	30	
Lab ID: B18051240-105A DUP	Sample Duplicate				Run: MISC-SOIL_180525A			05/25/18 12:43	
Sodium Adsorption Ratio (SAR)	0.220	unitless	0.010				0.0	30	
Lab ID: LCS-1805251243	Laboratory Control Sample				Run: MISC-SOIL_180525A			05/25/18 12:43	
Sodium Adsorption Ratio (SAR)	8.79	unitless	0.010	94	70	130			
Method: Calculation									Batch: R301132
Lab ID: B18051240-108A DUP	Sample Duplicate				Run: MISC-SOIL_180531B			05/31/18 08:51	
Sodium Adsorption Ratio (SAR)	0.270	unitless	0.010				11	30	
Lab ID: B18051240-118A DUP	Sample Duplicate				Run: MISC-SOIL_180531B			05/31/18 08:51	
Sodium Adsorption Ratio (SAR)	0.190	unitless	0.010				0.0	30	
Lab ID: B18051240-128A DUP	Sample Duplicate				Run: MISC-SOIL_180531B			05/31/18 08:51	
Sodium Adsorption Ratio (SAR)	0.110	unitless	0.010				9.5	30	
Lab ID: B18051240-138A DUP	Sample Duplicate				Run: MISC-SOIL_180531B			05/31/18 08:51	
Sodium Adsorption Ratio (SAR)	0.140	unitless	0.010				7.4	30	
Lab ID: B18051240-148A DUP	Sample Duplicate				Run: MISC-SOIL_180531B			05/31/18 08:51	
Sodium Adsorption Ratio (SAR)	0.220	unitless	0.010				4.7	30	
Lab ID: LCS-1805310851	Laboratory Control Sample				Run: MISC-SOIL_180531B			05/31/18 08:51	
Sodium Adsorption Ratio (SAR)	9.18	unitless	0.010	98	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/31/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Batch: 121470
Lab ID: LCS-121470	Laboratory Control Sample				Run: IC METROHM 1_180517A				05/17/18 22:21
Bromide	ND	mg/L	2.5		70	130			
Chloride	265	mg/L	1.2	110	70	130			
Fluoride	0.850	mg/L	5.0	91	70	130			
Sulfate	1910	mg/L	5.0	96	70	130			
Lab ID: B18051240-003A DUP	Sample Duplicate				Run: IC METROHM 1_180517A				05/18/18 18:31
Bromide	0.240	mg/L	0.50					30	
Chloride	5.66	mg/L	1.0				1.6	30	
Fluoride	0.540	mg/L	0.50				0.9	30	
Sulfate	81.7	mg/L	1.0				7.2	30	
Lab ID: B18051240-007AMS	Sample Matrix Spike				Run: IC METROHM 1_180517A				05/18/18 20:08
Bromide	15.8	mg/L	0.50	105	70	130			
Chloride	57.8	mg/L	1.0	107	70	130			
Fluoride	15.7	mg/L	0.51	104	70	130			
Sulfate	190	mg/L	1.0	105	70	130			
Lab ID: B18051240-014A DUP	Sample Duplicate				Run: IC METROHM 1_180517A				05/18/18 23:03
Bromide	3.85	mg/L	2.5				1.3	30	
Chloride	37.6	mg/L	1.2				3.2	30	
Fluoride	1.25	mg/L	5.0					30	
Sulfate	2430	mg/L	5.0				0.6	30	
Lab ID: B18051240-017AMS	Sample Matrix Spike				Run: IC METROHM 1_180517A				05/19/18 00:22
Bromide	33.1	mg/L	0.51	106	70	130			
Chloride	117	mg/L	1.0	108	70	130			
Fluoride	34.9	mg/L	1.0	108	70	130			
Sulfate	699	mg/L	1.0	103	70	130			
Method: E300.0									Batch: 121538
Lab ID: B18051240-025AMS	Sample Matrix Spike				Run: IC METROHM 1_180521A				05/22/18 07:14
Bromide	1590	mg/L	26	104	70	130			
Chloride	5810	mg/L	13	107	70	130			
Fluoride	1590	mg/L	51	106	70	130			
Sulfate	29900	mg/L	51	102	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/31/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Batch: 121748
Lab ID: LCS-121748	Laboratory Control Sample				Run: IC METROHM 1_180524A				05/25/18 12:42
Bromide	ND	mg/L	2.5		70	130			
Chloride	284	mg/L	1.2	118	70	130			
Fluoride	0.900	mg/L	5.0	97	70	130			
Sulfate	2060	mg/L	5.0	103	70	130			
Lab ID: B18051240-108A DUP	Sample Duplicate				Run: IC METROHM 1_180524A				05/25/18 13:21
Bromide	0.735	mg/L	0.50				2.1	30	
Chloride	8.00	mg/L	1.0				1.2	30	
Fluoride	0.140	mg/L	0.50					30	
Sulfate	33.3	mg/L	1.0				2.3	30	
Lab ID: B18051240-109AMS	Sample Matrix Spike				Run: IC METROHM 1_180524A				05/25/18 14:00
Bromide	152	mg/L	2.6	102	70	130			
Chloride	522	mg/L	1.3	103	70	130			
Fluoride	156	mg/L	5.1	104	70	130			
Sulfate	4220	mg/L	5.1	99	70	130			
Lab ID: B18051240-117AMS	Sample Matrix Spike				Run: IC METROHM 1_180524A				05/25/18 17:35
Bromide	313	mg/L	5.1	103	70	130			
Chloride	1160	mg/L	2.6	107	70	130			
Fluoride	318	mg/L	10	105	70	130			
Sulfate	9780	mg/L	10	112	70	130			
Lab ID: B18051240-118A DUP	Sample Duplicate				Run: IC METROHM 1_180524A				05/25/18 18:14
Bromide	0.375	mg/L	0.50					30	
Chloride	7.26	mg/L	1.0				5.7	30	
Fluoride	0.520	mg/L	0.50				1.9	30	
Sulfate	128	mg/L	1.0				3.7	30	
Lab ID: B18051240-126AMS	Sample Matrix Spike				Run: IC METROHM 1_180524A				05/25/18 21:48
Bromide	62.9	mg/L	1.0	104	70	130			
Chloride	224	mg/L	1.0	106	70	130			
Fluoride	64.1	mg/L	2.0	106	70	130			
Sulfate	1620	mg/L	2.0	100	70	130			
Lab ID: B18051240-128A DUP	Sample Duplicate				Run: IC METROHM 1_180524A				05/25/18 22:46
Bromide	0.930	mg/L	0.50				3.2	30	
Chloride	20.7	mg/L	1.0				2.8	30	
Fluoride	0.330	mg/L	1.0					30	
Sulfate	56.9	mg/L	1.0				1.2	30	
Lab ID: B18051240-135AMS	Sample Matrix Spike				Run: IC METROHM 1_180524A				05/26/18 02:02
Bromide	15.8	mg/L	0.50	104	70	130			
Chloride	63.8	mg/L	1.0	107	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/31/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Batch: 121748
Lab ID: B18051240-135AMS	Sample Matrix Spike				Run: IC METROHM 1_180524A				05/26/18 02:02
Fluoride	16.3	mg/L	0.51	105	70	130			
Sulfate	227	mg/L	1.0	104	70	130			
Lab ID: B18051240-138A DUP	Sample Duplicate				Run: IC METROHM 1_180524A				05/26/18 03:21
Bromide	0.0950	mg/L	0.50					30	
Chloride	2.89	mg/L	1.0				10	30	
Fluoride	0.460	mg/L	0.50					30	
Sulfate	101	mg/L	1.0				13	30	
Lab ID: B18051240-144AMS	Sample Matrix Spike				Run: IC METROHM 1_180524A				05/26/18 06:16
Bromide	156	mg/L	2.6	103	70	130			
Chloride	606	mg/L	1.3	106	70	130			
Fluoride	159	mg/L	5.1	105	70	130			
Sulfate	4740	mg/L	5.1	99	70	130			
Lab ID: B18051240-148A DUP	Sample Duplicate				Run: IC METROHM 1_180524A				05/26/18 07:54
Bromide	0.195	mg/L	0.50					30	
Chloride	3.82	mg/L	1.0				20	30	
Fluoride	0.550	mg/L	0.50				1.8	30	
Sulfate	29.6	mg/L	1.0				0.2	30	
Lab ID: B18051240-153AMS	Sample Matrix Spike				Run: IC METROHM 1_180524A				05/26/18 10:30
Bromide	15.8	mg/L	0.50	105	70	130			
Chloride	56.3	mg/L	1.0	107	70	130			
Fluoride	16.5	mg/L	0.51	106	70	130			
Sulfate	274	mg/L	1.0	103	70	130			
Method: E300.0									Batch: 121697
Lab ID: B18051240-089AMS	Sample Matrix Spike				Run: IC METROHM 1_180529A				05/29/18 17:15
Bromide	152	mg/L	2.6	102	70	130			
Chloride	522	mg/L	1.3	103	70	130			
Fluoride	154	mg/L	5.1	102	70	130			
Sulfate	3230	mg/L	5.1	99	70	130			
Lab ID: B18051240-095A DUP	Sample Duplicate				Run: IC METROHM 1_180529A				05/29/18 18:14
Bromide	0.260	mg/L	1.0					30	
Fluoride	0.600	mg/L	2.0					30	
Sulfate	1610	mg/L	2.0				1.7	30	
Lab ID: B18051240-105A DUP	Sample Duplicate				Run: IC METROHM 1_180529A				05/29/18 19:12
Bromide	0.375	mg/L	0.50					30	
Fluoride	0.375	mg/L	0.50					30	
Sulfate	43.2	mg/L	1.0				3.2	30	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/31/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **E300.0**									Batch: 121538
Lab ID: **LCS-121538**	Laboratory Control Sample				Run: IC METROHM 2_180518A				05/20/18 04:53
Bromide	ND	mg/L	2.5		70	130			
Chloride	276	mg/L	1.2	114	70	130			
Fluoride	1.00	mg/L	5.0	108	70	130			
Sulfate	2040	mg/L	5.0	102	70	130			
Lab ID: **B18051240-022AMS**	Sample Matrix Spike				Run: IC METROHM 2_180518A				05/20/18 05:32
Bromide	326	mg/L	5.1	106	70	130			
Chloride	1330	mg/L	2.6	108	70	130			
Fluoride	333	mg/L	10	109	70	130			
Sulfate	11400	mg/L	10	98	70	130			
Lab ID: **B18051240-022A DUP**	Sample Duplicate				Run: IC METROHM 2_180518A				05/20/18 05:51
Bromide	7.50	mg/L	5.0				0.0	30	
Chloride	243	mg/L	2.5				2.2	30	
Fluoride	6.00	mg/L	10					30	
Sulfate	8310	mg/L	10				1.5	30	
Lab ID: **B18051240-031AMS**	Sample Matrix Spike				Run: IC METROHM 2_180518A				05/20/18 09:50
Bromide	64.4	mg/L	1.0	107	70	130			
Chloride	230	mg/L	1.0	108	70	130			
Fluoride	66.0	mg/L	2.0	109	70	130			
Sulfate	1340	mg/L	2.0	105	70	130			
Lab ID: **B18051240-032A DUP**	Sample Duplicate				Run: IC METROHM 2_180518A				05/20/18 10:29
Bromide	0.820	mg/L	1.0					30	
Chloride	32.8	mg/L	1.0				11	30	
Fluoride	0.820	mg/L	2.0					30	
Sulfate	1150	mg/L	2.0				5.4	30	
Lab ID: **B18051240-040AMS**	Sample Matrix Spike				Run: IC METROHM 2_180518A				05/20/18 14:03
Bromide	32.8	mg/L	0.51	108	70	130			
Chloride	127	mg/L	1.0	110	70	130			
Fluoride	33.9	mg/L	1.0	112	70	130			
Sulfate	819	mg/L	1.0	104	70	130			
Lab ID: **B18051240-042A DUP**	Sample Duplicate				Run: IC METROHM 2_180518A				05/20/18 15:02
Bromide	0.210	mg/L	0.50					30	
Chloride	8.07	mg/L	1.0				4.2	30	
Fluoride	0.490	mg/L	1.0					30	
Sulfate	330	mg/L	1.0				5.3	30	
Lab ID: **B18051240-049AMS**	Sample Matrix Spike				Run: IC METROHM 2_180518A				05/20/18 18:17
Bromide	64.9	mg/L	1.0	108	70	130			
Chloride	226	mg/L	1.0	109	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/31/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **E300.0**								Batch: 121538	
Lab ID: **B18051240-049AMS**	Sample Matrix Spike				Run: IC METROHM 2_180518A			05/20/18 18:17	
Fluoride	66.6	mg/L	2.0	110	70	130			
Sulfate	2530	mg/L	2.0	107	70	130			
Lab ID: **B18051240-052A DUP**	Sample Duplicate				Run: IC METROHM 2_180518A			05/20/18 19:36	
Bromide	2.35	mg/L	2.5					30	
Chloride	38.2	mg/L	1.2				3.3	30	
Fluoride	2.00	mg/L	5.0					30	
Sulfate	4590	mg/L	5.0				2.1	30	
Lab ID: **B18051240-058AMS**	Sample Matrix Spike				Run: IC METROHM 2_180518A			05/20/18 22:31	
Bromide	160	mg/L	2.6	106	70	130			
Chloride	551	mg/L	1.3	107	70	130			
Fluoride	171	mg/L	5.1	110	70	130			
Sulfate	5330	mg/L	5.1	99	70	130			E
Lab ID: **B18051240-062A DUP**	Sample Duplicate				Run: IC METROHM 2_180518A			05/21/18 00:10	
Bromide	15.8	mg/L	5.0				2.6	30	
Chloride	487	mg/L	2.5				0.6	30	
Fluoride	3.20	mg/L	10					30	
Sulfate	12800	mg/L	10				1.2	30	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

E - Estimated value. Result exceeds the instrument upper quantitation limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/31/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **E300.0**									Batch: 121697
Lab ID: **LCS-121697**	Laboratory Control Sample				Run: IC METROHM 2_180523A				05/24/18 18:04
Bromide	ND	mg/L	2.5		70	130			
Chloride	281	mg/L	1.2	116	70	130			
Fluoride	0.950	mg/L	5.0	102	70	130			
Sulfate	2070	mg/L	5.0	104	70	130			
Lab ID: **B18051240-064A DUP**	Sample Duplicate				Run: IC METROHM 2_180523A				05/24/18 21:00
Bromide	16.7	mg/L	5.0				0.6	30	
Chloride	390	mg/L	2.5				1.0	30	
Fluoride	1.70	mg/L	10					30	
Lab ID: **B18051240-069AMS**	Sample Matrix Spike				Run: IC METROHM 2_180523A				05/24/18 22:57
Bromide	319	mg/L	5.1	105	70	130			
Chloride	1120	mg/L	2.6	107	70	130			
Fluoride	327	mg/L	10	108	70	130			
Sulfate	9510	mg/L	10	99	70	130			
Lab ID: **B18051240-075A DUP**	Sample Duplicate				Run: IC METROHM 2_180523A				05/25/18 01:34
Bromide	ND	mg/L	2.5					30	
Chloride	10.7	mg/L	1.2				4.8	30	
Fluoride	1.70	mg/L	5.0					30	
Sulfate	2460	mg/L	5.0				0.7	30	
Lab ID: **B18051240-079AMS**	Sample Matrix Spike				Run: IC METROHM 2_180523A				05/25/18 03:12
Bromide	159	mg/L	2.6	106	70	130			
Chloride	562	mg/L	1.3	107	70	130			
Fluoride	164	mg/L	5.1	109	70	130			
Sulfate	4290	mg/L	5.1	101	70	130			
Lab ID: **B18051240-085A DUP**	Sample Duplicate				Run: IC METROHM 2_180523A				05/25/18 06:07
Bromide	ND	mg/L	1.0					30	
Chloride	9.12	mg/L	1.0				0.2	30	
Fluoride	0.520	mg/L	2.0					30	
Sulfate	835	mg/L	2.0				0.6	30	
Lab ID: **B18051240-088AMS**	Sample Matrix Spike				Run: IC METROHM 2_180523A				05/25/18 07:27
Bromide	32.1	mg/L	0.51	105	70	130			
Chloride	115	mg/L	1.0	108	70	130			
Fluoride	33.2	mg/L	1.0	109	70	130			
Sulfate	345	mg/L	1.0	108	70	130			
Lab ID: **B18051240-097AMS**	Sample Matrix Spike				Run: IC METROHM 2_180523A				05/25/18 11:43
Bromide	64.9	mg/L	1.0	107	70	130			
Chloride	228	mg/L	1.0	108	70	130			
Fluoride	67.3	mg/L	2.0	111	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/31/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Batch: 121697
Lab ID: B18051240-097AMS	Sample Matrix Spike				Run: IC METROHM 2_180523A				05/25/18 11:43
Sulfate	1790	mg/L	2.0	99	70	130			
Lab ID: B18051240-106AMS	Sample Matrix Spike				Run: IC METROHM 2_180523A				05/25/18 15:57
Bromide	16.5	mg/L	0.50	107	70	130			
Chloride	74.6	mg/L	1.0	109	70	130			
Fluoride	17.3	mg/L	0.51	111	70	130			
Sulfate	200	mg/L	1.0	109	70	130			
Method: E300.0									Batch: 121697
Lab ID: B18051240-064A DUP	Sample Duplicate				Run: IC METROHM 2_180525A				05/26/18 05:16
Bromide	16.6	mg/L	10				2.4	30	
Chloride	360	mg/L	5.0				2.0	30	
Fluoride	3.20	mg/L	20					30	
Sulfate	11100	mg/L	20				1.8	30	
Lab ID: B18051240-073AMS	Sample Matrix Spike				Run: IC METROHM 2_180525A				05/26/18 05:55
Bromide	310	mg/L	5.1	103	70	130			
Chloride	1070	mg/L	2.6	104	70	130			
Fluoride	319	mg/L	10	105	70	130			
Sulfate	7620	mg/L	10	99	70	130			
Method: E300.0									Batch: 121697
Lab ID: B18051240-095A DUP	Sample Duplicate				Run: IC METROHM 2_180530A				05/30/18 15:42
Bromide	ND	mg/L	1.0					30	
Chloride	8.00	mg/L	1.0				1.3	30	
Fluoride	0.620	mg/L	2.0					30	
Sulfate	1640	mg/L	2.0				0.8	30	
Lab ID: B18051240-105A DUP	Sample Duplicate				Run: IC METROHM 2_180530A				05/30/18 16:21
Bromide	0.380	mg/L	0.50					30	
Chloride	10.4	mg/L	1.0				6.7	30	
Fluoride	0.415	mg/L	0.50					30	
Sulfate	45.2	mg/L	1.0				1.1	30	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/31/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Batch: 121470
Lab ID: LCS-121470	Laboratory Control Sample				Run: ICP203-B_180518A				05/18/18 13:44
Calcium, sat. paste	14.1	meq/L	0.050	122	70	130			
Magnesium, sat. paste	7.89	meq/L	0.082	108	70	130			
Potassium, sat. paste	2.07	meq/L	0.026	86	70	130			
Sodium, sat. paste	26.3	meq/L	0.043	91	70	130			
Lab ID: B18051240-003A DUP	Sample Duplicate				Run: ICP203-B_180518A				05/18/18 18:41
Calcium, sat. paste	3.15	meq/L	0.050				0.2	30	
Magnesium, sat. paste	3.55	meq/L	0.082				2.8	30	
Potassium, sat. paste	0.826	meq/L	0.026				0.4	30	
Sodium, sat. paste	0.451	meq/L	0.043				10.0	30	
Lab ID: B18051240-004AMS2	Sample Matrix Spike				Run: ICP203-B_180518A				05/18/18 18:56
Calcium, sat. paste	40.6	meq/L	0.050	122	70	130			
Magnesium, sat. paste	63.0	meq/L	0.082	120	70	130			
Sodium, sat. paste	18.4	meq/L	0.044	127	70	130			
Lab ID: B18051240-014A DUP	Sample Duplicate				Run: ICP203-B_180518A				05/18/18 20:10
Calcium, sat. paste	24.5	meq/L	0.050				9.1	30	
Magnesium, sat. paste	19.2	meq/L	0.082				10	30	
Potassium, sat. paste	0.731	meq/L	0.026				11	30	
Sodium, sat. paste	3.35	meq/L	0.043				12	30	
Lab ID: B18051240-015AMS2	Sample Matrix Spike				Run: ICP203-B_180518A				05/18/18 20:18
Calcium, sat. paste	37.8	meq/L	0.050	95	70	130			
Magnesium, sat. paste	39.2	meq/L	0.082	95	70	130			
Potassium, sat. paste	7.02	meq/L	0.026	98	70	130			
Sodium, sat. paste	13.8	meq/L	0.044	97	70	130			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/31/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Batch: 121748
Lab ID: B18051240-128A DUP	Sample Duplicate				Run: ICP203-B_180530A				05/30/18 16:39
Calcium, sat. paste	4.25	meq/L	0.050				3.9	30	
Magnesium, sat. paste	3.34	meq/L	0.082				3.7	30	
Potassium, sat. paste	0.837	meq/L	0.026				3.7	30	
Sodium, sat. paste	0.210	meq/L	0.043				1.2	30	
Lab ID: B18051240-129AMS2	Sample Matrix Spike				Run: ICP203-B_180530A				05/30/18 16:47
Calcium, sat. paste	7.52	meq/L	0.050	93	70	130			
Magnesium, sat. paste	11.9	meq/L	0.082	98	70	130			
Potassium, sat. paste	3.00	meq/L	0.026	108	70	130			
Sodium, sat. paste	5.28	meq/L	0.043	103	70	130			
Lab ID: LCS-121748	Laboratory Control Sample				Run: ICP203-B_180530A				05/30/18 17:10
Calcium, sat. paste	14.8	meq/L	0.050	128	70	130			
Magnesium, sat. paste	9.04	meq/L	0.082	124	70	130			
Potassium, sat. paste	2.47	meq/L	0.026	103	70	130			
Sodium, sat. paste	31.7	meq/L	0.043	109	70	130			

Qualifiers:

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QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/31/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Batch: 121470
Lab ID: B18051240-021AMS2	Sample Matrix Spike				Run: ICP204-B_180521A				05/22/18 15:43
Calcium, sat. paste	81.7	meq/L	0.094	96	70	130			
Magnesium, sat. paste	270	meq/L	0.082	95	70	130			
Potassium, sat. paste	37.4	meq/L	0.095	117	70	130			
Method: SW6010B									Batch: 121538
Lab ID: LCS-121538	Laboratory Control Sample				Run: ICP204-B_180521A				05/22/18 17:37
Calcium, sat. paste	14.5	meq/L	0.050	125	70	130			
Magnesium, sat. paste	9.01	meq/L	0.082	123	70	130			
Potassium, sat. paste	2.42	meq/L	0.026	101	70	130			
Sodium, sat. paste	29.6	meq/L	0.043	102	70	130			
Lab ID: B18051240-022A DUP	Sample Duplicate				Run: ICP204-B_180521A				05/22/18 17:45
Calcium, sat. paste	22.0	meq/L	0.092				0.4	30	
Magnesium, sat. paste	116	meq/L	0.082				0.8	30	
Potassium, sat. paste	1.25	meq/L	0.093				0.2	30	
Sodium, sat. paste	36.8	meq/L	0.15				1.4	30	
Lab ID: B18051240-032A DUP	Sample Duplicate				Run: ICP204-B_180521A				05/22/18 18:40
Calcium, sat. paste	6.45	meq/L	0.050				4.6	30	
Magnesium, sat. paste	13.9	meq/L	0.082				6.3	30	
Potassium, sat. paste	0.824	meq/L	0.026				1.8	30	
Sodium, sat. paste	6.02	meq/L	0.043				11	30	
Lab ID: B18051240-033AMS2	Sample Matrix Spike				Run: ICP204-B_180521A				05/22/18 18:48
Calcium, sat. paste	38.8	meq/L	0.050	96	70	130			
Magnesium, sat. paste	80.2	meq/L	0.082	96	70	130			
Potassium, sat. paste	13.9	meq/L	0.038	101	70	130			
Sodium, sat. paste	38.7	meq/L	0.062	100	70	130			
Lab ID: B18051240-042A DUP	Sample Duplicate				Run: ICP204-B_180521A				05/22/18 19:35
Calcium, sat. paste	3.20	meq/L	0.050				5.3	30	
Magnesium, sat. paste	4.61	meq/L	0.082				0.1	30	
Potassium, sat. paste	0.422	meq/L	0.026				1.9	30	
Sodium, sat. paste	1.74	meq/L	0.043				3.9	30	
Lab ID: B18051240-043AMS2	Sample Matrix Spike				Run: ICP204-B_180521A				05/22/18 19:43
Calcium, sat. paste	8.09	meq/L	0.050	92	70	130			
Magnesium, sat. paste	13.3	meq/L	0.082	98	70	130			
Potassium, sat. paste	3.08	meq/L	0.026	103	70	130			
Sodium, sat. paste	6.22	meq/L	0.043	99	70	130			
Lab ID: B18051240-052A DUP	Sample Duplicate				Run: ICP204-B_180521A				05/22/18 20:29
Calcium, sat. paste	23.6	meq/L	0.050				0.9	30	
Magnesium, sat. paste	54.3	meq/L	0.082				1.3	30	

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QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/31/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Batch: 121538
Lab ID: B18051240-052A DUP	Sample Duplicate				Run: ICP204-B_180521A				05/22/18 20:29
Potassium, sat. paste	3.22	meq/L	0.037				0.0	30	
Sodium, sat. paste	14.1	meq/L	0.061				0.8	30	
Lab ID: B18051240-053AMS2	Sample Matrix Spike				Run: ICP204-B_180521A				05/22/18 20:45
Calcium, sat. paste	80.4	meq/L	0.094	95	70	130			
Magnesium, sat. paste	309	meq/L	0.082	103	70	130			
Potassium, sat. paste	33.4	meq/L	0.095	97	70	130			
Sodium, sat. paste	104	meq/L	0.22	99	70	130			
Lab ID: B18051240-062A DUP	Sample Duplicate				Run: ICP204-B_180521A				05/22/18 21:57
Calcium, sat. paste	22.7	meq/L	0.092				2.4	30	
Magnesium, sat. paste	191	meq/L	0.082				4.6	30	
Potassium, sat. paste	2.09	meq/L	0.093				0.2	30	
Sodium, sat. paste	52.7	meq/L	0.15				1.4	30	
Lab ID: B18051240-063AMS2	Sample Matrix Spike				Run: ICP204-B_180521A				05/22/18 22:05
Calcium, sat. paste	87.8	meq/L	0.094	104	70	130			
Magnesium, sat. paste	257	meq/L	0.082	109	70	130			
Potassium, sat. paste	35.0	meq/L	0.095	103	70	130			
Sodium, sat. paste	92.1	meq/L	0.22	104	70	130			

Qualifiers:

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QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 05/31/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Batch: 121697
Lab ID: B18051240-064A DUP	Sample Duplicate				Run: ICP204-B_180523A				05/23/18 17:49
Calcium, sat. paste	22.5	meq/L	0.092				2.6	30	
Magnesium, sat. paste	158	meq/L	0.082					30	
Potassium, sat. paste	1.69	meq/L	0.093					30	
Sodium, sat. paste	37.0	meq/L	0.15				7.3	30	
Lab ID: B18051240-065AMS2	Sample Matrix Spike				Run: ICP204-B_180523A				05/23/18 17:57
Calcium, sat. paste	20.6	meq/L	0.050	105	70	130			
Magnesium, sat. paste	36.3	meq/L	0.082	113	70	130			
Potassium, sat. paste	7.43	meq/L	0.026	105	70	130			
Sodium, sat. paste	15.8	meq/L	0.043	110	70	130			
Lab ID: B18051240-075A DUP	Sample Duplicate				Run: ICP204-B_180523A				05/23/18 18:51
Calcium, sat. paste	23.4	meq/L	0.050				16	30	
Magnesium, sat. paste	15.2	meq/L	0.082				17	30	
Potassium, sat. paste	0.714	meq/L	0.026				17	30	
Sodium, sat. paste	1.73	meq/L	0.043				18	30	
Lab ID: B18051240-076AMS2	Sample Matrix Spike				Run: ICP204-B_180523A				05/23/18 18:59
Calcium, sat. paste	17.7	meq/L	0.050	103	70	130			
Magnesium, sat. paste	26.0	meq/L	0.082	97	70	130			
Potassium, sat. paste	6.17	meq/L	0.026	93	70	130			
Sodium, sat. paste	11.7	meq/L	0.043	92	70	130			
Lab ID: B18051240-085A DUP	Sample Duplicate				Run: ICP204-B_180523A				05/23/18 20:23
Calcium, sat. paste	7.28	meq/L	0.050				0.0	30	
Magnesium, sat. paste	6.00	meq/L	0.082				0.1	30	
Potassium, sat. paste	0.594	meq/L	0.026				0.3	30	
Sodium, sat. paste	6.37	meq/L	0.043				0.7	30	
Lab ID: B18051240-095A DUP	Sample Duplicate				Run: ICP204-B_180523A				05/23/18 21:20
Calcium, sat. paste	25.8	meq/L	0.050				30	30	
Magnesium, sat. paste	2.38	meq/L	0.082				30	30	
Potassium, sat. paste	0.387	meq/L	0.026				26	30	
Sodium, sat. paste	0.165	meq/L	0.043				27	30	
Lab ID: B18051240-105A DUP	Sample Duplicate				Run: ICP204-B_180523A				05/23/18 22:21
Calcium, sat. paste	2.35	meq/L	0.050				2.2	30	
Magnesium, sat. paste	2.36	meq/L	0.082				2.1	30	
Potassium, sat. paste	0.283	meq/L	0.026				2.0	30	
Sodium, sat. paste	0.343	meq/L	0.043				2.3	30	

Qualifiers:

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QA/QC Summary Report

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Client: Talen Energy Supply LLC
Report Date: 05/31/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Batch: 121697
Lab ID: LCS-121697	Laboratory Control Sample				Run: ICP204-B_180524A				05/24/18 13:38
Calcium, sat. paste	15.2	meq/L	0.050	127	70	130			
Magnesium, sat. paste	9.06	meq/L	0.082	124	70	130			
Potassium, sat. paste	2.47	meq/L	0.026	103	70	130			
Sodium, sat. paste	30.7	meq/L	0.043	105	70	130			
Lab ID: B18051240-086AMS2	Sample Matrix Spike				Run: ICP204-B_180524A				05/25/18 07:59
Calcium, sat. paste	9.36	meq/L	0.050	94	70	130			
Magnesium, sat. paste	10.1	meq/L	0.082	89	70	130			
Potassium, sat. paste	2.79	meq/L	0.026	109	70	130			
Sodium, sat. paste	4.37	meq/L	0.043	100	70	130			
Lab ID: B18051240-096AMS2	Sample Matrix Spike				Run: ICP204-B_180524A				05/25/18 08:06
Calcium, sat. paste	6.89	meq/L	0.050	95	70	130			
Magnesium, sat. paste	9.19	meq/L	0.082	91	70	130			
Potassium, sat. paste	3.09	meq/L	0.026	121	70	130			
Sodium, sat. paste	4.33	meq/L	0.043	92	70	130			
Method: SW6010B									Batch: 121748
Lab ID: B18051240-108A DUP	Sample Duplicate				Run: ICP204-B_180529A				05/29/18 18:41
Calcium, sat. paste	1.83	meq/L	0.050				4.1	30	
Magnesium, sat. paste	2.06	meq/L	0.082				1.9	30	
Potassium, sat. paste	0.347	meq/L	0.026				1.4	30	
Sodium, sat. paste	0.382	meq/L	0.043				10	30	
Lab ID: B18051240-109AMS2	Sample Matrix Spike				Run: ICP204-B_180529A				05/29/18 18:49
Calcium, sat. paste	37.9	meq/L	0.050	94	70	130			
Magnesium, sat. paste	46.8	meq/L	0.082	92	70	130			
Potassium, sat. paste	6.54	meq/L	0.026	99	70	130			
Sodium, sat. paste	13.2	meq/L	0.043	98	70	130			
Lab ID: B18051240-118A DUP	Sample Duplicate				Run: ICP204-B_180529A				05/29/18 19:36
Calcium, sat. paste	3.88	meq/L	0.050				2.9	30	
Magnesium, sat. paste	2.57	meq/L	0.082				2.2	30	
Potassium, sat. paste	0.488	meq/L	0.026				0.5	30	
Sodium, sat. paste	0.341	meq/L	0.043				0.6	30	
Lab ID: B18051240-119AMS2	Sample Matrix Spike				Run: ICP204-B_180529A				05/29/18 19:43
Calcium, sat. paste	39.6	meq/L	0.050	93	70	130			
Magnesium, sat. paste	32.8	meq/L	0.082	92	70	130			
Potassium, sat. paste	6.28	meq/L	0.026	93	70	130			
Sodium, sat. paste	11.7	meq/L	0.043	91	70	130			

Qualifiers:

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QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/27/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2320 B										Batch: R300520
Lab ID: B18051206-005ADUP	2	Sample Duplicate				Run: Metrohm 2_180519A				05/19/18 17:33
Bicarbonate as HCO3		385	mg/L	4.0				0.1	10	
Carbonate as CO3		ND	mg/L	4.0					10	
Lab ID: B18051276-001BDUP	2	Sample Duplicate				Run: Metrohm 2_180519A				05/19/18 19:10
Bicarbonate as HCO3		263	mg/L	4.0				0.0	10	
Carbonate as CO3		ND	mg/L	4.0					10	

Qualifiers:

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MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/27/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A2510 B										Batch: R300178
Lab ID: SC 2nd 1413	Laboratory Control Sample					Run: PHSC _101-B_180515A				05/15/18 13:19
Conductivity @ 25 C		1400	umhos/cm	5.0	99	90	110			
Lab ID: MBLK	Method Blank					Run: PHSC _101-B_180515A				05/15/18 13:29
Conductivity @ 25 C		ND	umhos/cm	5						
Lab ID: B18051255-001ADUP	Sample Duplicate					Run: PHSC _101-B_180515A				05/15/18 13:34
Conductivity @ 25 C		1140	umhos/cm	5.0				1.1	10	
Lab ID: B18051206-002ADUP	Sample Duplicate					Run: PHSC _101-B_180515A				05/15/18 14:05
Conductivity @ 25 C		2990	umhos/cm	5.0				1.2	10	

Qualifiers:

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QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/27/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **A4500-F C**									Analytical Run: Metrohm 3_180516A	
Lab ID: **ICV**	Initial Calibration Verification Standard								05/16/18 16:16	
Fluoride		1.04	mg/L	0.10	104	90	110			
Method: **A4500-F C**									Batch: R300313	
Lab ID: **MBLK**	Method Blank					Run: Metrohm 3_180516A			05/16/18 16:19	
Fluoride		ND	mg/L	0.05						
Lab ID: **LFB**	Laboratory Fortified Blank					Run: Metrohm 3_180516A			05/16/18 16:21	
Fluoride		1.30	mg/L	0.10	104	90	110			
Lab ID: **B18051093-007AMS**	Sample Matrix Spike					Run: Metrohm 3_180516A			05/16/18 16:36	
Fluoride		4.41	mg/L	0.10	92	80	120			
Lab ID: **B18051093-007AMSD**	Sample Matrix Spike Duplicate					Run: Metrohm 3_180516A			05/16/18 16:38	
Fluoride		4.37	mg/L	0.10	89	80	120	0.9	10	
Lab ID: **B18051206-002AMS**	Sample Matrix Spike					Run: Metrohm 3_180516A			05/16/18 17:01	
Fluoride		2.30	mg/L	0.10	95	80	120			
Lab ID: **B18051206-002AMSD**	Sample Matrix Spike Duplicate					Run: Metrohm 3_180516A			05/16/18 17:03	
Fluoride		2.28	mg/L	0.10	94	80	120	0.9	10	

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QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/27/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: A4500-H B									Analytical Run: PHSC _101-B_180515A	
Lab ID: pH 8	2	Initial Calibration Verification Standard							05/15/18 13:06	
pH		8.01	s.u.	0.10	100	98	102			
pH Measurement Temp		19.3	°C			0	0			
Method: A4500-H B									Batch: R300178	
Lab ID: B18051255-001ADUP	2	Sample Duplicate				Run: PHSC _101-B_180515A			05/15/18 13:34	
pH		7.30	s.u.	0.10				0.3	3	
pH Measurement Temp		17.5	°C							
Lab ID: B18051206-002ADUP	2	Sample Duplicate				Run: PHSC _101-B_180515A			05/15/18 14:05	
pH		8.02	s.u.	0.10				0.2	3	
pH Measurement Temp		19.9	°C							

Qualifiers:

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QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/27/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E300.0									Analytical Run: IC METROHM 2_180515A	
Lab ID: ICV	3	Initial Calibration Verification Standard							05/15/18 16:40	
Chloride		2.19	mg/L	1.0	97	90	110			
Sulfate		9.00	mg/L	1.0	100	90	110			
Bromide		1.12	mg/L	0.50	99	90	110			
Method: E300.0									Batch: R300275	
Lab ID: ICB	3	Method Blank				Run: IC METROHM 2_180515A			05/15/18 17:00	
Chloride		ND	mg/L	0.05						
Sulfate		ND	mg/L	0.03						
Bromide		ND	mg/L	0.002						
Lab ID: LFB	3	Laboratory Fortified Blank				Run: IC METROHM 2_180515A			05/15/18 17:19	
Chloride		10.3	mg/L	1.0	103	90	110			
Sulfate		30.8	mg/L	1.0	103	90	110			
Bromide		3.06	mg/L	0.50	102	90	110			
Lab ID: B18051206-001AMS	3	Sample Matrix Spike				Run: IC METROHM 2_180515A			05/16/18 00:50	
Chloride		818	mg/L	1.2	85	90	110			SE
Sulfate		1610	mg/L	3.7	95	90	110			
Bromide		64.2	mg/L	0.50	105	90	110			
Lab ID: B18051206-001AMSD	3	Sample Matrix Spike Duplicate				Run: IC METROHM 2_180515A			05/16/18 01:09	
Chloride		822	mg/L	1.2	87	90	110	0.5	20	SE
Sulfate		1620	mg/L	3.7	97	90	110	0.5	20	
Bromide		64.6	mg/L	0.50	105	90	110	0.7	20	
Lab ID: B18051255-010AMS	3	Sample Matrix Spike				Run: IC METROHM 2_180515A			05/16/18 05:22	
Chloride		48.5	mg/L	1.0	101	90	110			
Sulfate		135	mg/L	1.0	102	90	110			
Bromide		6.45	mg/L	0.50	105	90	110			
Lab ID: B18051255-010AMSD	3	Sample Matrix Spike Duplicate				Run: IC METROHM 2_180515A			05/16/18 05:42	
Chloride		48.7	mg/L	1.0	102	90	110	0.3	20	
Sulfate		135	mg/L	1.0	103	90	110	0.4	20	
Bromide		6.49	mg/L	0.50	106	90	110	0.7	20	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

S - Spike recovery outside of advisory limits.

ND - Not detected at the reporting limit.

E - Estimated value. Result exceeds the instrument upper quantitation limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.7								Analytical Run: ICP204-B_180521A	
Lab ID: ICV	Continuing Calibration Verification Standard							05/21/18 12:19	
Barium	2.44	mg/L	0.10	98	95	105			
Calcium	25.2	mg/L	1.0	101	95	105			
Lithium	1.24	mg/L	0.10	99	95	105			
Magnesium	25.1	mg/L	1.0	100	95	105			
Potassium	25.2	mg/L	1.0	101	95	105			
Method: E200.7								Batch: 121441	
Lab ID: MB-121441	Method Blank				Run: ICP204-B_180521A			05/22/18 01:38	
Barium	ND	mg/L	0.007						
Boron	ND	mg/L	0.02						
Calcium	ND	mg/L	0.09						
Lithium	ND	mg/L	0.007						
Magnesium	ND	mg/L	0.03						
Potassium	ND	mg/L	0.05						
Lab ID: LCS-121441	Laboratory Control Sample				Run: ICP204-B_180521A			05/22/18 01:42	
Barium	0.531	mg/L	0.050	106	85	115			
Boron	0.536	mg/L	0.050	107	85	115			
Calcium	26.7	mg/L	1.0	107	85	115			
Lithium	0.522	mg/L	0.10	104	85	115			
Magnesium	25.8	mg/L	1.0	103	85	115			
Potassium	26.3	mg/L	1.0	105	85	115			
Lab ID: B18051240-013BMS3	Sample Matrix Spike				Run: ICP204-B_180521A			05/22/18 01:57	
Barium	0.546	mg/L	0.050	109	70	130			
Boron	0.544	mg/L	0.090	109	70	130			
Calcium	28.1	mg/L	1.0	106	70	130			
Lithium	0.534	mg/L	0.10	107	70	130			
Magnesium	26.4	mg/L	1.0	106	70	130			
Potassium	26.8	mg/L	1.0	107	70	130			
Lab ID: B18051240-013BMSD3	Sample Matrix Spike Duplicate				Run: ICP204-B_180521A			05/22/18 02:01	
Barium	0.540	mg/L	0.050	108	70	130	1.0	20	
Boron	0.542	mg/L	0.090	108	70	130	0.4	20	
Calcium	27.7	mg/L	1.0	105	70	130	1.4	20	
Lithium	0.530	mg/L	0.10	106	70	130	0.8	20	
Magnesium	26.0	mg/L	1.0	104	70	130	1.7	20	
Potassium	26.6	mg/L	1.0	106	70	130	0.7	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **E200.7**								Analytical Run: ICP204-B_180604A	
Lab ID: **ICV**	Continuing Calibration Verification Standard							06/04/18 11:06	
Boron	2.57	mg/L	0.10	103	95	105			
Method: **E200.7**								Batch: 121441	
Lab ID: **MB-121441**	Method Blank				Run: ICP204-B_180604A			06/04/18 14:14	
Barium	ND	mg/L	0.007						
Boron	ND	mg/L	0.02						
Calcium	ND	mg/L	0.09						
Lithium	ND	mg/L	0.007						
Magnesium	ND	mg/L	0.03						
Potassium	ND	mg/L	0.05						

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8									Batch: 121441
Lab ID: MB-121441	Method Blank				Run: ICPMS202-B_180612A				06/12/18 15:28
Arsenic	ND	mg/L	0.00006						
Beryllium	ND	mg/L	0.00002						
Cadmium	ND	mg/L	0.00002						
Chromium	0.0002	mg/L	0.00009						
Cobalt	ND	mg/L	0.00003						
Lead	ND	mg/L	0.00005						
Manganese	ND	mg/L	0.00004						
Molybdenum	0.0002	mg/L	0.00007						
Selenium	ND	mg/L	0.0002						
Thallium	ND	mg/L	0.0001						
Lab ID: LCS-121441	Laboratory Control Sample				Run: ICPMS202-B_180612A				06/12/18 15:39
Arsenic	0.543	mg/L	0.0010	109	85	115			
Beryllium	0.252	mg/L	0.0010	101	85	115			
Cadmium	0.255	mg/L	0.0010	102	85	115			
Chromium	0.484	mg/L	0.0050	97	85	115			
Cobalt	0.490	mg/L	0.0050	98	85	115			
Lead	0.498	mg/L	0.0010	100	85	115			
Manganese	2.37	mg/L	0.0010	95	85	115			
Molybdenum	0.566	mg/L	0.0010	113	85	115			
Selenium	0.508	mg/L	0.0010	102	85	115			
Thallium	0.492	mg/L	0.00050	98	85	115			
Lab ID: B18051240-013BMS3	Sample Matrix Spike				Run: ICPMS202-B_180612A				06/12/18 15:52
Arsenic	0.535	mg/L	0.0010	107	70	130			
Beryllium	0.251	mg/L	0.0010	100	70	130			
Cadmium	0.248	mg/L	0.0010	99	70	130			
Chromium	0.484	mg/L	0.0050	97	70	130			
Cobalt	0.473	mg/L	0.0050	95	70	130			
Lead	0.509	mg/L	0.0010	102	70	130			
Manganese	2.38	mg/L	0.0010	95	70	130			
Molybdenum	0.557	mg/L	0.0010	111	70	130			
Selenium	0.494	mg/L	0.0010	99	70	130			
Thallium	0.504	mg/L	0.00050	101	70	130			
Lab ID: B18051240-013BMSD3	Sample Matrix Spike Duplicate				Run: ICPMS202-B_180612A				06/12/18 15:54
Arsenic	0.540	mg/L	0.0010	108	70	130	0.8	20	
Beryllium	0.262	mg/L	0.0010	105	70	130	4.4	20	
Cadmium	0.248	mg/L	0.0010	99	70	130	0.0	20	
Chromium	0.485	mg/L	0.0050	97	70	130	0.2	20	
Cobalt	0.485	mg/L	0.0050	97	70	130	2.5	20	
Lead	0.508	mg/L	0.0010	102	70	130	0.1	20	
Manganese	2.37	mg/L	0.0010	95	70	130	0.1	20	
Molybdenum	0.568	mg/L	0.0010	113	70	130	1.8	20	

Qualifiers:

RL - Analyte reporting limit.
ND - Not detected at the reporting limit.
MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8									Batch: 121441
Lab ID: B18051240-013BMSD3	Sample Matrix Spike Duplicate				Run: ICPMS202-B_180612A				06/12/18 15:54
Selenium	0.500	mg/L	0.0010	100	70	130	1.2	20	
Thallium	0.507	mg/L	0.00050	101	70	130	0.7	20	
Method: E200.8									Batch: 121441
Lab ID: MB-121441	Method Blank				Run: ICPMS202-B_180614A				06/14/18 21:30
Antimony	0.0008	mg/L	0.0003						
Arsenic	ND	mg/L	0.0004						
Beryllium	ND	mg/L	0.0004						
Cadmium	ND	mg/L	0.0004						
Chromium	ND	mg/L	0.001						
Cobalt	ND	mg/L	0.0004						
Lead	0.001	mg/L	0.0004						
Manganese	ND	mg/L	0.0002						
Molybdenum	0.0004	mg/L	0.0003						
Selenium	ND	mg/L	0.0004						
Thallium	ND	mg/L	0.0004						
Lab ID: B18051240-013BMS3	Sample Matrix Spike				Run: ICPMS202-B_180614A				06/14/18 21:39
Antimony	0.559	mg/L	0.0010	112	70	130			
Arsenic	0.528	mg/L	0.0010	105	70	130			
Beryllium	0.247	mg/L	0.0010	99	70	130			
Cadmium	0.244	mg/L	0.0010	98	70	130			
Chromium	0.485	mg/L	0.0050	97	70	130			
Cobalt	0.481	mg/L	0.0050	96	70	130			
Lead	0.477	mg/L	0.0010	95	70	130			
Manganese	2.41	mg/L	0.0010	96	70	130			
Molybdenum	0.530	mg/L	0.0010	106	70	130			
Selenium	0.476	mg/L	0.0010	95	70	130			
Thallium	0.465	mg/L	0.00050	93	70	130			
Lab ID: B18051240-013BMSD3	Sample Matrix Spike Duplicate				Run: ICPMS202-B_180614A				06/14/18 21:41
Antimony	0.559	mg/L	0.0010	112	70	130	0.0	20	
Arsenic	0.524	mg/L	0.0010	105	70	130	0.6	20	
Beryllium	0.238	mg/L	0.0010	95	70	130	3.8	20	
Cadmium	0.242	mg/L	0.0010	97	70	130	0.8	20	
Chromium	0.505	mg/L	0.0050	101	70	130	4.1	20	
Cobalt	0.488	mg/L	0.0050	98	70	130	1.5	20	
Lead	0.491	mg/L	0.0010	98	70	130	2.8	20	
Manganese	2.44	mg/L	0.0010	98	70	130	1.3	20	
Molybdenum	0.546	mg/L	0.0010	109	70	130	3.0	20	
Selenium	0.478	mg/L	0.0010	96	70	130	0.5	20	
Thallium	0.487	mg/L	0.00050	97	70	130	4.6	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8								Analytical Run: ICPMS206-B_180611A	
Lab ID: QCS	Initial Calibration Verification Standard							06/12/18 16:11	
Molybdenum	0.0484	mg/L	0.0050	97	90	110			
Selenium	0.0503	mg/L	0.0050	101	90	110			
Method: E200.8								Batch: 121441	
Lab ID: MB-121441	Method Blank				Run: ICPMS206-B_180611A			06/12/18 16:52	
Antimony	ND	mg/L	0.0004						
Arsenic	ND	mg/L	0.0001						
Beryllium	ND	mg/L	0.0001						
Cadmium	ND	mg/L	0.00003						
Calcium	ND	mg/L	0.05						
Chromium	ND	mg/L	0.0002						
Cobalt	ND	mg/L	0.00004						
Lead	ND	mg/L	0.00008						
Manganese	ND	mg/L	0.0001						
Molybdenum	0.0001	mg/L	0.00006						
Selenium	ND	mg/L	0.0002						
Sodium	ND	mg/L	0.03						
Thallium	ND	mg/L	0.00007						

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **E200.8**								Analytical Run: ICPMS207-B_180522A	
Lab ID: **QCS**	Initial Calibration Verification Standard								05/22/18 11:30
Antimony	0.0480	mg/L	0.050	96	90	110			
Arsenic	0.0498	mg/L	0.0050	100	90	110			
Beryllium	0.0255	mg/L	0.0010	102	90	110			
Cadmium	0.0253	mg/L	0.0010	101	90	110			
Calcium	2.55	mg/L	0.50	102	90	110			
Chromium	0.0503	mg/L	0.010	101	90	110			
Cobalt	0.0514	mg/L	0.010	103	90	110			
Lead	0.0502	mg/L	0.010	100	90	110			
Manganese	0.253	mg/L	0.010	101	90	110			
Sodium	2.62	mg/L	0.50	105	90	110			
Thallium	0.0503	mg/L	0.10	101	90	110			
Method: **E200.8**									Batch: 121441
Lab ID: **MB-121441**	Method Blank				Run: ICPMS207-B_180522A				05/22/18 12:32
Antimony	0.0004	mg/L	0.0004						
Arsenic	ND	mg/L	0.0001						
Beryllium	ND	mg/L	0.0001						
Cadmium	ND	mg/L	0.00003						
Calcium	ND	mg/L	0.05						
Chromium	ND	mg/L	0.0002						
Cobalt	ND	mg/L	0.00004						
Lead	ND	mg/L	0.00008						
Manganese	ND	mg/L	0.0001						
Molybdenum	0.0009	mg/L	0.00006						
Selenium	ND	mg/L	0.0002						
Sodium	ND	mg/L	0.03						
Thallium	ND	mg/L	0.00005						
Lab ID: **LCS-121441**	Laboratory Control Sample				Run: ICPMS207-B_180522A				05/22/18 12:35
Antimony	0.469	mg/L	0.0050	94	85	115			
Arsenic	0.502	mg/L	0.0010	100	85	115			
Beryllium	0.240	mg/L	0.0010	96	85	115			
Cadmium	0.220	mg/L	0.0010	88	85	115			
Calcium	24.5	mg/L	1.0	98	85	115			
Chromium	0.489	mg/L	0.0010	98	85	115			
Cobalt	0.487	mg/L	0.0010	97	85	115			
Lead	0.498	mg/L	0.0010	100	85	115			
Manganese	2.38	mg/L	0.0010	95	85	115			
Molybdenum	0.434	mg/L	0.0050	87	85	115			
Selenium	0.486	mg/L	0.0050	97	85	115			
Sodium	24.3	mg/L	1.0	97	85	115			
Thallium	0.489	mg/L	0.0010	98	85	115			

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E200.8									Batch: 121441
Lab ID: B18051240-013BMS3	Sample Matrix Spike				Run: ICPMS207-B_180522A				05/22/18 12:40
Antimony	0.460	mg/L	0.0010	92	70	130			
Arsenic	0.507	mg/L	0.0010	101	70	130			
Beryllium	0.241	mg/L	0.0010	96	70	130			
Cadmium	0.217	mg/L	0.0010	87	70	130			
Calcium	24.5	mg/L	1.0	98	70	130			
Chromium	0.489	mg/L	0.0050	98	70	130			
Cobalt	0.473	mg/L	0.0050	95	70	130			
Lead	0.490	mg/L	0.0010	98	70	130			
Manganese	2.40	mg/L	0.0010	96	70	130			
Molybdenum	0.442	mg/L	0.0010	87	70	130			
Selenium	0.481	mg/L	0.0010	96	70	130			
Sodium	24.6	mg/L	1.0	98	70	130			
Thallium	0.481	mg/L	0.00050	96	70	130			
Lab ID: B18051240-013BMSD3	Sample Matrix Spike Duplicate				Run: ICPMS207-B_180522A				05/22/18 12:43
Antimony	0.460	mg/L	0.0010	92	70	130	0.0	20	
Arsenic	0.512	mg/L	0.0010	102	70	130	0.8	20	
Beryllium	0.240	mg/L	0.0010	96	70	130	0.4	20	
Cadmium	0.216	mg/L	0.0010	86	70	130	0.4	20	
Calcium	24.9	mg/L	1.0	99	70	130	1.3	20	
Chromium	0.492	mg/L	0.0050	98	70	130	0.6	20	
Cobalt	0.475	mg/L	0.0050	95	70	130	0.3	20	
Lead	0.493	mg/L	0.0010	98	70	130	0.5	20	
Manganese	2.43	mg/L	0.0010	97	70	130	1.3	20	
Molybdenum	0.460	mg/L	0.0010	90	70	130	3.9	20	
Selenium	0.491	mg/L	0.0010	98	70	130	1.9	20	
Sodium	24.9	mg/L	1.0	99	70	130	1.3	20	
Thallium	0.487	mg/L	0.00050	97	70	130	1.3	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **E200.8**								Analytical Run: ICPMS207-B_180525B	
Lab ID: **QCS**	Initial Calibration Verification Standard							05/25/18 19:48	
Arsenic	0.0506	mg/L	0.0050	101	90	110			
Method: **E200.8**								Batch: 121441	
Lab ID: **MB-121441**	Method Blank				Run: ICPMS207-B_180525B			05/25/18 22:10	
Arsenic	ND	mg/L	0.0009						
Lab ID: **LCS-121441**	Laboratory Control Sample				Run: ICPMS207-B_180525B			05/25/18 22:13	
Arsenic	0.530	mg/L	0.0010	106	85	115			
Lab ID: **B18051240-013BMS3**	Sample Matrix Spike				Run: ICPMS207-B_180525B			05/25/18 22:24	
Arsenic	0.513	mg/L	0.0010	103	70	130			
Lab ID: **B18051240-013BMSD3**	Sample Matrix Spike Duplicate				Run: ICPMS207-B_180525B			05/25/18 22:26	
Arsenic	0.520	mg/L	0.0010	104	70	130	1.3	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte		Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method:	**E245.1**								Analytical Run: HGCV202-B_180523A	
Lab ID:	**ICV**	Initial Calibration Verification Standard							05/23/18 09:18	
Mercury		0.00218	mg/L	0.00010	109	90	110			
Method:	**E245.1**								Batch: 121661	
Lab ID:	**MB-121661**	Method Blank				Run: HGCV202-B_180523A			05/23/18 10:27	
Mercury		0.00009	mg/L	0.00005						
Lab ID:	**LCS-121661**	Laboratory Control Sample				Run: HGCV202-B_180523A			05/23/18 10:29	
Mercury		0.00223	mg/L	0.00010	107	85	115			
Lab ID:	**B18051511-002BMS**	Sample Matrix Spike				Run: HGCV202-B_180523A			05/23/18 11:18	
Mercury		0.00214	mg/L	0.00010	102	70	130			
Lab ID:	**B18051511-002BMSD**	Sample Matrix Spike Duplicate				Run: HGCV202-B_180523A			05/23/18 11:20	
Mercury		0.00214	mg/L	0.00010	102	70	130	0.2	30	
Method:	**E245.1**								Analytical Run: HGCV202-B_180524A	
Lab ID:	**ICV**	Initial Calibration Verification Standard							05/24/18 13:45	
Mercury		0.00209	mg/L	0.00010	105	90	110			
Method:	**E245.1**								Batch: 121755	
Lab ID:	**MB-121755**	Method Blank				Run: HGCV202-B_180524A			05/24/18 13:51	
Mercury		ND	mg/L	0.00005						
Lab ID:	**LCS-121755**	Laboratory Control Sample				Run: HGCV202-B_180524A			05/24/18 13:53	
Mercury		0.00202	mg/L	0.00010	101	85	115			
Lab ID:	**B18051157-003BMS**	Sample Matrix Spike				Run: HGCV202-B_180524A			05/24/18 13:57	
Mercury		0.00211	mg/L	0.00010	105	70	130			
Lab ID:	**B18051157-003BMSD**	Sample Matrix Spike Duplicate				Run: HGCV202-B_180524A			05/24/18 13:58	
Mercury		0.00212	mg/L	0.00010	106	70	130	0.3	30	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **SW6010B**								Analytical Run: ICP203-B_180601A	
Lab ID: **QCS**	Initial Calibration Verification Standard							06/01/18 11:48	
Boron	0.804	mg/L	0.10	100	90	110			
Lithium	0.801	mg/L	0.10	100	90	110			
Lab ID: **ICSA**	Interference Check Sample A							06/01/18 11:52	
Boron	0.0365	mg/L	0.10						
Lithium	0.00511	mg/L	0.10						
Lab ID: **ICSAB**	Interference Check Sample AB							06/01/18 11:57	
Boron	1.03	mg/L	0.10	103	80	120			
Lithium	0.905	mg/L	0.10	90	80	120			
Method: **SW6010B**								Batch: 121526	
Lab ID: **MB-121526**	Method Blank				Run: ICP203-B_180601A			06/01/18 13:44	
Boron	ND	mg/kg	1						
Lithium	ND	mg/kg	0.8						
Lab ID: **B18051240-071ADIL**	Serial Dilution				Run: ICP203-B_180601A			06/01/18 14:39	
Boron	22.3	mg/kg	4.9					10	N
Lithium	18.4	mg/kg	24					10	N
Lab ID: **B18051240-071APDS**	Post Digestion/Distillation Spike				Run: ICP203-B_180601A			06/01/18 14:50	
Boron	66.4	mg/kg	1.0	95	75	125			
Lithium	62.5	mg/kg	4.9	95	75	125			
Lab ID: **B18051240-071AMS3**	Sample Matrix Spike				Run: ICP203-B_180601A			06/01/18 14:55	
Boron	65.3	mg/kg	1.0	94	75	125			
Lithium	60.8	mg/kg	4.9	93	75	125			
Lab ID: **B18051240-071AMSD3**	Sample Matrix Spike Duplicate				Run: ICP203-B_180601A			06/01/18 14:59	
Boron	65.1	mg/kg	1.0	95	75	125	0.3	20	
Lithium	61.0	mg/kg	4.8	94	75	125	0.3	20	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B								Analytical Run: ICP203-B_180602A	
Lab ID: QCS	Initial Calibration Verification Standard							06/02/18 10:31	
Beryllium	0.387	mg/L	0.010	97	90	110			
Boron	0.812	mg/L	0.10	102	90	110			
Chromium	0.782	mg/L	0.050	98	90	110			
Lithium	0.858	mg/L	0.10	107	90	110			
Manganese	3.95	mg/L	0.010	99	90	110			
Lab ID: ICSA	Interference Check Sample A							06/02/18 10:35	
Beryllium	0.0000900	mg/L	0.010						
Boron	-0.000990	mg/L	0.10						
Chromium	-0.00100	mg/L	0.050						
Lithium	0.00554	mg/L	0.10						
Manganese	-0.00288	mg/L	0.010						
Lab ID: ICSAB	Interference Check Sample AB							06/02/18 10:39	
Beryllium	0.413	mg/L	0.010	83	80	120			
Boron	0.982	mg/L	0.10	98	80	120			
Chromium	0.446	mg/L	0.050	89	80	120			
Lithium	1.01	mg/L	0.10	101	80	120			
Manganese	0.442	mg/L	0.010	88	80	120			
Method: SW6010B								Batch: 121427	
Lab ID: MB-121427	Method Blank				Run: ICP203-B_180602A			06/02/18 12:31	
Beryllium	ND	mg/kg	0.03						
Boron	ND	mg/kg	1						
Chromium	ND	mg/kg	0.8						
Lithium	ND	mg/kg	0.8						
Lab ID: SRM3-121427	Standard Reference Material				Run: ICP203-B_180602A			06/02/18 12:35	
Beryllium	70.1	mg/kg	1.0	84	76	108			
Boron	98.2	mg/kg	1.0	76	59	106			
Chromium	99.3	mg/kg	4.9	85	73	109			
Lithium	88.2	mg/kg	4.9	88	80	120			
Lab ID: B18051240-022ADIL	Serial Dilution				Run: ICP203-B_180602A			06/02/18 14:55	
Beryllium	0.521	mg/kg	1.0				10		N
Boron	28.2	mg/kg	4.9				10		N
Chromium	14.0	mg/kg	24				10		N
Lithium	9.95	mg/kg	24				10		N
Lab ID: B18051240-022APDS	Post Digestion/Distillation Spike				Run: ICP203-B_180602A			06/02/18 14:59	
Beryllium	21.1	mg/kg	1.0	84	75	125			
Boron	69.4	mg/kg	1.0	89	75	125			
Chromium	58.3	mg/kg	4.9	94	75	125			
Lithium	55.5	mg/kg	4.9	96	75	125			

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B								Batch: 121427	
Lab ID: B18051240-022APDS	Post Digestion/Distillation Spike				Run: ICP203-B_180602A			06/02/18 14:59	
Lab ID: B18051240-022AMS3	Sample Matrix Spike				Run: ICP203-B_180602A			06/02/18 15:03	
Beryllium	21.2	mg/kg	1.0	85	75	125			
Boron	73.3	mg/kg	1.0	98	75	125			
Chromium	62.7	mg/kg	4.9	104	75	125			
Lithium	54.1	mg/kg	4.9	94	75	125			
Lab ID: B18051240-022AMSD3	Sample Matrix Spike Duplicate				Run: ICP203-B_180602A			06/02/18 15:08	
Beryllium	20.7	mg/kg	1.0	84	75	125	2.5	20	
Boron	74.5	mg/kg	1.0	101	75	125	1.6	20	
Chromium	61.6	mg/kg	4.8	102	75	125	1.8	20	
Lithium	54.7	mg/kg	4.8	96	75	125	1.0	20	
Method: SW6010B								Batch: 121428	
Lab ID: MB-121428	Method Blank				Run: ICP203-B_180602A			06/02/18 18:01	
Boron	ND	mg/kg	1						
Lithium	ND	mg/kg	0.8						
Manganese	ND	mg/kg	0.6						
Lab ID: SRM3-121428	Standard Reference Material				Run: ICP203-B_180602A			06/02/18 18:05	
Boron	97.1	mg/kg	1.0	75	59	106			
Lithium	89.8	mg/kg	4.9	90	80	120			
Manganese	386	mg/kg	1.0	89	81	117			
Lab ID: B18051240-042ADIL	Serial Dilution				Run: ICP203-B_180602A			06/02/18 19:50	
Boron	11.5	mg/kg	4.8					10	N
Lithium	13.4	mg/kg	24					10	N
Manganese	337	mg/kg	2.8				19	10	R
Lab ID: B18051240-042APDS	Post Digestion/Distillation Spike				Run: ICP203-B_180602A			06/02/18 19:54	
Boron	54.6	mg/kg	1.0	92	75	125			
Lithium	58.2	mg/kg	4.9	97	75	125			
Manganese	486	mg/kg	1.0	86	75	125			
Lab ID: B18051240-042AMS3	Sample Matrix Spike				Run: ICP203-B_180602A			06/02/18 19:59	
Boron	54.3	mg/kg	1.0	93	75	125			
Lithium	56.9	mg/kg	4.8	96	75	125			
Manganese	499	mg/kg	1.0	93	75	125			
Lab ID: B18051240-042AMSD3	Sample Matrix Spike Duplicate				Run: ICP203-B_180602A			06/02/18 20:03	
Boron	54.0	mg/kg	1.0	92	75	125	0.6	20	
Lithium	57.3	mg/kg	4.8	96	75	125	0.7	20	
Manganese	514	mg/kg	1.0	99	75	125	2.9	20	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

R - RPD exceeds advisory limit.

ND - Not detected at the reporting limit.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B								Batch: 121496	
Lab ID: MB-121496	Method Blank				Run: ICP203-B_180602A			06/02/18 15:20	
Boron	ND	mg/kg	1						
Lithium	ND	mg/kg	0.8						
Manganese	ND	mg/kg	0.6						
Lab ID: SRM3-121496	Standard Reference Material				Run: ICP203-B_180602A			06/02/18 15:24	
Boron	95.1	mg/kg	1.0	74	59	106			
Lithium	89.9	mg/kg	5.0	90	80	120			
Manganese	382	mg/kg	1.0	88	81	117			
Lab ID: B18051240-061ADIL	Serial Dilution				Run: ICP203-B_180602A			06/02/18 17:08	
Boron	78.9	mg/kg	5.0				12	10	R
Lithium	22.6	mg/kg	24					10	N
Manganese	229	mg/kg	2.9				17	10	R
Lab ID: B18051240-061APDS	Post Digestion/Distillation Spike				Run: ICP203-B_180602A			06/02/18 17:12	
Boron	113	mg/kg	1.0	86	75	125			
Lithium	69.5	mg/kg	5.0	100	75	125			
Manganese	429	mg/kg	1.0	94	75	125			
Lab ID: B18051240-061AMS3	Sample Matrix Spike				Run: ICP203-B_180602A			06/02/18 17:52	
Boron	120	mg/kg	1.0	103	75	125			
Lithium	67.8	mg/kg	4.9	99	75	125			
Manganese	397	mg/kg	1.0	83	75	125			
Lab ID: B18051240-061AMSD3	Sample Matrix Spike Duplicate				Run: ICP203-B_180602A			06/02/18 17:56	
Boron	116	mg/kg	1.0	94	75	125	3.9	20	
Lithium	66.4	mg/kg	4.9	97	75	125	2.0	20	
Manganese	404	mg/kg	1.0	86	75	125	1.8	20	
Method: SW6010B								Batch: 121591	
Lab ID: MB-121591	Method Blank				Run: ICP203-B_180602A			06/02/18 20:07	
Barium	ND	mg/kg	0.1						
Beryllium	ND	mg/kg	0.03						
Boron	ND	mg/kg	1						
Cadmium	ND	mg/kg	0.1						
Lithium	ND	mg/kg	0.8						
Manganese	ND	mg/kg	0.6						
Lab ID: SRM3-121591	Standard Reference Material				Run: ICP203-B_180602A			06/02/18 20:11	
Barium	157	mg/kg	1.0	84	78	113			
Beryllium	70.5	mg/kg	1.0	84	76	108			
Boron	96.0	mg/kg	1.0	74	59	106			
Cadmium	86.5	mg/kg	1.0	87	73.2	105			
Lithium	83.7	mg/kg	4.9	84	80	120			

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration

R - RPD exceeds advisory limit.

ND - Not detected at the reporting limit.
N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **SW6010B**									Batch: 121591
Lab ID: **SRM3-121591**	Standard Reference Material				Run: ICP203-B_180602A				06/02/18 20:11
Manganese	383	mg/kg	1.0	88	81	117			

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **SW6010B**								Analytical Run: ICP204-B_180521A	
Lab ID: **QCS**	Initial Calibration Verification Standard							05/21/18 12:38	
Barium	0.771	mg/L	0.10	96	90	110			
Beryllium	0.391	mg/L	0.010	98	90	110			
Boron	0.790	mg/L	0.10	99	90	110			
Cadmium	0.389	mg/L	0.010	97	90	110			
Calcium	39.8	mg/L	1.0	100	90	110			
Lithium	0.754	mg/L	0.10	94	90	110			
Magnesium	38.8	mg/L	1.0	97	90	110			
Manganese	3.86	mg/L	0.010	97	90	110			
Potassium	37.8	mg/L	1.0	95	90	110			
Sodium	37.6	mg/L	1.0	94	90	110			
Lab ID: **ICSA**	Interference Check Sample A							05/21/18 12:41	
Barium	0.0000900	mg/L	0.10						
Beryllium	0.0000300	mg/L	0.010						
Boron	-0.0204	mg/L	0.10						
Cadmium	0.00175	mg/L	0.010						
Calcium	467	mg/L	1.0	93	80	120			
Lithium	0.0102	mg/L	0.10						
Magnesium	497	mg/L	1.0	99	80	120			
Manganese	-0.00950	mg/L	0.010						
Potassium	-0.00166	mg/L	1.0						
Sodium	0.0132	mg/L	1.0						
Lab ID: **ICSAB**	Interference Check Sample AB							05/21/18 12:46	
Barium	0.448	mg/L	0.10	90	80	120			
Beryllium	0.442	mg/L	0.010	88	80	120			
Boron	0.911	mg/L	0.10	91	80	120			
Cadmium	0.922	mg/L	0.010	92	80	120			
Calcium	460	mg/L	1.0	92	80	120			
Lithium	0.852	mg/L	0.10	85	80	120			
Magnesium	491	mg/L	1.0	98	80	120			
Manganese	0.425	mg/L	0.010	85	80	120			
Potassium	16.7	mg/L	1.0	84	80	120			
Sodium	18.1	mg/L	1.0	91	80	120			
Method: **SW6010B**								Batch: 121591	
Lab ID: **MB-121591**	Method Blank				Run: ICP204-B_180521A			05/22/18 15:47	
Barium	ND	mg/kg	0.1						
Beryllium	ND	mg/kg	0.03						
Boron	ND	mg/kg	1						
Cadmium	ND	mg/kg	0.2						
Lithium	ND	mg/kg	0.8						
Manganese	ND	mg/kg	0.6						

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B								Batch: 121591	
Lab ID: SRM3-121591	Standard Reference Material				Run: ICP204-B_180521A			05/22/18 15:51	
Barium	166	mg/kg	1.0	89	78	113			
Beryllium	73.2	mg/kg	1.0	88	76	108			
Boron	96.5	mg/kg	4.9	75	59	106			
Cadmium	86.7	mg/kg	1.0	88	73.2	105			
Lithium	98.2	mg/kg	4.9	98	80	120			
Manganese	367	mg/kg	1.0	85	81	117			
Lab ID: SRM3-121591	Standard Reference Material				Run: ICP204-B_180521A			05/23/18 08:16	
Barium	157	mg/kg	1.0	84	78	113			
Beryllium	71.8	mg/kg	1.0	86	76	108			
Boron	92.9	mg/kg	1.1	72	59	106			
Cadmium	86.1	mg/kg	1.0	87	73.2	105			
Lithium	84.6	mg/kg	4.9	85	80	120			
Manganese	363	mg/kg	1.0	84	81	117			
Lab ID: B18051240-080ADIL	Serial Dilution				Run: ICP204-B_180521A			05/23/18 09:03	
Barium	460	mg/kg	2.3				8.7	10	
Beryllium	0.631	mg/kg	1.0					10	N
Boron	13.2	mg/kg	23					10	N
Cadmium	ND	mg/kg	3.6					10	
Lithium	15.1	mg/kg	23					10	N
Manganese	369	mg/kg	2.6				11	10	R
Lab ID: B18051240-080APDS	Post Digestion/Distillation Spike				Run: ICP204-B_180521A			05/23/18 09:07	
Barium	461	mg/kg	1.0		75	125			A
Beryllium	19.7	mg/kg	1.0	81	75	125			
Boron	51.8	mg/kg	4.7	85	75	125			
Cadmium	19.0	mg/kg	1.0	81	75	125			
Lithium	54.3	mg/kg	4.7	86	75	125			
Manganese	516	mg/kg	1.0	79	75	125			
Lab ID: B18051240-080AMS3	Sample Matrix Spike				Run: ICP204-B_180521A			05/23/18 09:11	
Barium	377	mg/kg	1.0		75	125			A
Beryllium	21.4	mg/kg	1.0	86	75	125			
Boron	53.2	mg/kg	4.9	84	75	125			
Cadmium	21.6	mg/kg	1.0	89	75	125			
Lithium	58.2	mg/kg	4.9	91	75	125			
Manganese	502	mg/kg	1.0	71	75	125			S
Lab ID: B18051240-080AMSD3	Sample Matrix Spike Duplicate				Run: ICP204-B_180521A			05/23/18 09:15	
Barium	325	mg/kg	1.0		75	125	15	20	A
Beryllium	21.5	mg/kg	1.0	85	75	125	0.5	20	
Boron	52.4	mg/kg	4.9	82	75	125	1.5	20	
Cadmium	21.8	mg/kg	1.0	88	75	125	1.0	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **SW6010B**									Batch: 121591
Lab ID: **B18051240-080AMSD3**	Sample Matrix Spike Duplicate				Run: ICP204-B_180521A				05/23/18 09:15
Lithium	57.1	mg/kg	4.9	88	75	125	1.9	20	
Manganese	520	mg/kg	1.0	77	75	125	3.5	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B								Analytical Run: ICP204-B_180604A	
Lab ID: QCS	Initial Calibration Verification Standard							06/04/18 10:38	
Beryllium	0.395	mg/L	0.010	99	90	110			
Boron	0.821	mg/L	0.10	103	90	110			
Lithium	0.879	mg/L	0.10	110	90	110			
Lab ID: ICSA	Interference Check Sample A							06/04/18 10:41	
Beryllium	0.0000900	mg/L	0.010						
Boron	-0.0215	mg/L	0.10						
Lithium	0.0130	mg/L	0.10						
Lab ID: ICSAB	Interference Check Sample AB							06/04/18 10:45	
Beryllium	0.445	mg/L	0.010	89	80	120			
Boron	0.948	mg/L	0.10	95	80	120			
Lithium	1.03	mg/L	0.10	103	80	120			
Method: SW6010B								Batch: 121591	
Lab ID: MB-121591	Method Blank				Run: ICP204-B_180604A			06/04/18 15:36	
Barium	ND	mg/kg	0.1						
Beryllium	ND	mg/kg	0.03						
Boron	ND	mg/kg	1						
Cadmium	ND	mg/kg	0.2						
Lithium	ND	mg/kg	0.8						
Manganese	ND	mg/kg	0.6						
Lab ID: SRM3-121591	Standard Reference Material				Run: ICP204-B_180604A			06/04/18 15:40	
Barium	170	mg/kg	1.0	91	78	113			
Beryllium	75.7	mg/kg	1.0	91	76	108			
Boron	99.9	mg/kg	4.9	77	59	106			
Cadmium	88.9	mg/kg	1.0	90	73.2	105			
Lithium	89.6	mg/kg	4.9	90	80	120			
Manganese	380	mg/kg	1.0	88	81	117			
Lab ID: B18051240-080ADIL	Serial Dilution				Run: ICP204-B_180604A			06/04/18 16:18	
Barium	574	mg/kg	2.3				12	10	R
Beryllium	0.738	mg/kg	1.0					10	N
Boron	17.3	mg/kg	23					10	N
Cadmium	ND	mg/kg	3.6					10	
Lithium	17.8	mg/kg	23					10	N
Manganese	390	mg/kg	2.6				13	10	R
Lab ID: B18051240-080APDS	Post Digestion/Distillation Spike				Run: ICP204-B_180604A			06/04/18 16:22	
Barium	560	mg/kg	1.0		75	125			A
Beryllium	21.9	mg/kg	1.0	90	75	125			
Boron	60.3	mg/kg	4.7	97	75	125			
Cadmium	15.3	mg/kg	1.0	64	75	125			S

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B									Batch: 121591
Lab ID: B18051240-080APDS	Post Digestion/Distillation Spike				Run: ICP204-B_180604A				06/04/18 16:22
Lithium	62.3	mg/kg	4.7	99	75	125			
Manganese	543	mg/kg	1.0	85	75	125			
Lab ID: B18051240-080AMS3	Sample Matrix Spike				Run: ICP204-B_180604A				06/04/18 16:27
Barium	438	mg/kg	1.0		75	125			A
Beryllium	22.6	mg/kg	1.0	90	75	125			
Boron	57.3	mg/kg	4.9	88	75	125			
Cadmium	22.3	mg/kg	1.0	90	75	125			
Lithium	62.9	mg/kg	4.9	97	75	125			
Manganese	523	mg/kg	1.0	74	75	125			S
Lab ID: B18051240-080AMSD3	Sample Matrix Spike Duplicate				Run: ICP204-B_180604A				06/04/18 16:31
Barium	372	mg/kg	1.0		75	125	16	20	A
Beryllium	22.9	mg/kg	1.0	90	75	125	1.0	20	
Boron	55.6	mg/kg	4.9	83	75	125	3.0	20	
Cadmium	22.6	mg/kg	1.0	90	75	125	1.4	20	
Lithium	61.0	mg/kg	4.9	92	75	125	3.0	20	
Manganese	539	mg/kg	1.0	79	75	125	3.1	20	
Method: SW6010B									Batch: 121592
Lab ID: MB-121592	Method Blank				Run: ICP204-B_180604A				06/04/18 16:35
Beryllium	ND	mg/kg	0.03						
Boron	ND	mg/kg	1						
Lithium	ND	mg/kg	0.8						
Lab ID: SRM3-121592	Standard Reference Material				Run: ICP204-B_180604A				06/04/18 16:39
Beryllium	79.1	mg/kg	1.0	95	76	108			
Boron	103	mg/kg	5.0	79	59	106			
Lithium	91.1	mg/kg	5.0	91	80	120			
Lab ID: B18051240-098ADIL	Serial Dilution				Run: ICP204-B_180604A				06/04/18 18:15
Beryllium	0.774	mg/kg	1.0					10	N
Boron	8.83	mg/kg	24					10	N
Lithium	12.8	mg/kg	24					10	N
Lab ID: B18051240-098APDS	Post Digestion/Distillation Spike				Run: ICP204-B_180604A				06/04/18 18:19
Beryllium	22.9	mg/kg	1.0	91	75	125			
Boron	53.2	mg/kg	4.9	86	75	125			
Lithium	59.0	mg/kg	4.9	96	75	125			
Lab ID: B18051240-098AMS3	Sample Matrix Spike				Run: ICP204-B_180604A				06/04/18 18:23
Beryllium	23.2	mg/kg	1.0	94	75	125			
Boron	53.3	mg/kg	4.8	88	75	125			
Lithium	59.6	mg/kg	4.8	100	75	125			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6010B								Batch: 121592	
Lab ID: B18051240-098AMS3	Sample Matrix Spike				Run: ICP204-B_180604A			06/04/18 18:23	
Lab ID: B18051240-098AMSD3	Sample Matrix Spike Duplicate				Run: ICP204-B_180604A			06/04/18 18:27	
Beryllium	23.0	mg/kg	1.0	94	75	125	0.6	20	
Boron	53.1	mg/kg	4.7	88	75	125	0.4	20	
Lithium	58.8	mg/kg	4.7	99	75	125	1.3	20	
Method: SW6010B								Batch: 121652	
Lab ID: MB-121652	Method Blank				Run: ICP204-B_180604A			06/04/18 18:39	
Beryllium	ND	mg/kg	0.03						
Boron	ND	mg/kg	1						
Lithium	ND	mg/kg	0.8						
Lab ID: SRM3-121652	Standard Reference Material				Run: ICP204-B_180604A			06/04/18 18:43	
Beryllium	80.2	mg/kg	1.0	96	76	108			
Boron	102	mg/kg	4.8	79	59	106			
Lithium	91.3	mg/kg	4.8	91	80	120			
Lab ID: B18051240-118ADIL	Serial Dilution				Run: ICP204-B_180604A			06/04/18 20:56	
Beryllium	0.557	mg/kg	1.0					10	N
Boron	13.0	mg/kg	24					10	N
Lithium	12.8	mg/kg	24					10	N
Lab ID: B18051240-118APDS	Post Digestion/Distillation Spike				Run: ICP204-B_180604A			06/04/18 21:00	
Beryllium	21.9	mg/kg	1.0	86	75	125			
Boron	58.3	mg/kg	5.0	88	75	125			
Lithium	58.7	mg/kg	5.0	94	75	125			
Lab ID: B18051240-118AMS3	Sample Matrix Spike				Run: ICP204-B_180604A			06/04/18 21:05	
Beryllium	22.5	mg/kg	1.0	89	75	125			
Boron	60.5	mg/kg	5.0	92	75	125			
Lithium	60.6	mg/kg	5.0	97	75	125			
Lab ID: B18051240-118AMSD3	Sample Matrix Spike Duplicate				Run: ICP204-B_180604A			06/04/18 21:09	
Beryllium	22.4	mg/kg	1.0	88	75	125	0.7	20	
Boron	61.4	mg/kg	5.0	94	75	125	1.4	20	
Lithium	60.1	mg/kg	5.0	97	75	125	0.8	20	
Method: SW6010B								Batch: 121653	
Lab ID: MB-121653	Method Blank				Run: ICP204-B_180604A			06/04/18 21:14	
Boron	ND	mg/kg	1						
Lithium	ND	mg/kg	0.8						
Lab ID: SRM3-1212653	Standard Reference Material				Run: ICP204-B_180604A			06/04/18 21:17	
Boron	101	mg/kg	4.7	78	59	106			

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **SW6010B**								Batch: 121653	
Lab ID: **SRM3-1212653**	Standard Reference Material				Run: ICP204-B_180604A			06/04/18 21:17	
Lithium	91.7	mg/kg	4.7	92	80	120			
Lab ID: **B18051240-138ADIL**	Serial Dilution				Run: ICP204-B_180604A			06/04/18 23:05	
Boron	ND	mg/kg	24					10	
Lithium	10.5	mg/kg	24					10	N
Lab ID: **B18051240-138APDS**	Post Digestion/Distillation Spike				Run: ICP204-B_180604A			06/04/18 23:09	
Boron	56.5	mg/kg	5.0	102	75	125			
Lithium	62.9	mg/kg	5.0	106	75	125			
Lab ID: **B18051240-138AMS3**	Sample Matrix Spike				Run: ICP204-B_180604A			06/04/18 23:21	
Boron	48.1	mg/kg	4.8	89	75	125			
Lithium	57.4	mg/kg	4.8	99	75	125			
Lab ID: **B18051240-138AMSD3**	Sample Matrix Spike Duplicate				Run: ICP204-B_180604A			06/04/18 23:25	
Boron	48.4	mg/kg	4.8	89	75	125	0.5	20	
Lithium	58.8	mg/kg	4.8	102	75	125	2.4	20	
Method: **SW6010B**								Batch: 121700	
Lab ID: **MB-121700**	Method Blank				Run: ICP204-B_180604A			06/04/18 23:30	
Boron	ND	mg/kg	1						
Lithium	ND	mg/kg	0.8						
Lab ID: **B18051240-153ADIL**	Serial Dilution				Run: ICP204-B_180604A			06/05/18 01:17	
Boron	ND	mg/kg	24					10	
Lithium	11.3	mg/kg	24					10	N
Lab ID: **B18051240-153APDS**	Post Digestion/Distillation Spike				Run: ICP204-B_180604A			06/05/18 01:28	
Boron	50.0	mg/kg	5.0	100	75	125			
Lithium	57.6	mg/kg	5.0	115	75	125			
Lab ID: **B18051240-153AMS3**	Sample Matrix Spike				Run: ICP204-B_180604A			06/05/18 01:33	
Boron	48.6	mg/kg	4.8	101	75	125			
Lithium	59.6	mg/kg	4.8	124	75	125			
Lab ID: **B18051240-153AMSD3**	Sample Matrix Spike Duplicate				Run: ICP204-B_180604A			06/05/18 01:37	
Boron	47.4	mg/kg	4.7	100	75	125	2.5	20	
Lithium	58.1	mg/kg	4.7	122	75	125	2.6	20	
Lab ID: **SRM3-121700**	Standard Reference Material				Run: ICP204-B_180604A			06/05/18 11:44	
Boron	98.6	mg/kg	4.7	76	59	106			
Lithium	94.3	mg/kg	4.7	94	80	120			

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.
N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Analytical Run: ICPMS202-B_180612A	
Lab ID: QCS	Initial Calibration Verification Standard							06/12/18 14:20	
Selenium	0.0502	mg/L	0.0010	100	90	110			
Lab ID: ICSA	Interference Check Sample A							06/12/18 13:03	
Selenium	0.000820	mg/L	0.0010						
Lab ID: ICSAB	Interference Check Sample AB							06/12/18 13:05	
Selenium	0.0101	mg/L	0.0010	101	70	130			
Method: SW6020								Batch: 121427	
Lab ID: MB-121427	Method Blank				Run: ICPMS202-B_180612A			06/12/18 18:57	
Selenium	0.03	mg/kg	0.02						
Lab ID: SRM3-121427	Standard Reference Material				Run: ICPMS202-B_180612A			06/12/18 19:00	
Selenium	176	mg/kg	1.0	86	71	111			
Lab ID: B18051240-022ADIL	Serial Dilution				Run: ICPMS202-B_180612A			06/12/18 19:11	
Selenium	0.751	mg/kg	1.0					10	N
Lab ID: B18051240-022AMS3	Sample Matrix Spike				Run: ICPMS202-B_180612A			06/12/18 19:16	
Selenium	43.0	mg/kg	1.0	87	75	125			
Lab ID: B18051240-022AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS202-B_180612A			06/12/18 19:18	
Selenium	35.6	mg/kg	1.0	73	75	125	19	20	S
Method: SW6020								Batch: 121592	
Lab ID: MB-121592	Method Blank				Run: ICPMS202-B_180612A			06/12/18 22:03	
Selenium	0.03	mg/kg	0.02						
Lab ID: SRM3-121592	Standard Reference Material				Run: ICPMS202-B_180612A			06/12/18 22:06	
Selenium	169	mg/kg	1.0	83	71	111			
Lab ID: B18051240-098ADIL	Serial Dilution				Run: ICPMS202-B_180612A			06/13/18 00:04	
Selenium	0.521	mg/kg	1.0					10	N
Lab ID: B18051240-098APDS1	Post Digestion/Distillation Spike				Run: ICPMS202-B_180612A			06/13/18 00:07	
Selenium	3.26	mg/kg	1.0	58	75	125			S
Lab ID: B18051240-098AMS3	Sample Matrix Spike				Run: ICPMS202-B_180612A			06/13/18 00:10	
Selenium	36.8	mg/kg	1.0	76	75	125			
Lab ID: B18051240-098AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS202-B_180612A			06/13/18 00:12	
Selenium	37.0	mg/kg	1.0	77	75	125	0.4	20	
Method: SW6020								Batch: 121652	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration

S - Spike recovery outside of advisory limits.

ND - Not detected at the reporting limit.
N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Batch: 121652
Lab ID: MB-121652	Method Blank				Run: ICPMS202-B_180612A				06/13/18 00:18
Selenium	0.05	mg/kg	0.02						
Lab ID: SRM3-121652	Standard Reference Material				Run: ICPMS202-B_180612A				06/13/18 00:20
Selenium	168	mg/kg	1.0	82	71	111			
Lab ID: B18051240-118ADIL	Serial Dilution				Run: ICPMS202-B_180612A				06/13/18 01:58
Selenium	0.905	mg/kg	1.0					10	N
Lab ID: B18051240-118APDS1	Post Digestion/Distillation Spike				Run: ICPMS202-B_180612A				06/13/18 02:00
Selenium	3.71	mg/kg	1.0	63	75	125			S
Lab ID: B18051240-118AMS3	Sample Matrix Spike				Run: ICPMS202-B_180612A				06/13/18 02:03
Selenium	40.0	mg/kg	1.0	79	75	125			
Lab ID: B18051240-118AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS202-B_180612A				06/13/18 02:06
Selenium	40.3	mg/kg	1.0	80	75	125	0.9	20	
Method: SW6020									Batch: 121653
Lab ID: MB-121653	Method Blank				Run: ICPMS202-B_180612A				06/13/18 02:19
Selenium	0.02	mg/kg	0.02						
Lab ID: SRM3-1212653	Standard Reference Material				Run: ICPMS202-B_180612A				06/13/18 02:22
Selenium	168	mg/kg	1.0	82	71	111			

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration

S - Spike recovery outside of advisory limits.

ND - Not detected at the reporting limit.
N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Analytical Run: ICPMS202-B_180614A	
Lab ID: QCS	Initial Calibration Verification Standard							06/14/18 18:24	
Selenium	0.0484	mg/L	0.0011	97	90	110			
Lab ID: ICSA	Interference Check Sample A							06/14/18 18:44	
Selenium	0.00152	mg/L	0.0011						
Lab ID: ICSAB	Interference Check Sample AB							06/14/18 18:47	
Selenium	0.00877	mg/L	0.0011	88	70	130			
Method: SW6020								Batch: 121428	
Lab ID: MB-121428	Method Blank				Run: ICPMS202-B_180614A			06/14/18 22:43	
Selenium	ND	mg/kg	0.09						
Lab ID: SRM3-121428	Standard Reference Material				Run: ICPMS202-B_180614A			06/14/18 22:51	
Selenium	179	mg/kg	1.0	87	71	111			
Lab ID: B18051240-042ADIL	Serial Dilution				Run: ICPMS202-B_180614A			06/14/18 23:56	
Selenium	ND	mg/kg	1.0					10	
Lab ID: B18051240-042APDS1	Post Digestion/Distillation Spike				Run: ICPMS202-B_180614A			06/14/18 23:59	
Selenium	3.85	mg/kg	1.0	72	75	125			S
Lab ID: B18051240-042AMS3	Sample Matrix Spike				Run: ICPMS202-B_180614A			06/15/18 00:01	
Selenium	35.5	mg/kg	1.0	74	75	125			S
Lab ID: B18051240-042AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS202-B_180614A			06/15/18 00:04	
Selenium	36.0	mg/kg	1.0	74	75	125	1.4	20	S
Method: SW6020								Batch: 121526	
Lab ID: MB-121526	Method Blank				Run: ICPMS202-B_180614A			06/15/18 00:13	
Selenium	ND	mg/kg	0.09						
Lab ID: SRM3-121526	Standard Reference Material				Run: ICPMS202-B_180614A			06/15/18 00:15	
Selenium	179	mg/kg	1.0	87	71	111			
Lab ID: B18051240-071ADIL	Serial Dilution				Run: ICPMS202-B_180614A			06/15/18 01:12	
Selenium	ND	mg/kg	1.0					10	
Lab ID: B18051240-071APDS1	Post Digestion/Distillation Spike				Run: ICPMS202-B_180614A			06/15/18 01:15	
Selenium	3.94	mg/kg	1.0	73	75	125			S
Lab ID: B18051240-071AMS3	Sample Matrix Spike				Run: ICPMS202-B_180614A			06/15/18 01:17	
Selenium	36.1	mg/kg	1.0	73	75	125			S
Lab ID: B18051240-071AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS202-B_180614A			06/15/18 01:20	
Selenium	36.5	mg/kg	1.0	75	75	125	1.1	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.
S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **SW6020**									Batch: 121592
Lab ID: **MB-121592**	Method Blank				Run: ICPMS202-B_180614A				06/15/18 01:29
Antimony	ND	mg/kg	0.09						
Arsenic	ND	mg/kg	0.2						
Barium	0.3	mg/kg	0.03						
Beryllium	0.08	mg/kg	0.02						
Cadmium	ND	mg/kg	0.04						
Chromium	ND	mg/kg	2						
Cobalt	ND	mg/kg	0.01						
Lead	ND	mg/kg	0.3						
Manganese	0.8	mg/kg	0.3						
Molybdenum	0.1	mg/kg	0.06						
Selenium	ND	mg/kg	0.09						
Thallium	0.02	mg/kg	0.02						

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Analytical Run: ICPMS206-B_180517A	
Lab ID: QCS	Initial Calibration Verification Standard								05/18/18 12:12
Antimony	0.0481	mg/L	0.0010	96	90	110			
Arsenic	0.0493	mg/L	0.0010	99	90	110			
Barium	0.0501	mg/L	0.0010	100	90	110			
Cadmium	0.0250	mg/L	0.0010	100	90	110			
Chromium	0.0497	mg/L	0.0010	99	90	110			
Cobalt	0.0516	mg/L	0.0010	103	90	110			
Lead	0.0481	mg/L	0.0010	96	90	110			
Manganese	0.250	mg/L	0.0010	100	90	110			
Molybdenum	0.0449	mg/L	0.0010	90	90	110			
Selenium	0.0491	mg/L	0.0010	98	90	110			
Thallium	0.0491	mg/L	0.0010	98	90	110			
Lab ID: ICSA	Interference Check Sample A								05/18/18 12:16
Antimony	0.000230	mg/L	0.0010						
Arsenic	-0.0000220	mg/L	0.0010						
Barium	0.000139	mg/L	0.0010						
Cadmium	0.0000585	mg/L	0.0010						
Chromium	0.000885	mg/L	0.0010						
Cobalt	0.000165	mg/L	0.0010						
Lead	0.000231	mg/L	0.0010						
Manganese	0.000255	mg/L	0.0010						
Molybdenum	0.742	mg/L	0.0010	93	80	120			
Selenium	0.000147	mg/L	0.0010						
Thallium	0.000145	mg/L	0.0010						
Lab ID: ICSAB	Interference Check Sample AB								05/18/18 12:21
Antimony	-0.0000204	mg/L	0.0010						
Arsenic	0.00973	mg/L	0.0010	97	70	130			
Barium	0.0000747	mg/L	0.0010						
Cadmium	0.00987	mg/L	0.0010	99	70	130			
Chromium	0.0203	mg/L	0.0010	101	70	130			
Cobalt	0.0194	mg/L	0.0010	97	70	130			
Lead	0.000223	mg/L	0.0010						
Manganese	0.0194	mg/L	0.0010	97	70	130			
Molybdenum	0.718	mg/L	0.0010	90	70	130			
Selenium	0.00984	mg/L	0.0010	98	70	130			
Thallium	0.0000784	mg/L	0.0010						
Method: SW6020									Batch: 121427
Lab ID: MB-121427	Method Blank				Run: ICPMS206-B_180517A				05/19/18 18:59
Antimony	ND	mg/kg	0.08						
Arsenic	ND	mg/kg	0.6						
Barium	ND	mg/kg	0.1						

Qualifiers:

RL - Analyte reporting limit.
ND - Not detected at the reporting limit.
MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: 121427	
Lab ID: MB-121427	Method Blank				Run: ICPMS206-B_180517A			05/19/18 18:59	
Cadmium	ND	mg/kg	0.03						
Chromium	ND	mg/kg	0.2						
Cobalt	ND	mg/kg	0.03						
Lead	ND	mg/kg	0.4						
Manganese	ND	mg/kg	0.4						
Molybdenum	ND	mg/kg	0.04						
Selenium	ND	mg/kg	1						
Thallium	0.02	mg/kg	0.01						
Lab ID: SRM3-121427	Standard Reference Material				Run: ICPMS206-B_180517A			05/19/18 19:41	
Antimony	55.6	mg/kg	1.0	23	0	93			
Arsenic	159	mg/kg	1.0	81	71	105			
Barium	175	mg/kg	1.0	94	78	113			
Cadmium	87.7	mg/kg	1.0	89	73.2	105			
Chromium	91.7	mg/kg	1.0	78	73	109			
Cobalt	97.8	mg/kg	1.0	91	74	116			
Lead	103	mg/kg	1.0	98	74	109			
Manganese	389	mg/kg	1.0	90	81	117			
Molybdenum	92.8	mg/kg	1.0	73	66	104			
Selenium	185	mg/kg	1.0	90	71	111			
Thallium	103	mg/kg	1.0	103	71	108			
Lab ID: B18051240-022ADIL	Serial Dilution				Run: ICPMS206-B_180517A			05/19/18 21:17	
Antimony	ND	mg/kg	1.0					10	
Arsenic	3.82	mg/kg	3.1					10	N
Barium	109	mg/kg	1.0				0.7	10	
Cadmium	ND	mg/kg	1.0					10	
Chromium	10.9	mg/kg	1.0				0.4	10	
Cobalt	4.40	mg/kg	1.0				5.1	10	
Lead	7.27	mg/kg	2.1					10	N
Manganese	273	mg/kg	2.0				3.5	10	
Molybdenum	0.653	mg/kg	1.0					10	N
Selenium	ND	mg/kg	5.2					10	
Thallium	0.107	mg/kg	1.0					10	N
Lab ID: B18051240-022APDS1	Post Digestion/Distillation Spike				Run: ICPMS206-B_180517A			05/19/18 21:22	
Antimony	4.29	mg/kg	1.0	88	75	125			
Arsenic	8.17	mg/kg	1.0	91	75	125			
Barium	111	mg/kg	1.0		75	125			A
Cadmium	4.31	mg/kg	1.0	87	75	125			
Chromium	14.5	mg/kg	1.0	72	75	125			S
Cobalt	8.05	mg/kg	1.0	80	75	125			
Lead	11.6	mg/kg	1.0	93	75	125			
Manganese	263	mg/kg	1.0		75	125			A

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Batch: 121427
Lab ID: B18051240-022APDS1	Post Digestion/Distillation Spike				Run: ICPMS206-B_180517A				05/19/18 21:22
Molybdenum	4.61	mg/kg	1.0	79	75	125			
Selenium	4.97	mg/kg	1.1	102	75	125			
Thallium	4.71	mg/kg	1.0	95	75	125			
Lab ID: B18051240-022AMS3	Sample Matrix Spike				Run: ICPMS206-B_180517A				05/19/18 21:26
Antimony	17.2	mg/kg	1.0	35	75	125			S
Arsenic	52.0	mg/kg	1.0	99	75	125			
Barium	177	mg/kg	1.0	141	75	125			S
Cadmium	22.5	mg/kg	1.0	92	75	125			
Chromium	55.1	mg/kg	1.0	90	75	125			
Cobalt	45.2	mg/kg	1.0	84	75	125			
Lead	56.6	mg/kg	1.0	101	75	125			
Manganese	497	mg/kg	1.0	95	75	125			
Molybdenum	38.5	mg/kg	1.0	77	75	125			
Selenium	50.1	mg/kg	1.1	102	75	125			
Thallium	49.8	mg/kg	1.0	102	75	125			
Lab ID: B18051240-022AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS206-B_180517A				05/19/18 21:31
Antimony	18.2	mg/kg	1.0	38	75	125	5.5	20	S
Arsenic	79.8	mg/kg	1.0	157	75	125	42	20	SR
Barium	171	mg/kg	1.0	129	75	125	3.6	20	S
Cadmium	22.0	mg/kg	1.0	91	75	125	2.2	20	
Chromium	55.3	mg/kg	1.0	92	75	125	0.5	20	
Cobalt	44.2	mg/kg	1.0	82	75	125	2.3	20	
Lead	58.1	mg/kg	1.0	105	75	125	2.5	20	
Manganese	496	mg/kg	1.0	96	75	125	0.1	20	
Molybdenum	38.7	mg/kg	1.0	78	75	125	0.5	20	
Selenium	47.2	mg/kg	1.0	97	75	125	6.1	20	
Thallium	48.3	mg/kg	1.0	100	75	125	3.0	20	
Method: SW6020									Batch: 121428
Lab ID: MB-121428	Method Blank				Run: ICPMS206-B_180517A				05/19/18 21:45
Antimony	ND	mg/kg	0.08						
Arsenic	ND	mg/kg	0.6						
Barium	ND	mg/kg	0.1						
Cadmium	ND	mg/kg	0.03						
Chromium	ND	mg/kg	0.2						
Cobalt	ND	mg/kg	0.03						
Lead	ND	mg/kg	0.4						
Manganese	ND	mg/kg	0.4						
Molybdenum	ND	mg/kg	0.04						
Selenium	ND	mg/kg	1						
Thallium	0.01	mg/kg	0.01						

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
S - Spike recovery outside of advisory limits.
ND - Not detected at the reporting limit.
R - RPD exceeds advisory limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: 121428	
Lab ID: SRM3-121428	Standard Reference Material				Run: ICPMS206-B_180517A			05/19/18 22:26	
Antimony	54.3	mg/kg	1.0	23	0	93			
Arsenic	166	mg/kg	1.0	85	71	105			
Barium	189	mg/kg	1.0	101	78	113			
Cadmium	88.5	mg/kg	1.0	89	73.2	105			
Chromium	89.1	mg/kg	1.0	76	73	109			
Cobalt	90.2	mg/kg	1.0	83	74	116			
Lead	103	mg/kg	1.0	98	74	109			
Manganese	367	mg/kg	1.0	84	81	117			
Molybdenum	87.8	mg/kg	1.0	69	66	104			
Selenium	208	mg/kg	1.1	101	71	111			
Thallium	105	mg/kg	1.0	106	71	108			
Lab ID: B18051240-042ADIL	Serial Dilution				Run: ICPMS206-B_180517A			05/19/18 23:59	
Antimony	ND	mg/kg	1.0					10	
Arsenic	6.41	mg/kg	3.0					10	N
Barium	176	mg/kg	1.0				1.8	10	
Cadmium	ND	mg/kg	1.0					10	
Chromium	12.1	mg/kg	1.0				5.3	10	
Cobalt	5.71	mg/kg	1.0				6.7	10	
Lead	11.1	mg/kg	2.1					10	N
Manganese	275	mg/kg	2.0				3.3	10	
Molybdenum	0.403	mg/kg	1.0					10	N
Selenium	ND	mg/kg	4.8					10	
Thallium	0.140	mg/kg	1.0					10	N
Lab ID: B18051240-042APDS1	Post Digestion/Distillation Spike				Run: ICPMS206-B_180517A			05/20/18 00:03	
Antimony	4.44	mg/kg	1.0	90	75	125			
Arsenic	10.5	mg/kg	1.0	90	75	125			
Barium	178	mg/kg	1.0		75	125			A
Cadmium	4.38	mg/kg	1.0	89	75	125			
Chromium	15.2	mg/kg	1.0	77	75	125			
Cobalt	9.04	mg/kg	1.0	77	75	125			
Lead	15.5	mg/kg	1.0	95	75	125			
Manganese	266	mg/kg	1.0		75	125			A
Molybdenum	4.21	mg/kg	1.0	78	75	125			
Selenium	5.13	mg/kg	1.0	107	75	125			
Thallium	4.79	mg/kg	1.0	97	75	125			
Lab ID: B18051240-042AMS3	Sample Matrix Spike				Run: ICPMS206-B_180517A			05/20/18 00:08	
Antimony	14.2	mg/kg	1.0	30	75	125			S
Arsenic	52.4	mg/kg	1.0	97	75	125			
Barium	270	mg/kg	1.0	203	75	125			S
Cadmium	22.6	mg/kg	1.0	94	75	125			
Chromium	54.7	mg/kg	1.0	91	75	125			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Batch: 121428
Lab ID: B18051240-042AMS3	Sample Matrix Spike				Run: ICPMS206-B_180517A				05/20/18 00:08
Cobalt	45.0	mg/kg	1.0	83	75	125			
Lead	60.4	mg/kg	1.0	104	75	125			
Manganese	487	mg/kg	1.0	92	75	125			
Molybdenum	36.0	mg/kg	1.0	74	75	125			S
Selenium	48.2	mg/kg	1.0	101	75	125			
Thallium	48.8	mg/kg	1.0	102	75	125			
Lab ID: B18051240-042AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS206-B_180517A				05/20/18 00:13
Antimony	14.3	mg/kg	1.0	30	75	125	0.5	20	S
Arsenic	51.8	mg/kg	1.0	96	75	125	1.1	20	
Barium	274	mg/kg	1.0	212	75	125	1.6	20	S
Cadmium	22.6	mg/kg	1.0	94	75	125	0.0	20	
Chromium	53.3	mg/kg	1.0	87	75	125	2.7	20	
Cobalt	44.8	mg/kg	1.0	82	75	125	0.5	20	
Lead	59.6	mg/kg	1.0	102	75	125	1.4	20	
Manganese	487	mg/kg	1.0	92	75	125	0.2	20	
Molybdenum	35.7	mg/kg	1.0	74	75	125	0.9	20	S
Selenium	47.9	mg/kg	1.0	100	75	125	0.6	20	
Thallium	48.4	mg/kg	1.0	101	75	125	0.7	20	
Method: SW6020									Batch: 121496
Lab ID: MB-121496	Method Blank				Run: ICPMS206-B_180517A				05/20/18 01:42
Antimony	ND	mg/kg	0.08						
Arsenic	ND	mg/kg	0.6						
Barium	ND	mg/kg	0.1						
Cadmium	ND	mg/kg	0.03						
Chromium	ND	mg/kg	0.2						
Cobalt	ND	mg/kg	0.03						
Lead	ND	mg/kg	0.4						
Manganese	ND	mg/kg	0.4						
Molybdenum	ND	mg/kg	0.04						
Selenium	ND	mg/kg	1						
Thallium	ND	mg/kg	0.01						
Lab ID: SRM3-121496	Standard Reference Material				Run: ICPMS206-B_180517A				05/20/18 02:24
Antimony	53.0	mg/kg	1.0	22	0	93			
Arsenic	150	mg/kg	1.0	76	71	105			
Barium	164	mg/kg	1.0	88	78	113			
Cadmium	91.0	mg/kg	1.0	92	73.2	105			
Chromium	95.4	mg/kg	1.0	82	73	109			
Cobalt	99.3	mg/kg	1.0	92	74	116			
Lead	91.0	mg/kg	1.0	87	74	109			
Manganese	382	mg/kg	1.0	88	81	117			

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.
S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: 121496	
Lab ID: SRM3-121496	Standard Reference Material				Run: ICPMS206-B_180517A			05/20/18 02:24	
Molybdenum	96.6	mg/kg	1.0	76	66	104			
Selenium	180	mg/kg	1.0	88	71	111			
Thallium	86.6	mg/kg	1.0	87	71	108			
Lab ID: B18051240-061ADIL	Serial Dilution				Run: ICPMS206-B_180517A			05/20/18 03:56	
Antimony	ND	mg/kg	1.0					10	
Arsenic	8.54	mg/kg	3.1					10	N
Barium	304	mg/kg	1.0				0.9	10	
Cadmium	ND	mg/kg	1.0					10	
Chromium	15.0	mg/kg	1.0				6.1	10	
Cobalt	6.59	mg/kg	1.0				2.8	10	
Lead	13.3	mg/kg	2.1					10	N
Manganese	195	mg/kg	2.0				4.5	10	
Molybdenum	1.40	mg/kg	1.0					10	N
Selenium	ND	mg/kg	5.0					10	
Thallium	0.145	mg/kg	1.0					10	N
Lab ID: B18051240-061APDS1	Post Digestion/Distillation Spike				Run: ICPMS206-B_180517A			05/20/18 04:00	
Antimony	4.70	mg/kg	1.0	90	75	125			
Arsenic	13.0	mg/kg	1.0	95	75	125			
Barium	307	mg/kg	1.0		75	125			A
Cadmium	4.60	mg/kg	1.0	91	75	125			
Chromium	18.6	mg/kg	1.0	89	75	125			
Cobalt	10.8	mg/kg	1.0	88	75	125			
Lead	17.6	mg/kg	1.0	89	75	125			
Manganese	188	mg/kg	1.0		75	125			A
Molybdenum	5.64	mg/kg	1.0	87	75	125			
Selenium	5.28	mg/kg	1.0	106	75	125			
Thallium	4.67	mg/kg	1.0	90	75	125			
Lab ID: B18051240-061AMS3	Sample Matrix Spike				Run: ICPMS206-B_180517A			05/20/18 04:05	
Antimony	13.9	mg/kg	1.0	28	75	125			S
Arsenic	55.5	mg/kg	1.0	96	75	125			
Barium	311	mg/kg	1.0		75	125			A
Cadmium	23.7	mg/kg	1.0	96	75	125			
Chromium	61.3	mg/kg	1.0	96	75	125			
Cobalt	51.4	mg/kg	1.0	92	75	125			
Lead	60.6	mg/kg	1.0	97	75	125			
Manganese	419	mg/kg	1.0	95	75	125			
Molybdenum	41.8	mg/kg	1.0	82	75	125			
Selenium	48.5	mg/kg	1.0	99	75	125			
Thallium	47.1	mg/kg	1.0	95	75	125			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Batch: 121496
Lab ID: B18051240-061AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS206-B_180517A				05/20/18 04:10
Antimony	13.2	mg/kg	1.0	26	75	125	5.3	20	S
Arsenic	53.0	mg/kg	1.0	92	75	125	4.5	20	
Barium	294	mg/kg	1.0		75	125	5.9	20	A
Cadmium	23.4	mg/kg	1.0	96	75	125	1.1	20	
Chromium	59.8	mg/kg	1.0	94	75	125	2.6	20	
Cobalt	50.5	mg/kg	1.0	90	75	125	1.8	20	
Lead	59.5	mg/kg	1.0	95	75	125	1.9	20	
Manganese	425	mg/kg	1.0	98	75	125	1.3	20	
Molybdenum	40.6	mg/kg	1.0	80	75	125	2.9	20	
Selenium	47.5	mg/kg	1.0	97	75	125	2.1	20	
Thallium	46.4	mg/kg	1.0	95	75	125	1.4	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Analytical Run: ICPMS206-B_180521A	
Lab ID: QCS	Initial Calibration Verification Standard								05/21/18 13:29
Antimony	0.0471	mg/L	0.0010	94	90	110			
Arsenic	0.0497	mg/L	0.0010	99	90	110			
Barium	0.0495	mg/L	0.0010	99	90	110			
Cadmium	0.0250	mg/L	0.0010	100	90	110			
Chromium	0.0501	mg/L	0.0010	100	90	110			
Cobalt	0.0512	mg/L	0.0010	102	90	110			
Lead	0.0485	mg/L	0.0010	97	90	110			
Manganese	0.249	mg/L	0.0010	100	90	110			
Selenium	0.0495	mg/L	0.0010	99	90	110			
Thallium	0.0494	mg/L	0.0010	99	90	110			
Lab ID: ICSA	Interference Check Sample A								05/21/18 13:49
Antimony	0.000278	mg/L	0.0010						
Arsenic	-0.0000641	mg/L	0.0010						
Barium	0.0000945	mg/L	0.0010						
Cadmium	0.000299	mg/L	0.0010						
Chromium	0.000657	mg/L	0.0010						
Cobalt	0.000132	mg/L	0.0010						
Lead	0.000194	mg/L	0.0010						
Manganese	0.000141	mg/L	0.0010						
Selenium	0.000131	mg/L	0.0010						
Thallium	0.000263	mg/L	0.0010						
Lab ID: ICSAB	Interference Check Sample AB								05/21/18 13:54
Antimony	0.0000849	mg/L	0.0010						
Arsenic	0.00960	mg/L	0.0010	96	70	130			
Barium	0.0000841	mg/L	0.0010						
Cadmium	0.00984	mg/L	0.0010	98	70	130			
Chromium	0.0202	mg/L	0.0010	101	70	130			
Cobalt	0.0194	mg/L	0.0010	97	70	130			
Lead	0.000179	mg/L	0.0010						
Manganese	0.0195	mg/L	0.0010	98	70	130			
Selenium	0.00956	mg/L	0.0010	96	70	130			
Thallium	0.0000558	mg/L	0.0010						
Method: SW6020									Batch: 121526
Lab ID: MB-121526	Method Blank				Run: ICPMS206-B_180521A				05/22/18 14:26
Antimony	ND	mg/kg	0.08						
Arsenic	ND	mg/kg	0.6						
Barium	ND	mg/kg	0.1						
Beryllium	ND	mg/kg	0.02						
Cadmium	ND	mg/kg	0.03						
Chromium	ND	mg/kg	0.2						

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: 121526	
Lab ID: MB-121526	Method Blank				Run: ICPMS206-B_180521A			05/22/18 14:26	
Cobalt	ND	mg/kg	0.03						
Lead	ND	mg/kg	0.4						
Manganese	ND	mg/kg	0.4						
Molybdenum	ND	mg/kg	0.04						
Selenium	ND	mg/kg	1						
Thallium	ND	mg/kg	0.01						
Lab ID: SRM3-121526	Standard Reference Material				Run: ICPMS206-B_180521A			05/22/18 15:15	
Antimony	63.2	mg/kg	1.0	26	0	120			
Arsenic	172	mg/kg	1.6	88	71	120			
Barium	185	mg/kg	1.0	99	78	120			
Beryllium	71.5	mg/kg	1.0	85	76	120			
Cadmium	97.2	mg/kg	1.0	98	73.2	120			
Chromium	108	mg/kg	1.0	93	73	120			
Cobalt	117	mg/kg	1.0	108	74	120			
Lead	104	mg/kg	1.1	99	74	120			
Manganese	417	mg/kg	1.0	96	80	120			
Molybdenum	104	mg/kg	1.0	82	66	120			
Selenium	202	mg/kg	2.5	99	71	120			
Thallium	101	mg/kg	1.0	101	71	120			
Lab ID: B18051240-071ADIL	Serial Dilution				Run: ICPMS206-B_180521A			05/22/18 18:37	
Antimony	ND	mg/kg	1.0					10	
Arsenic	ND	mg/kg	7.7					10	
Barium	63.8	mg/kg	1.5				64	10	R
Beryllium	0.332	mg/kg	1.0					10	N
Cadmium	ND	mg/kg	1.0					10	
Chromium	12.3	mg/kg	2.3					10	N
Cobalt	4.29	mg/kg	1.0				60	10	R
Lead	9.25	mg/kg	5.3					10	N
Manganese	90.4	mg/kg	5.0				62	10	R
Molybdenum	296	mg/kg	1.0				120	10	R
Selenium	ND	mg/kg	12					10	
Thallium	ND	mg/kg	1.0					10	
Lab ID: B18051240-071APDS1	Post Digestion/Distillation Spike				Run: ICPMS206-B_180521A			05/22/18 18:41	
Antimony	11.5	mg/kg	1.0	94	75	125			
Arsenic	21.0	mg/kg	1.6	98	75	125			
Barium	135	mg/kg	1.0		75	125			A
Beryllium	9.37	mg/kg	1.0	71	75	125			S
Cadmium	11.8	mg/kg	1.0	95	75	125			
Chromium	29.6	mg/kg	1.0	86	75	125			
Cobalt	18.9	mg/kg	1.0	89	75	125			
Lead	31.2	mg/kg	1.1	110	75	125			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Batch: 121526
Lab ID: B18051240-071APDS1	Post Digestion/Distillation Spike				Run: ICPMS206-B_180521A				05/22/18 18:41
Manganese	179	mg/kg	1.0		75	125			A
Molybdenum	82.9	mg/kg	1.0		75	125			A
Selenium	12.3	mg/kg	2.5	100	75	125			
Thallium	12.3	mg/kg	1.0	99	75	125			
Lab ID: B18051240-071AMS3	Sample Matrix Spike				Run: ICPMS206-B_180521A				05/22/18 18:46
Antimony	12.6	mg/kg	1.0	26	75	125			S
Arsenic	57.3	mg/kg	1.6	99	75	125			
Barium	196	mg/kg	1.0	149	75	125			S
Beryllium	18.8	mg/kg	1.0	75	75	125			
Cadmium	24.4	mg/kg	1.0	99	75	125			
Chromium	67.3	mg/kg	1.0	99	75	125			
Cobalt	53.8	mg/kg	1.0	94	75	125			
Lead	72.8	mg/kg	1.1	113	75	125			
Manganese	408	mg/kg	1.0	97	75	125			
Molybdenum	94.1	mg/kg	1.0	31	75	125			S
Selenium	49.6	mg/kg	2.5	102	75	125			
Thallium	50.6	mg/kg	1.0	103	75	125			
Lab ID: B18051240-071AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS206-B_180521A				05/22/18 18:50
Antimony	12.6	mg/kg	1.0	26	75	125	0.2	20	S
Arsenic	57.7	mg/kg	1.6	101	75	125	0.8	20	
Barium	197	mg/kg	1.0	152	75	125	0.5	20	S
Beryllium	18.7	mg/kg	1.0	75	75	125	0.3	20	
Cadmium	24.4	mg/kg	1.0	100	75	125	0.1	20	
Chromium	68.1	mg/kg	1.0	101	75	125	1.2	20	
Cobalt	53.6	mg/kg	1.0	94	75	125	0.3	20	
Lead	74.1	mg/kg	1.1	116	75	125	1.7	20	
Manganese	417	mg/kg	1.0	101	75	125	2.2	20	
Molybdenum	87.4	mg/kg	1.0	17	75	125	7.4	20	S
Selenium	49.7	mg/kg	2.5	103	75	125	0.3	20	
Thallium	50.6	mg/kg	1.0	104	75	125	0.0	20	
Method: SW6020									Batch: 121591
Lab ID: MB-121591	Method Blank				Run: ICPMS206-B_180521A				05/22/18 15:28
Antimony	ND	mg/kg	0.08						
Arsenic	ND	mg/kg	0.6						
Barium	ND	mg/kg	0.1						
Cadmium	ND	mg/kg	0.03						
Chromium	ND	mg/kg	0.2						
Cobalt	ND	mg/kg	0.03						
Lead	ND	mg/kg	0.4						
Manganese	ND	mg/kg	0.4						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: 121591	
Lab ID: MB-121591	Method Blank				Run: ICPMS206-B_180521A			05/22/18 15:28	
Molybdenum	ND	mg/kg	0.04						
Selenium	ND	mg/kg	1						
Thallium	0.01	mg/kg	0.01						
Lab ID: SRM3-121591	Standard Reference Material				Run: ICPMS206-B_180521A			05/22/18 18:55	
Antimony	53.3	mg/kg	1.0	22	0	120			
Arsenic	160	mg/kg	1.6	81	71	120			
Barium	180	mg/kg	1.0	96	78	120			
Cadmium	92.2	mg/kg	1.0	93	73.2	120			
Chromium	96.7	mg/kg	1.0	83	73	120			
Cobalt	107	mg/kg	1.0	99	74	120			
Lead	110	mg/kg	1.1	105	74	120			
Manganese	385	mg/kg	1.0	89	80	120			
Molybdenum	138	mg/kg	1.0	109	66	120			
Selenium	192	mg/kg	2.5	94	71	120			
Thallium	92.7	mg/kg	1.0	93	71	120			
Lab ID: B18051240-080ADIL	Serial Dilution				Run: ICPMS206-B_180521A			05/22/18 20:32	
Antimony	ND	mg/kg	1.0					10	
Arsenic	ND	mg/kg	7.3					10	
Barium	532	mg/kg	1.4				9.8	10	
Cadmium	ND	mg/kg	1.0					10	
Chromium	14.9	mg/kg	2.2					10	N
Cobalt	5.75	mg/kg	1.0				4.3	10	
Lead	12.0	mg/kg	5.0					10	N
Manganese	392	mg/kg	4.8				4.1	10	
Molybdenum	61.1	mg/kg	1.0				120	10	R
Selenium	ND	mg/kg	12					10	
Thallium	ND	mg/kg	1.0					10	
Lab ID: B18051240-080APDS1	Post Digestion/Distillation Spike				Run: ICPMS206-B_180521A			05/22/18 20:36	
Antimony	10.9	mg/kg	1.0	94	75	125			
Arsenic	16.9	mg/kg	1.5	97	75	125			
Barium	597	mg/kg	1.0		75	125			A
Cadmium	11.1	mg/kg	1.0	95	75	125			
Chromium	24.3	mg/kg	1.0	86	75	125			
Cobalt	16.0	mg/kg	1.0	90	75	125			
Lead	24.8	mg/kg	1.0	113	75	125			
Manganese	381	mg/kg	1.0		75	125			A
Molybdenum	25.9	mg/kg	1.0	99	75	125			
Selenium	11.7	mg/kg	2.4	101	75	125			
Thallium	11.8	mg/kg	1.0	100	75	125			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Batch: 121591
Lab ID: B18051240-080AMS3	Sample Matrix Spike				Run: ICPMS206-B_180521A				05/22/18 20:41
Antimony	16.3	mg/kg	1.0	33	75	125			S
Arsenic	58.1	mg/kg	1.6	108	75	125			
Barium	504	mg/kg	1.0		75	125			A
Cadmium	23.2	mg/kg	1.0	95	75	125			
Chromium	63.0	mg/kg	1.0	100	75	125			
Cobalt	51.0	mg/kg	1.0	93	75	125			
Lead	68.3	mg/kg	1.1	116	75	125			
Manganese	567	mg/kg	1.0	79	75	125			
Molybdenum	52.4	mg/kg	1.0	78	75	125			
Selenium	49.9	mg/kg	2.5	102	75	125			
Thallium	50.1	mg/kg	1.0	103	75	125			
Lab ID: B18051240-080AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS206-B_180521A				05/22/18 20:45
Antimony	16.0	mg/kg	1.0	32	75	125	1.5	20	S
Arsenic	54.7	mg/kg	1.6	99	75	125	6.1	20	
Barium	399	mg/kg	1.0		75	125	23	20	AR
Cadmium	23.3	mg/kg	1.0	94	75	125	0.3	20	
Chromium	61.9	mg/kg	1.0	97	75	125	1.8	20	
Cobalt	50.1	mg/kg	1.0	90	75	125	1.7	20	
Lead	67.2	mg/kg	1.1	112	75	125	1.6	20	
Manganese	582	mg/kg	1.0	84	75	125	2.6	20	
Molybdenum	51.8	mg/kg	1.0	76	75	125	1.1	20	
Selenium	49.6	mg/kg	2.5	100	75	125	0.5	20	
Thallium	49.9	mg/kg	1.0	101	75	125	0.5	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

R - RPD exceeds advisory limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: 121526	
Lab ID: MB-121526	Method Blank				Run: ICPMS206-B_180523A			05/23/18 19:28	
Antimony	ND	mg/kg	0.08						
Arsenic	ND	mg/kg	0.6						
Barium	ND	mg/kg	0.1						
Cadmium	ND	mg/kg	0.03						
Chromium	ND	mg/kg	0.2						
Cobalt	ND	mg/kg	0.03						
Lead	ND	mg/kg	0.4						
Manganese	ND	mg/kg	0.4						
Molybdenum	0.06	mg/kg	0.04						
Selenium	ND	mg/kg	1						
Thallium	ND	mg/kg	0.01						
Lab ID: SRM3-121526	Standard Reference Material				Run: ICPMS206-B_180523A			05/23/18 20:10	
Antimony	62.5	mg/kg	1.0	26	0	120			
Arsenic	169	mg/kg	1.6	86	71	120			
Barium	183	mg/kg	1.0	98	78	120			
Cadmium	95.5	mg/kg	1.0	97	73.2	120			
Chromium	104	mg/kg	1.0	89	73	120			
Cobalt	97.4	mg/kg	1.0	90	74	120			
Lead	95.6	mg/kg	1.1	91	74	120			
Manganese	378	mg/kg	1.0	87	80	120			
Molybdenum	189	mg/kg	1.0	149	66	120			S
Selenium	199	mg/kg	2.5	97	71	120			
Thallium	87.9	mg/kg	1.0	89	71	120			
Lab ID: B18051240-071ADIL	Serial Dilution				Run: ICPMS206-B_180523A			05/23/18 21:23	
Antimony	ND	mg/kg	1.0					10	
Arsenic	8.72	mg/kg	7.7					10	N
Barium	124	mg/kg	1.5				1.4	10	
Cadmium	ND	mg/kg	1.0					10	
Chromium	18.9	mg/kg	2.3					10	N
Cobalt	7.85	mg/kg	1.0				3.1	10	
Lead	14.2	mg/kg	5.3					10	N
Manganese	162	mg/kg	5.0				2.4	10	
Molybdenum	192	mg/kg	1.0				120	10	R
Selenium	ND	mg/kg	12					10	
Thallium	0.219	mg/kg	1.0					10	N
Lab ID: B18051240-071APDS1	Post Digestion/Distillation Spike				Run: ICPMS206-B_180523A			05/23/18 21:28	
Antimony	11.5	mg/kg	1.0	94	75	125			
Arsenic	20.5	mg/kg	1.6	95	75	125			
Barium	135	mg/kg	1.0		75	125			A
Cadmium	11.7	mg/kg	1.0	95	75	125			
Chromium	29.1	mg/kg	1.0	86	75	125			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Batch: 121526
Lab ID: B18051240-071APDS1	Post Digestion/Distillation Spike				Run: ICPMS206-B_180523A				05/23/18 21:28
Cobalt	18.2	mg/kg	1.0	86	75	125			
Lead	25.5	mg/kg	1.1	92	75	125			
Manganese	165	mg/kg	1.0		75	125			A
Molybdenum	55.6	mg/kg	1.0	66	75	125			S
Selenium	12.2	mg/kg	2.5	100	75	125			
Thallium	11.4	mg/kg	1.0	91	75	125			
Lab ID: B18051240-071AMS3	Sample Matrix Spike				Run: ICPMS206-B_180523A				05/23/18 21:32
Antimony	12.4	mg/kg	1.0	25	75	125			S
Arsenic	56.4	mg/kg	1.6	98	75	125			
Barium	196	mg/kg	1.0	150	75	125			S
Cadmium	23.9	mg/kg	1.0	97	75	125			
Chromium	67.4	mg/kg	1.0	100	75	125			
Cobalt	51.4	mg/kg	1.0	90	75	125			
Lead	62.5	mg/kg	1.1	99	75	125			
Manganese	376	mg/kg	1.0	89	75	125			
Molybdenum	74.2	mg/kg	1.0	55	75	125			S
Selenium	48.5	mg/kg	2.5	99	75	125			
Thallium	48.6	mg/kg	1.0	99	75	125			
Lab ID: B18051240-071AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS206-B_180523A				05/23/18 21:37
Antimony	12.4	mg/kg	1.0	26	75	125	0.1	20	S
Arsenic	56.1	mg/kg	1.6	98	75	125	0.4	20	
Barium	196	mg/kg	1.0	152	75	125	0.0	20	S
Cadmium	23.8	mg/kg	1.0	98	75	125	0.5	20	
Chromium	67.4	mg/kg	1.0	101	75	125	0.1	20	
Cobalt	51.8	mg/kg	1.0	91	75	125	0.7	20	
Lead	62.2	mg/kg	1.1	99	75	125	0.4	20	
Manganese	383	mg/kg	1.0	93	75	125	1.8	20	
Molybdenum	70.4	mg/kg	1.0	47	75	125	5.3	20	S
Selenium	48.5	mg/kg	2.5	100	75	125	0.0	20	
Thallium	48.3	mg/kg	1.0	99	75	125	0.7	20	
Method: SW6020									Batch: 121591
Lab ID: MB-121591	Method Blank				Run: ICPMS206-B_180523A				05/24/18 13:27
Antimony	ND	mg/kg	0.08						
Arsenic	ND	mg/kg	0.6						
Barium	ND	mg/kg	0.1						
Cadmium	ND	mg/kg	0.03						
Chromium	ND	mg/kg	0.2						
Cobalt	ND	mg/kg	0.03						
Lead	ND	mg/kg	0.4						
Manganese	ND	mg/kg	0.4						

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: 121591	
Lab ID: MB-121591	Method Blank				Run: ICPMS206-B_180523A			05/24/18 13:27	
Molybdenum	0.9	mg/kg	0.04						
Selenium	ND	mg/kg	1						
Thallium	ND	mg/kg	0.01						
Lab ID: SRM3-121591	Standard Reference Material				Run: ICPMS206-B_180523A			05/24/18 14:22	
Antimony	55.2	mg/kg	1.0	23	0	120			
Arsenic	164	mg/kg	1.6	84	71	120			
Barium	176	mg/kg	1.0	94	78	120			
Cadmium	96.2	mg/kg	1.0	97	73.2	120			
Chromium	104	mg/kg	1.0	89	73	120			
Cobalt	108	mg/kg	1.0	100	74	120			
Lead	106	mg/kg	1.1	101	74	120			
Manganese	404	mg/kg	1.0	93	80	120			
Molybdenum	116	mg/kg	1.0	91	66	120			
Selenium	192	mg/kg	2.5	94	71	120			
Thallium	98.6	mg/kg	1.0	99	71	120			
Lab ID: B18051240-080ADIL	Serial Dilution				Run: ICPMS206-B_180523A			05/24/18 15:26	
Antimony	ND	mg/kg	1.0					10	
Arsenic	ND	mg/kg	7.3					10	
Barium	537	mg/kg	1.4				3.2	10	
Cadmium	ND	mg/kg	1.0					10	
Chromium	16.0	mg/kg	2.2					10	N
Cobalt	6.39	mg/kg	1.0				4.2	10	
Lead	10.9	mg/kg	5.0					10	N
Manganese	416	mg/kg	4.8				4.6	10	
Molybdenum	ND	mg/kg	1.0					10	
Selenium	ND	mg/kg	12					10	
Thallium	0.155	mg/kg	1.0					10	N
Lab ID: B18051240-080APDS1	Post Digestion/Distillation Spike				Run: ICPMS206-B_180523A			05/24/18 15:31	
Antimony	11.5	mg/kg	1.0	99	75	125			
Arsenic	17.1	mg/kg	1.5	98	75	125			
Barium	553	mg/kg	1.0		75	125			A
Cadmium	11.4	mg/kg	1.0	97	75	125			
Chromium	26.3	mg/kg	1.0	93	75	125			
Cobalt	17.1	mg/kg	1.0	95	75	125			
Lead	24.2	mg/kg	1.0	108	75	125			
Manganese	398	mg/kg	1.0		75	125			A
Molybdenum	13.1	mg/kg	1.0	110	75	125			
Selenium	11.7	mg/kg	2.4	100	75	125			
Thallium	12.8	mg/kg	1.0	109	75	125			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Batch: 121591
Lab ID: B18051240-080AMS3	Sample Matrix Spike				Run: ICPMS206-B_180523A				05/24/18 15:35
Antimony	17.2	mg/kg	1.0	35	75	125			S
Arsenic	59.3	mg/kg	1.6	110	75	125			
Barium	461	mg/kg	1.0		75	125			A
Cadmium	24.6	mg/kg	1.0	101	75	125			
Chromium	67.9	mg/kg	1.0	107	75	125			
Cobalt	55.9	mg/kg	1.0	102	75	125			
Lead	67.6	mg/kg	1.1	115	75	125			
Manganese	592	mg/kg	1.0	80	75	125			
Molybdenum	49.6	mg/kg	1.0	101	75	125			
Selenium	49.1	mg/kg	2.5	101	75	125			
Thallium	54.9	mg/kg	1.0	112	75	125			
Lab ID: B18051240-080AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS206-B_180523A				05/24/18 15:40
Antimony	17.0	mg/kg	1.0	34	75	125	1.1	20	S
Arsenic	55.8	mg/kg	1.6	101	75	125	6.2	20	
Barium	398	mg/kg	1.0		75	125	15	20	A
Cadmium	25.0	mg/kg	1.0	101	75	125	1.5	20	
Chromium	66.9	mg/kg	1.0	104	75	125	1.5	20	
Cobalt	55.7	mg/kg	1.0	100	75	125	0.3	20	
Lead	67.3	mg/kg	1.1	113	75	125	0.3	20	
Manganese	609	mg/kg	1.0	86	75	125	2.8	20	
Molybdenum	49.2	mg/kg	1.0	99	75	125	0.8	20	
Selenium	49.3	mg/kg	2.5	100	75	125	0.3	20	
Thallium	55.5	mg/kg	1.0	112	75	125	1.1	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Analytical Run: ICPMS206-B_180524A	
Lab ID: QCS	Initial Calibration Verification Standard								05/24/18 19:23
Barium	0.0491	mg/L	0.0010	98	90	110			
Lead	0.0488	mg/L	0.0010	98	90	110			
Lab ID: ICSA	Interference Check Sample A								05/24/18 19:28
Barium	0.000110	mg/L	0.0010						
Lead	0.000240	mg/L	0.0010						
Lab ID: ICSAB	Interference Check Sample AB								05/24/18 19:32
Barium	0.0000694	mg/L	0.0010						
Lead	0.000217	mg/L	0.0010						
Method: SW6020									Batch: 121591
Lab ID: MB-121591	Method Blank				Run: ICPMS206-B_180524A				05/24/18 20:49
Antimony	ND	mg/kg	0.08						
Arsenic	ND	mg/kg	0.6						
Barium	ND	mg/kg	0.1						
Cadmium	ND	mg/kg	0.03						
Chromium	ND	mg/kg	0.2						
Cobalt	ND	mg/kg	0.03						
Lead	ND	mg/kg	0.4						
Manganese	ND	mg/kg	0.4						
Molybdenum	0.6	mg/kg	0.04						
Selenium	ND	mg/kg	1						
Thallium	ND	mg/kg	0.01						

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Analytical Run: ICPMS206-B_180611A	
Lab ID: QCS	Initial Calibration Verification Standard								06/11/18 16:16
Manganese	0.253	mg/L	0.0010	101	90	110			
Lab ID: ICSA	Interference Check Sample A								06/11/18 16:49
Manganese	0.000586	mg/L	0.0010						
Lab ID: ICSAB	Interference Check Sample AB								06/11/18 16:53
Manganese	0.0194	mg/L	0.0010	97	70	130			
Method: SW6020									Batch: 121427
Lab ID: MB-121427	Method Blank				Run: ICPMS206-B_180611A				06/12/18 13:37
Antimony	ND	mg/kg	0.04						
Arsenic	ND	mg/kg	0.3						
Barium	ND	mg/kg	0.06						
Beryllium	ND	mg/kg	0.01						
Cadmium	ND	mg/kg	0.01						
Chromium	ND	mg/kg	0.10						
Cobalt	ND	mg/kg	0.01						
Lead	ND	mg/kg	0.2						
Manganese	ND	mg/kg	0.2						
Molybdenum	ND	mg/kg	0.02						
Selenium	ND	mg/kg	0.5						
Thallium	ND	mg/kg	0.006						

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020							Analytical Run: ICPMS207-B_180524A		
Lab ID: ICSA	Interference Check Sample A								05/24/18 11:21
Arsenic	0.0000658	mg/L	0.0010						
Barium	0.0000910	mg/L	0.0010						
Beryllium	0.0000312	mg/L	0.0010						
Chromium	0.000968	mg/L	0.0010						
Cobalt	0.0000936	mg/L	0.0010						
Manganese	0.000198	mg/L	0.0010						
Molybdenum	0.812	mg/L	0.0010	101	80	120			
Selenium	0.000531	mg/L	0.0010						
Lab ID: ICSAB	Interference Check Sample AB								05/24/18 11:24
Arsenic	0.0100	mg/L	0.0010	100	70	130			
Barium	0.000333	mg/L	0.0010						
Beryllium	7.34E-07	mg/L	0.0010						
Chromium	0.0204	mg/L	0.0010	102	70	130			
Cobalt	0.0202	mg/L	0.0010	101	70	130			
Manganese	0.0198	mg/L	0.0010	99	70	130			
Molybdenum	0.793	mg/L	0.0010	99	70	130			
Selenium	0.00974	mg/L	0.0010	97	70	130			
Lab ID: QCS	Initial Calibration Verification Standard								05/24/18 14:35
Arsenic	0.0515	mg/L	0.0010	103	90	110			
Barium	0.0500	mg/L	0.0010	100	90	110			
Beryllium	0.0252	mg/L	0.0010	101	90	110			
Chromium	0.0517	mg/L	0.0010	103	90	110			
Cobalt	0.0546	mg/L	0.0010	109	90	110			
Manganese	0.262	mg/L	0.0010	105	90	110			
Molybdenum	0.0488	mg/L	0.0010	98	90	110			
Selenium	0.0513	mg/L	0.0010	103	90	110			
Method: SW6020									Batch: 121427
Lab ID: MB-121427	Method Blank				Run: ICPMS207-B_180524A				05/25/18 03:38
Antimony	0.1	mg/kg	0.08						
Arsenic	ND	mg/kg	0.6						
Barium	ND	mg/kg	0.1						
Beryllium	ND	mg/kg	0.02						
Cadmium	ND	mg/kg	0.03						
Chromium	ND	mg/kg	0.2						
Cobalt	ND	mg/kg	0.03						
Lead	ND	mg/kg	0.4						
Manganese	ND	mg/kg	0.4						
Molybdenum	0.7	mg/kg	0.04						
Selenium	ND	mg/kg	1						
Thallium	0.02	mg/kg	0.01						

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: 121427	
Lab ID: SRM3-121427	Standard Reference Material				Run: ICPMS207-B_180524A			05/25/18 03:47	
Antimony	62.8	mg/kg	1.0	26	0	93			
Arsenic	189	mg/kg	1.6	96	71	105			
Barium	160	mg/kg	1.0	86	78	113			
Beryllium	72.9	mg/kg	1.0	87	76	108			
Cadmium	86.4	mg/kg	1.0	87	73.2	105			
Chromium	125	mg/kg	1.0	107	73	109			
Cobalt	105	mg/kg	1.0	97	74	116			
Lead	98.5	mg/kg	1.1	94	74	109			
Manganese	498	mg/kg	1.0	115	81	117			
Molybdenum	119	mg/kg	1.0	94	66	104			
Selenium	208	mg/kg	2.5	101	71	111			
Thallium	96.7	mg/kg	1.0	97	71	108			
Lab ID: B18051240-022ADIL	Serial Dilution				Run: ICPMS207-B_180524A			05/25/18 05:03	
Antimony	ND	mg/kg	1.0					10	
Arsenic	ND	mg/kg	7.6					10	
Barium	110	mg/kg	1.5				4.9	10	
Beryllium	0.435	mg/kg	1.0					10	N
Cadmium	ND	mg/kg	1.0					10	
Chromium	13.1	mg/kg	2.3					10	N
Cobalt	5.28	mg/kg	1.0				1.3	10	
Lead	7.10	mg/kg	5.2					10	N
Manganese	299	mg/kg	5.0				11	10	R
Molybdenum	ND	mg/kg	1.0					10	
Selenium	ND	mg/kg	12					10	
Thallium	ND	mg/kg	1.0					10	
Lab ID: B18051240-022APDS1	Post Digestion/Distillation Spike				Run: ICPMS207-B_180524A			05/25/18 05:06	
Antimony	11.8	mg/kg	1.0	97	75	125			
Arsenic	16.9	mg/kg	1.6	104	75	125			
Barium	113	mg/kg	1.0		75	125			A
Beryllium	10.5	mg/kg	1.0	83	75	125			
Cadmium	11.3	mg/kg	1.0	93	75	125			
Chromium	26.4	mg/kg	1.0	101	75	125			
Cobalt	16.4	mg/kg	1.0	91	75	125			
Lead	18.9	mg/kg	1.1	96	75	125			
Manganese	339	mg/kg	1.0		75	125			A
Molybdenum	13.1	mg/kg	1.0	101	75	125			
Selenium	11.6	mg/kg	2.5	95	75	125			
Thallium	12.0	mg/kg	1.0	98	75	125			
Lab ID: B18051240-022AMS3	Sample Matrix Spike				Run: ICPMS207-B_180524A			05/25/18 05:09	
Antimony	18.9	mg/kg	1.0	39	75	125			S
Arsenic	58.7	mg/kg	1.6	111	75	125			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Batch: 121427
Lab ID: B18051240-022AMS3	Sample Matrix Spike				Run: ICPMS207-B_180524A				05/25/18 05:09
Barium	163	mg/kg	1.0	119	75	125			
Beryllium	21.9	mg/kg	1.0	88	75	125			
Cadmium	24.6	mg/kg	1.0	100	75	125			
Chromium	71.3	mg/kg	1.0	117	75	125			
Cobalt	52.2	mg/kg	1.0	96	75	125			
Lead	58.2	mg/kg	1.1	104	75	125			
Manganese	620	mg/kg	1.0	116	75	125			
Molybdenum	51.3	mg/kg	1.0	103	75	125			
Selenium	49.1	mg/kg	2.5	100	75	125			
Thallium	50.8	mg/kg	1.0	104	75	125			
Lab ID: B18051240-022AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS207-B_180524A				05/25/18 05:12
Antimony	21.2	mg/kg	1.0	44	75	125	11	20	S
Arsenic	91.9	mg/kg	1.6	181	75	125	44	20	SR
Barium	159	mg/kg	1.0	111	75	125	2.6	20	
Beryllium	21.6	mg/kg	1.0	87	75	125	1.5	20	
Cadmium	24.4	mg/kg	1.0	100	75	125	0.7	20	
Chromium	72.2	mg/kg	1.0	120	75	125	1.2	20	
Cobalt	52.2	mg/kg	1.0	97	75	125	0.0	20	
Lead	60.4	mg/kg	1.1	110	75	125	3.7	20	
Manganese	628	mg/kg	1.0	121	75	125	1.3	20	
Molybdenum	53.0	mg/kg	1.0	108	75	125	3.3	20	
Selenium	46.8	mg/kg	2.5	97	75	125	4.8	20	
Thallium	50.0	mg/kg	1.0	103	75	125	1.6	20	
Method: SW6020									Batch: 121428
Lab ID: MB-121428	Method Blank				Run: ICPMS207-B_180524A				05/25/18 05:15
Antimony	ND	mg/kg	0.08						
Arsenic	ND	mg/kg	0.6						
Barium	ND	mg/kg	0.1						
Beryllium	ND	mg/kg	0.02						
Cadmium	ND	mg/kg	0.03						
Chromium	ND	mg/kg	0.2						
Cobalt	ND	mg/kg	0.03						
Lead	ND	mg/kg	0.4						
Manganese	ND	mg/kg	0.4						
Molybdenum	0.2	mg/kg	0.04						
Selenium	ND	mg/kg	1						
Thallium	0.02	mg/kg	0.01						
Lab ID: SRM3-121428	Standard Reference Material				Run: ICPMS207-B_180524A				05/25/18 05:18
Antimony	58.4	mg/kg	1.0	24	0	93			
Arsenic	185	mg/kg	1.6	94	71	105			

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
S - Spike recovery outside of advisory limits.
ND - Not detected at the reporting limit.
R - RPD exceeds advisory limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: 121428	
Lab ID: SRM3-121428	Standard Reference Material				Run: ICPMS207-B_180524A			05/25/18 05:18	
Barium	163	mg/kg	1.0	87	78	113			
Beryllium	70.3	mg/kg	1.0	84	76	108			
Cadmium	86.8	mg/kg	1.0	88	73.2	105			
Chromium	123	mg/kg	1.0	105	73	109			
Cobalt	106	mg/kg	1.0	98	74	116			
Lead	98.9	mg/kg	1.1	94	74	109			
Manganese	471	mg/kg	1.0	108	81	117			
Molybdenum	120	mg/kg	1.0	94	66	104			
Selenium	204	mg/kg	2.5	99	71	111			
Thallium	94.6	mg/kg	1.0	95	71	108			
Lab ID: B18051240-042ADIL	Serial Dilution				Run: ICPMS207-B_180524A			05/25/18 06:34	
Antimony	ND	mg/kg	1.0					10	
Arsenic	ND	mg/kg	7.5					10	
Barium	164	mg/kg	1.5				7.0	10	
Beryllium	0.600	mg/kg	1.0					10	N
Cadmium	ND	mg/kg	1.0					10	
Chromium	14.9	mg/kg	2.3					10	N
Cobalt	7.01	mg/kg	1.0				0.5	10	
Lead	11.0	mg/kg	5.2					10	N
Manganese	320	mg/kg	5.0				7.8	10	
Molybdenum	ND	mg/kg	1.0					10	
Selenium	ND	mg/kg	12					10	
Thallium	0.131	mg/kg	1.0					10	N
Lab ID: B18051240-042APDS1	Post Digestion/Distillation Spike				Run: ICPMS207-B_180524A			05/25/18 06:37	
Antimony	12.0	mg/kg	1.0	99	75	125			
Arsenic	19.7	mg/kg	1.5	107	75	125			
Barium	161	mg/kg	1.0		75	125			A
Beryllium	10.5	mg/kg	1.0	83	75	125			
Cadmium	11.6	mg/kg	1.0	95	75	125			
Chromium	28.5	mg/kg	1.0	107	75	125			
Cobalt	17.8	mg/kg	1.0	90	75	125			
Lead	22.6	mg/kg	1.1	97	75	125			
Manganese	362	mg/kg	1.0		75	125			A
Molybdenum	12.8	mg/kg	1.0	103	75	125			
Selenium	11.8	mg/kg	2.5	98	75	125			
Thallium	12.0	mg/kg	1.0	99	75	125			
Lab ID: B18051240-042AMS3	Sample Matrix Spike				Run: ICPMS207-B_180524A			05/25/18 06:40	
Antimony	14.5	mg/kg	1.0	30	75	125			S
Arsenic	59.7	mg/kg	1.5	111	75	125			
Barium	232	mg/kg	1.0	165	75	125			S
Beryllium	20.9	mg/kg	1.0	85	75	125			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Batch: 121428
Lab ID: B18051240-042AMS3	Sample Matrix Spike				Run: ICPMS207-B_180524A				05/25/18 06:40
Cadmium	23.7	mg/kg	1.0	99	75	125			
Chromium	74.1	mg/kg	1.0	123	75	125			
Cobalt	53.0	mg/kg	1.0	96	75	125			
Lead	60.5	mg/kg	1.0	104	75	125			
Manganese	629	mg/kg	1.0	119	75	125			
Molybdenum	48.9	mg/kg	1.0	102	75	125			
Selenium	47.2	mg/kg	2.4	99	75	125			
Thallium	48.8	mg/kg	1.0	102	75	125			
Lab ID: B18051240-042AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS207-B_180524A				05/25/18 06:49
Antimony	15.2	mg/kg	1.0	32	75	125	5.0	20	S
Arsenic	60.1	mg/kg	1.5	111	75	125	0.6	20	
Barium	244	mg/kg	1.0	191	75	125	5.3	20	S
Beryllium	21.2	mg/kg	1.0	86	75	125	1.4	20	
Cadmium	24.2	mg/kg	1.0	101	75	125	1.9	20	
Chromium	73.4	mg/kg	1.0	121	75	125	1.0	20	
Cobalt	53.5	mg/kg	1.0	97	75	125	0.9	20	
Lead	60.4	mg/kg	1.1	103	75	125	0.1	20	
Manganese	638	mg/kg	1.0	122	75	125	1.4	20	
Molybdenum	50.1	mg/kg	1.0	104	75	125	2.4	20	
Selenium	47.4	mg/kg	2.4	99	75	125	0.5	20	
Thallium	49.3	mg/kg	1.0	103	75	125	1.0	20	
Method: SW6020									Batch: 121496
Lab ID: MB-121496	Method Blank				Run: ICPMS207-B_180524A				05/25/18 06:52
Antimony	ND	mg/kg	0.08						
Arsenic	ND	mg/kg	0.6						
Barium	ND	mg/kg	0.1						
Beryllium	ND	mg/kg	0.02						
Cadmium	ND	mg/kg	0.03						
Chromium	ND	mg/kg	0.2						
Cobalt	ND	mg/kg	0.03						
Lead	ND	mg/kg	0.4						
Manganese	ND	mg/kg	0.4						
Molybdenum	0.1	mg/kg	0.04						
Selenium	ND	mg/kg	1						
Thallium	0.02	mg/kg	0.01						
Lab ID: SRM3-121496	Standard Reference Material				Run: ICPMS207-B_180524A				05/25/18 06:55
Antimony	58.6	mg/kg	1.0	24	0	93			
Arsenic	178	mg/kg	1.6	91	71	105			
Barium	155	mg/kg	1.0	83	78	113			
Beryllium	68.0	mg/kg	1.0	81	76	108			

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.
S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: 121496	
Lab ID: SRM3-121496	Standard Reference Material				Run: ICPMS207-B_180524A			05/25/18 06:55	
Cadmium	86.1	mg/kg	1.0	87	73.2	105			
Chromium	124	mg/kg	1.0	106	73	109			
Cobalt	102	mg/kg	1.0	94	74	116			
Lead	95.0	mg/kg	1.1	90	74	109			
Manganese	456	mg/kg	1.0	105	81	117			
Molybdenum	120	mg/kg	1.0	95	66	104			
Selenium	189	mg/kg	2.5	92	71	111			
Thallium	90.5	mg/kg	1.0	91	71	108			
Lab ID: B18051240-061ADIL	Serial Dilution				Run: ICPMS207-B_180524A			05/25/18 08:11	
Antimony	ND	mg/kg	1.0					10	
Arsenic	9.31	mg/kg	7.8					10	N
Barium	280	mg/kg	1.5				0.5	10	
Beryllium	0.690	mg/kg	1.0					10	N
Cadmium	ND	mg/kg	1.0					10	
Chromium	16.4	mg/kg	2.4					10	N
Cobalt	7.24	mg/kg	1.0				1.2	10	
Lead	13.5	mg/kg	5.4					10	N
Manganese	201	mg/kg	5.1				13	10	R
Molybdenum	0.727	mg/kg	1.0					10	N
Selenium	ND	mg/kg	12					10	
Thallium	0.170	mg/kg	1.0					10	N
Lab ID: B18051240-061APDS1	Post Digestion/Distillation Spike				Run: ICPMS207-B_180524A			05/25/18 08:15	
Antimony	12.4	mg/kg	1.0	98	75	125			
Arsenic	22.2	mg/kg	1.6	99	75	125			
Barium	288	mg/kg	1.0		75	125			A
Beryllium	10.5	mg/kg	1.0	79	75	125			
Cadmium	11.7	mg/kg	1.0	93	75	125			
Chromium	29.3	mg/kg	1.0	94	75	125			
Cobalt	18.1	mg/kg	1.0	87	75	125			
Lead	25.4	mg/kg	1.1	91	75	125			
Manganese	229	mg/kg	1.0		75	125			A
Molybdenum	13.9	mg/kg	1.0	101	75	125			
Selenium	12.0	mg/kg	2.5	96	75	125			
Thallium	11.7	mg/kg	1.0	93	75	125			
Lab ID: B18051240-061AMS3	Sample Matrix Spike				Run: ICPMS207-B_180524A			05/25/18 08:18	
Antimony	14.9	mg/kg	1.0	30	75	125			S
Arsenic	64.6	mg/kg	1.6	111	75	125			
Barium	286	mg/kg	1.0		75	125			A
Beryllium	21.0	mg/kg	1.0	83	75	125			
Cadmium	24.7	mg/kg	1.0	100	75	125			
Chromium	76.1	mg/kg	1.0	119	75	125			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: 121496	
Lab ID: B18051240-061AMS3	Sample Matrix Spike				Run: ICPMS207-B_180524A			05/25/18 08:18	
Cobalt	54.2	mg/kg	1.0	95	75	125			
Lead	65.2	mg/kg	1.1	104	75	125			
Manganese	511	mg/kg	1.0	115	75	125			
Molybdenum	53.1	mg/kg	1.0	105	75	125			
Selenium	49.7	mg/kg	2.5	101	75	125			
Thallium	51.1	mg/kg	1.0	104	75	125			
Lab ID: B18051240-061AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS207-B_180524A			05/25/18 08:20	
Antimony	13.8	mg/kg	1.0	28	75	125	7.1	20	S
Arsenic	62.4	mg/kg	1.6	107	75	125	3.5	20	
Barium	264	mg/kg	1.0		75	125	8.1	20	A
Beryllium	20.2	mg/kg	1.0	80	75	125	4.1	20	
Cadmium	24.0	mg/kg	1.0	98	75	125	3.1	20	
Chromium	75.5	mg/kg	1.0	119	75	125	0.8	20	
Cobalt	52.9	mg/kg	1.0	93	75	125	2.5	20	
Lead	62.7	mg/kg	1.1	100	75	125	3.8	20	
Manganese	518	mg/kg	1.0	119	75	125	1.5	20	
Molybdenum	50.8	mg/kg	1.0	101	75	125	4.6	20	
Selenium	48.6	mg/kg	2.5	100	75	125	2.1	20	
Thallium	49.4	mg/kg	1.0	101	75	125	3.4	20	
Method: SW6020								Batch: 121526	
Lab ID: MB-121526	Method Blank				Run: ICPMS207-B_180524A			05/25/18 08:23	
Antimony	ND	mg/kg	0.08						
Arsenic	ND	mg/kg	0.6						
Barium	ND	mg/kg	0.1						
Beryllium	ND	mg/kg	0.02						
Cadmium	ND	mg/kg	0.03						
Chromium	ND	mg/kg	0.2						
Cobalt	ND	mg/kg	0.03						
Lead	ND	mg/kg	0.4						
Manganese	ND	mg/kg	0.4						
Molybdenum	0.2	mg/kg	0.04						
Selenium	ND	mg/kg	1						
Thallium	0.02	mg/kg	0.01						
Lab ID: SRM3-121526	Standard Reference Material				Run: ICPMS207-B_180524A			05/25/18 08:26	
Antimony	66.4	mg/kg	1.0	28	0	93			
Arsenic	191	mg/kg	1.6	98	71	105			
Barium	165	mg/kg	1.0	88	78	113			
Beryllium	69.3	mg/kg	1.0	83	76	108			
Cadmium	87.8	mg/kg	1.0	89	73.2	105			
Chromium	106	mg/kg	5.3	91	73	109			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: 121526	
Lab ID: SRM3-121526	Standard Reference Material				Run: ICPMS207-B_180524A			05/25/18 08:26	
Cobalt	105	mg/kg	1.0	97	74	116			
Lead	102	mg/kg	1.1	97	74	109			
Manganese	469	mg/kg	1.0	108	81	117			
Molybdenum	122	mg/kg	1.0	96	66	104			
Selenium	202	mg/kg	2.5	99	71	111			
Thallium	97.3	mg/kg	1.0	98	71	108			
Lab ID: B18051240-071ADIL	Serial Dilution				Run: ICPMS207-B_180524A			05/25/18 09:03	
Antimony	ND	mg/kg	1.0					10	
Arsenic	ND	mg/kg	7.7					10	
Barium	81.9	mg/kg	1.5				30	10	R
Beryllium	0.543	mg/kg	1.0					10	N
Cadmium	ND	mg/kg	1.0					10	
Chromium	7.35	mg/kg	2.3					10	N
Cobalt	6.15	mg/kg	1.0				34	10	R
Lead	10.9	mg/kg	5.3					10	N
Manganese	64.6	mg/kg	5.0				100	10	R
Molybdenum	1.22	mg/kg	1.0					10	N
Selenium	ND	mg/kg	12					10	
Thallium	0.136	mg/kg	1.0					10	N
Lab ID: B18051240-071APDS1	Post Digestion/Distillation Spike				Run: ICPMS207-B_180524A			05/25/18 09:06	
Antimony	12.1	mg/kg	1.0	99	75	125			
Arsenic	22.8	mg/kg	1.6	108	75	125			
Barium	120	mg/kg	1.0		75	125			A
Beryllium	10.1	mg/kg	1.0	77	75	125			
Cadmium	11.7	mg/kg	1.0	94	75	125			
Chromium	34.3	mg/kg	1.0	121	75	125			
Cobalt	19.3	mg/kg	1.0	87	75	125			
Lead	27.2	mg/kg	1.1	95	75	125			
Manganese	211	mg/kg	1.0		75	125			A
Molybdenum	15.1	mg/kg	1.0	100	75	125			
Selenium	11.8	mg/kg	2.5	96	75	125			
Thallium	12.1	mg/kg	1.0	97	75	125			
Lab ID: B18051240-071AMS3	Sample Matrix Spike				Run: ICPMS207-B_180524A			05/25/18 09:18	
Antimony	12.8	mg/kg	1.0	26	75	125			S
Arsenic	63.4	mg/kg	1.6	110	75	125			
Barium	172	mg/kg	1.0	124	75	125			
Beryllium	20.5	mg/kg	1.0	81	75	125			
Cadmium	24.0	mg/kg	1.0	98	75	125			
Chromium	80.2	mg/kg	1.0	124	75	125			
Cobalt	53.6	mg/kg	1.0	92	75	125			
Lead	63.1	mg/kg	1.1	98	75	125			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: 121526	
Lab ID: B18051240-071AMS3	Sample Matrix Spike				Run: ICPMS207-B_180524A			05/25/18 09:18	
Manganese	480	mg/kg	1.0	116	75	125			
Molybdenum	48.1	mg/kg	1.0	93	75	125			
Selenium	48.6	mg/kg	2.5	100	75	125			
Thallium	48.9	mg/kg	1.0	100	75	125			
Lab ID: B18051240-071AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS207-B_180524A			05/25/18 09:21	
Antimony	12.8	mg/kg	1.0	27	75	125	0.5	20	S
Arsenic	62.7	mg/kg	1.6	110	75	125	1.1	20	
Barium	171	mg/kg	1.0	124	75	125	0.5	20	
Beryllium	20.3	mg/kg	1.0	81	75	125	1.1	20	
Cadmium	23.8	mg/kg	1.0	97	75	125	0.9	20	
Chromium	79.3	mg/kg	1.0	124	75	125	1.1	20	
Cobalt	54.0	mg/kg	1.0	94	75	125	0.8	20	
Lead	63.9	mg/kg	1.1	100	75	125	1.3	20	
Manganese	480	mg/kg	1.0	117	75	125	0.0	20	
Molybdenum	48.6	mg/kg	1.0	95	75	125	1.1	20	
Selenium	47.9	mg/kg	2.5	99	75	125	1.4	20	
Thallium	49.0	mg/kg	1.0	101	75	125	0.2	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.
S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Analytical Run: ICPMS207-B_180525B	
Lab ID: QCS	Initial Calibration Verification Standard								05/25/18 17:18
Antimony	0.0501	mg/L	0.0010	100	90	110			
Arsenic	0.0525	mg/L	0.0010	105	90	110			
Barium	0.0510	mg/L	0.0010	102	90	110			
Cadmium	0.0259	mg/L	0.0010	104	90	110			
Chromium	0.0500	mg/L	0.0010	100	90	110			
Cobalt	0.0514	mg/L	0.0010	103	90	110			
Lead	0.0498	mg/L	0.0010	100	90	110			
Manganese	0.255	mg/L	0.0010	102	90	110			
Molybdenum	0.0487	mg/L	0.0010	97	90	110			
Selenium	0.0475	mg/L	0.0010	95	90	110			
Thallium	0.0485	mg/L	0.0010	97	90	110			
Lab ID: ICSA	Interference Check Sample A								05/25/18 17:50
Antimony	0.000126	mg/L	0.0010						
Arsenic	0.0000917	mg/L	0.0010						
Barium	0.0000854	mg/L	0.0010						
Cadmium	0.000126	mg/L	0.0010						
Chromium	0.000723	mg/L	0.0010						
Cobalt	0.000165	mg/L	0.0010						
Lead	0.000211	mg/L	0.0010						
Manganese	0.000147	mg/L	0.0010						
Molybdenum	0.775	mg/L	0.0010	97	80	120			
Selenium	0.000145	mg/L	0.0010						
Thallium	0.0000350	mg/L	0.0010						
Lab ID: ICSAB	Interference Check Sample AB								05/25/18 17:52
Antimony	0.0000152	mg/L	0.0010						
Arsenic	0.0102	mg/L	0.0010	102	70	130			
Barium	0.0000536	mg/L	0.0010						
Cadmium	0.00967	mg/L	0.0010	97	70	130			
Chromium	0.0194	mg/L	0.0010	97	70	130			
Cobalt	0.0197	mg/L	0.0010	99	70	130			
Lead	0.000196	mg/L	0.0010						
Manganese	0.0184	mg/L	0.0010	92	70	130			
Molybdenum	0.788	mg/L	0.0010	99	70	130			
Selenium	0.00950	mg/L	0.0010	95	70	130			
Thallium	4.34E-06	mg/L	0.0010						
Method: SW6020									Batch: 121526
Lab ID: MB-121526	Method Blank				Run: ICPMS207-B_180525B				05/26/18 04:25
Antimony	ND	mg/kg	0.08						
Arsenic	ND	mg/kg	0.6						
Barium	ND	mg/kg	0.1						

Qualifiers:

RL - Analyte reporting limit.
ND - Not detected at the reporting limit.
MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: 121526	
Lab ID: MB-121526	Method Blank				Run: ICPMS207-B_180525B			05/26/18 04:25	
Beryllium	ND	mg/kg	0.02						
Cadmium	ND	mg/kg	0.03						
Chromium	ND	mg/kg	0.2						
Cobalt	ND	mg/kg	0.03						
Lead	ND	mg/kg	0.4						
Manganese	ND	mg/kg	0.4						
Molybdenum	0.3	mg/kg	0.04						
Selenium	ND	mg/kg	1						
Thallium	ND	mg/kg	0.01						
Method: SW6020								Batch: 121592	
Lab ID: MB-121592	Method Blank				Run: ICPMS207-B_180525B			05/26/18 04:31	
Antimony	ND	mg/kg	0.08						
Arsenic	ND	mg/kg	0.6						
Barium	ND	mg/kg	0.1						
Beryllium	ND	mg/kg	0.02						
Cadmium	ND	mg/kg	0.03						
Chromium	ND	mg/kg	0.2						
Cobalt	ND	mg/kg	0.03						
Lead	ND	mg/kg	0.4						
Manganese	0.4	mg/kg	0.4						
Molybdenum	0.07	mg/kg	0.04						
Selenium	ND	mg/kg	1						
Thallium	ND	mg/kg	0.01						
Lab ID: SRM3-121592	Standard Reference Material				Run: ICPMS207-B_180525B			05/26/18 04:39	
Antimony	60.5	mg/kg	1.0	25	0	93			
Arsenic	174	mg/kg	1.6	89	71	105			
Barium	168	mg/kg	1.0	90	78	113			
Beryllium	64.1	mg/kg	1.0	77	76	108			
Cadmium	88.2	mg/kg	1.0	89	73.2	105			
Chromium	106	mg/kg	1.0	91	73	109			
Cobalt	101	mg/kg	1.0	94	74	116			
Lead	97.5	mg/kg	1.1	93	74	109			
Manganese	415	mg/kg	1.0	96	81	117			
Molybdenum	108	mg/kg	1.0	85	66	104			
Selenium	187	mg/kg	2.5	91	71	111			
Thallium	88.5	mg/kg	1.0	89	71	108			
Lab ID: B18051240-098ADIL	Serial Dilution				Run: ICPMS207-B_180525B			05/26/18 05:38	
Antimony	ND	mg/kg	1.0					10	
Arsenic	12.2	mg/kg	7.6					10	N
Barium	126	mg/kg	1.5				2.5	10	

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: 121592	
Lab ID: B18051240-098ADIL	Serial Dilution				Run: ICPMS207-B_180525B			05/26/18 05:38	
Beryllium	0.636	mg/kg	1.0					10	N
Cadmium	ND	mg/kg	1.0					10	
Chromium	15.8	mg/kg	2.3					10	N
Cobalt	7.16	mg/kg	1.0				2.9	10	
Lead	13.3	mg/kg	5.2					10	N
Manganese	320	mg/kg	5.0				0.6	10	
Molybdenum	0.725	mg/kg	1.0					10	N
Selenium	ND	mg/kg	12					10	
Thallium	0.175	mg/kg	1.0					10	N
Lab ID: B18051240-098APDS1	Post Digestion/Distillation Spike				Run: ICPMS207-B_180525B			05/26/18 05:46	
Antimony	11.4	mg/kg	1.0	93	75	125			
Arsenic	23.0	mg/kg	1.5	90	75	125			
Barium	134	mg/kg	1.0		75	125			A
Beryllium	9.22	mg/kg	1.0	72	75	125			S
Cadmium	11.1	mg/kg	1.0	91	75	125			
Chromium	25.9	mg/kg	1.0	84	75	125			
Cobalt	17.5	mg/kg	1.0	87	75	125			
Lead	23.8	mg/kg	1.1	88	75	125			
Manganese	322	mg/kg	1.0		75	125			A
Molybdenum	12.7	mg/kg	1.0	97	75	125			
Selenium	11.0	mg/kg	2.5	91	75	125			
Thallium	11.5	mg/kg	1.0	94	75	125			
Lab ID: B18051240-098AMS3	Sample Matrix Spike				Run: ICPMS207-B_180525B			05/26/18 05:49	
Antimony	14.0	mg/kg	1.0	29	75	125			S
Arsenic	61.3	mg/kg	1.5	103	75	125			
Barium	175	mg/kg	1.0	111	75	125			
Beryllium	18.1	mg/kg	1.0	74	75	125			S
Cadmium	21.3	mg/kg	1.0	89	75	125			
Chromium	65.8	mg/kg	1.0	105	75	125			
Cobalt	50.6	mg/kg	1.0	92	75	125			
Lead	57.9	mg/kg	1.0	94	75	125			
Manganese	547	mg/kg	1.0	96	75	125			
Molybdenum	44.9	mg/kg	1.0	92	75	125			
Selenium	42.5	mg/kg	2.4	89	75	125			
Thallium	44.5	mg/kg	1.0	93	75	125			
Lab ID: B18051240-098AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS207-B_180525B			05/26/18 05:52	
Antimony	13.4	mg/kg	1.0	28	75	125	4.7	20	S
Arsenic	59.3	mg/kg	1.5	100	75	125	3.4	20	
Barium	176	mg/kg	1.0	113	75	125	0.4	20	
Beryllium	17.9	mg/kg	1.0	73	75	125	1.5	20	S
Cadmium	21.4	mg/kg	1.0	90	75	125	0.5	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: 121592	
Lab ID: B18051240-098AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS207-B_180525B			05/26/18 05:52	
Chromium	65.5	mg/kg	1.0	105	75	125	0.4	20	
Cobalt	50.0	mg/kg	1.0	91	75	125	1.1	20	
Lead	57.3	mg/kg	1.0	93	75	125	1.1	20	
Manganese	593	mg/kg	1.0	116	75	125	7.9	20	
Molybdenum	44.9	mg/kg	1.0	93	75	125	0.1	20	
Selenium	43.6	mg/kg	2.4	92	75	125	2.6	20	
Thallium	44.3	mg/kg	1.0	93	75	125	0.5	20	
Method: SW6020								Batch: 121652	
Lab ID: MB-121652	Method Blank				Run: ICPMS207-B_180525B			05/26/18 05:54	
Antimony	ND	mg/kg	0.08						
Arsenic	ND	mg/kg	0.6						
Barium	ND	mg/kg	0.1						
Cadmium	ND	mg/kg	0.03						
Chromium	ND	mg/kg	0.2						
Cobalt	ND	mg/kg	0.03						
Lead	ND	mg/kg	0.4						
Manganese	ND	mg/kg	0.4						
Molybdenum	0.09	mg/kg	0.05						
Selenium	ND	mg/kg	1						
Thallium	0.03	mg/kg	0.01						
Lab ID: SRM3-121652	Standard Reference Material				Run: ICPMS207-B_180525B			05/26/18 05:57	
Antimony	59.8	mg/kg	1.0	25	0	93			
Arsenic	175	mg/kg	1.5	89	71	105			
Barium	166	mg/kg	1.0	89	78	113			
Cadmium	86.9	mg/kg	1.0	88	73.2	105			
Chromium	106	mg/kg	1.0	91	73	109			
Cobalt	101	mg/kg	1.0	94	74	116			
Lead	95.2	mg/kg	1.1	91	74	109			
Manganese	400	mg/kg	1.0	92	81	117			
Molybdenum	117	mg/kg	1.0	92	66	104			
Selenium	190	mg/kg	2.5	93	71	111			
Thallium	89.5	mg/kg	1.0	90	71	108			
Lab ID: B18051240-118ADIL	Serial Dilution				Run: ICPMS207-B_180525B			05/26/18 07:07	
Antimony	ND	mg/kg	1.0					10	
Arsenic	8.95	mg/kg	7.7					10	N
Barium	110	mg/kg	1.5				2.5	10	
Cadmium	ND	mg/kg	1.0					10	
Chromium	12.4	mg/kg	2.3					10	N
Cobalt	6.76	mg/kg	1.0				2.3	10	
Lead	11.7	mg/kg	5.3					10	N

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: 121652	
Lab ID: B18051240-118ADIL	Serial Dilution				Run: ICPMS207-B_180525B			05/26/18 07:07	
Manganese	386	mg/kg	5.1				2.8	10	
Molybdenum	ND	mg/kg	1.0					10	
Selenium	ND	mg/kg	12					10	
Thallium	ND	mg/kg	1.0					10	
Lab ID: B18051240-118APDS1	Post Digestion/Distillation Spike				Run: ICPMS207-B_180525B			05/26/18 07:10	
Antimony	11.6	mg/kg	1.0	95	75	125			
Arsenic	20.4	mg/kg	1.6	97	75	125			
Barium	115	mg/kg	1.0		75	125			A
Cadmium	11.3	mg/kg	1.0	91	75	125			
Chromium	23.0	mg/kg	1.0	86	75	125			
Cobalt	17.3	mg/kg	1.0	87	75	125			
Lead	22.8	mg/kg	1.1	88	75	125			
Manganese	378	mg/kg	1.0		75	125			A
Molybdenum	13.1	mg/kg	1.0	99	75	125			
Selenium	11.5	mg/kg	2.5	94	75	125			
Thallium	12.0	mg/kg	1.0	97	75	125			
Lab ID: B18051240-118AMS3	Sample Matrix Spike				Run: ICPMS207-B_180525B			05/26/18 07:13	
Antimony	16.1	mg/kg	1.0	32	75	125			S
Arsenic	60.3	mg/kg	1.6	104	75	125			
Barium	203	mg/kg	1.0	193	75	125			S
Cadmium	22.5	mg/kg	1.0	90	75	125			
Chromium	64.2	mg/kg	1.0	104	75	125			
Cobalt	51.5	mg/kg	1.0	90	75	125			
Lead	58.9	mg/kg	1.1	94	75	125			
Manganese	623	mg/kg	1.0	100	75	125			
Molybdenum	50.7	mg/kg	1.0	100	75	125			
Selenium	47.4	mg/kg	2.5	95	75	125			
Thallium	48.8	mg/kg	1.0	98	75	125			
Lab ID: B18051240-118AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS207-B_180525B			05/26/18 07:15	
Antimony	15.5	mg/kg	1.0	31	75	125	3.7	20	S
Arsenic	58.1	mg/kg	1.6	100	75	125	3.7	20	
Barium	180	mg/kg	1.0	147	75	125	12	20	S
Cadmium	22.0	mg/kg	1.0	88	75	125	2.3	20	
Chromium	63.5	mg/kg	1.0	103	75	125	1.2	20	
Cobalt	52.4	mg/kg	1.0	92	75	125	1.7	20	
Lead	58.4	mg/kg	1.1	93	75	125	1.0	20	
Manganese	646	mg/kg	1.0	109	75	125	3.6	20	
Molybdenum	49.3	mg/kg	1.0	98	75	125	2.8	20	
Selenium	45.9	mg/kg	2.5	92	75	125	3.2	20	
Thallium	47.2	mg/kg	1.0	95	75	125	3.4	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **SW6020**								Analytical Run: ICPMS207-B_180529A	
Lab ID: **ICSA**	Interference Check Sample A								05/29/18 14:50
Antimony	0.0000811	mg/L	0.0010						
Arsenic	0.000169	mg/L	0.0010						
Barium	0.0000965	mg/L	0.0010						
Beryllium	0.0000196	mg/L	0.0010						
Cadmium	0.000137	mg/L	0.0010						
Chromium	0.000691	mg/L	0.0010						
Cobalt	0.000175	mg/L	0.0010						
Lead	0.000210	mg/L	0.0010						
Manganese	0.000159	mg/L	0.0010						
Molybdenum	0.758	mg/L	0.0010	95	80	120			
Selenium	0.000203	mg/L	0.0010						
Thallium	0.0000352	mg/L	0.0010						
Lab ID: **ICSAB**	Interference Check Sample AB								05/29/18 14:52
Antimony	0.0000561	mg/L	0.0010						
Arsenic	0.0101	mg/L	0.0010	101	70	130			
Barium	0.0000871	mg/L	0.0010						
Beryllium	0.0000130	mg/L	0.0010						
Cadmium	0.00977	mg/L	0.0010	98	70	130			
Chromium	0.0192	mg/L	0.0010	96	70	130			
Cobalt	0.0198	mg/L	0.0010	99	70	130			
Lead	0.000204	mg/L	0.0010						
Manganese	0.0206	mg/L	0.0010	103	70	130			
Molybdenum	0.784	mg/L	0.0010	98	70	130			
Selenium	0.00914	mg/L	0.0010	91	70	130			
Thallium	0.0000178	mg/L	0.0010						
Lab ID: **QCS**	Initial Calibration Verification Standard								05/29/18 16:59
Antimony	0.0501	mg/L	0.0010	100	90	110			
Arsenic	0.0495	mg/L	0.0010	99	90	110			
Barium	0.0504	mg/L	0.0010	101	90	110			
Beryllium	0.0247	mg/L	0.0010	99	90	110			
Cadmium	0.0256	mg/L	0.0010	102	90	110			
Chromium	0.0488	mg/L	0.0010	98	90	110			
Cobalt	0.0508	mg/L	0.0010	102	90	110			
Lead	0.0507	mg/L	0.0010	101	90	110			
Manganese	0.248	mg/L	0.0010	99	90	110			
Molybdenum	0.0472	mg/L	0.0010	94	90	110			
Selenium	0.0480	mg/L	0.0010	96	90	110			
Thallium	0.0490	mg/L	0.0010	98	90	110			
Method: **SW6020**								Batch: 121653	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: 121653	
Lab ID: MB-121653	Method Blank				Run: ICPMS207-B_180529A			05/29/18 17:08	
Antimony	ND	mg/kg	0.08						
Arsenic	ND	mg/kg	0.6						
Barium	ND	mg/kg	0.1						
Beryllium	ND	mg/kg	0.02						
Cadmium	ND	mg/kg	0.03						
Chromium	ND	mg/kg	0.2						
Cobalt	ND	mg/kg	0.03						
Lead	ND	mg/kg	0.4						
Manganese	ND	mg/kg	0.4						
Molybdenum	0.06	mg/kg	0.04						
Selenium	ND	mg/kg	1						
Thallium	ND	mg/kg	0.01						
Lab ID: SRM3-1212653	Standard Reference Material				Run: ICPMS207-B_180529A			05/29/18 17:11	
Antimony	57.5	mg/kg	1.0	24	0	120			
Arsenic	178	mg/kg	1.5	91	71	120			
Barium	173	mg/kg	1.0	92	78	120			
Beryllium	75.6	mg/kg	1.0	90	76	120			
Cadmium	94.1	mg/kg	1.0	95	73.2	120			
Chromium	111	mg/kg	1.0	95	73	120			
Cobalt	110	mg/kg	1.0	102	74	120			
Lead	101	mg/kg	1.0	96	74	120			
Manganese	439	mg/kg	1.0	101	80	120			
Molybdenum	115	mg/kg	1.0	90	66	120			
Selenium	191	mg/kg	2.4	93	71	120			
Thallium	95.7	mg/kg	1.0	96	71	120			
Lab ID: B18051240-138ADIL	Serial Dilution				Run: ICPMS207-B_180529A			05/29/18 18:21	
Antimony	ND	mg/kg	1.0					10	
Arsenic	ND	mg/kg	7.8					10	
Barium	145	mg/kg	1.5				8.3	10	
Beryllium	0.410	mg/kg	1.0					10	N
Cadmium	ND	mg/kg	1.0					10	
Chromium	10.1	mg/kg	2.4					10	N
Cobalt	5.80	mg/kg	1.0				10	10	
Lead	8.49	mg/kg	5.4					10	N
Manganese	267	mg/kg	5.1				7.8	10	
Molybdenum	0.723	mg/kg	1.0					10	N
Selenium	ND	mg/kg	12					10	
Thallium	ND	mg/kg	1.0					10	
Lab ID: B18051240-138APDS1	Post Digestion/Distillation Spike				Run: ICPMS207-B_180529A			05/29/18 18:24	
Antimony	11.8	mg/kg	1.0	95	75	125			
Arsenic	18.4	mg/kg	1.6	95	75	125			

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Batch: 121653
Lab ID: B18051240-138APDS1	Post Digestion/Distillation Spike				Run: ICPMS207-B_180529A				05/29/18 18:24
Barium	170	mg/kg	1.0		75	125			A
Beryllium	10.5	mg/kg	1.0	81	75	125			
Cadmium	11.9	mg/kg	1.0	95	75	125			
Chromium	22.7	mg/kg	1.0	89	75	125			
Cobalt	18.0	mg/kg	1.0	93	75	125			
Lead	21.6	mg/kg	1.1	96	75	125			
Manganese	300	mg/kg	1.0		75	125			A
Molybdenum	12.8	mg/kg	1.0	97	75	125			
Selenium	11.3	mg/kg	2.5	91	75	125			
Thallium	11.7	mg/kg	1.0	94	75	125			
Lab ID: B18051240-138AMS3	Sample Matrix Spike				Run: ICPMS207-B_180529A				05/29/18 18:27
Antimony	16.3	mg/kg	1.0	34	75	125			S
Arsenic	57.0	mg/kg	1.5	105	75	125			
Barium	234	mg/kg	1.0	157	75	125			S
Beryllium	21.2	mg/kg	1.0	86	75	125			
Cadmium	23.6	mg/kg	1.0	98	75	125			
Chromium	64.4	mg/kg	1.0	110	75	125			
Cobalt	54.2	mg/kg	1.0	99	75	125			
Lead	59.5	mg/kg	1.1	103	75	125			
Manganese	546	mg/kg	1.0	107	75	125			
Molybdenum	49.3	mg/kg	1.0	101	75	125			
Selenium	46.4	mg/kg	2.5	96	75	125			
Thallium	51.2	mg/kg	1.0	106	75	125			
Lab ID: B18051240-138AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS207-B_180529A				05/29/18 18:29
Antimony	16.1	mg/kg	1.0	33	75	125	1.6	20	S
Arsenic	56.3	mg/kg	1.5	103	75	125	1.1	20	
Barium	253	mg/kg	1.0	197	75	125	7.9	20	S
Beryllium	21.0	mg/kg	1.0	85	75	125	0.9	20	
Cadmium	23.7	mg/kg	1.0	98	75	125	0.6	20	
Chromium	63.2	mg/kg	1.0	107	75	125	1.9	20	
Cobalt	54.9	mg/kg	1.0	101	75	125	1.4	20	
Lead	58.9	mg/kg	1.1	102	75	125	0.9	20	
Manganese	584	mg/kg	1.0	123	75	125	6.8	20	
Molybdenum	49.3	mg/kg	1.0	101	75	125	0.2	20	
Selenium	46.6	mg/kg	2.5	97	75	125	0.4	20	
Thallium	49.9	mg/kg	1.0	103	75	125	2.4	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

S - Spike recovery outside of advisory limits.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **SW6020**								Analytical Run: ICPMS207-B_180530A	
Lab ID: **ICSA**	Interference Check Sample A								05/30/18 15:24
Antimony	0.00268	mg/L	0.0010						
Arsenic	0.0000624	mg/L	0.0010						
Barium	0.0000214	mg/L	0.0010						
Beryllium	0.0000184	mg/L	0.0010						
Cadmium	0.0000855	mg/L	0.0010						
Chromium	0.000907	mg/L	0.0010						
Cobalt	0.000103	mg/L	0.0010						
Lead	0.000220	mg/L	0.0010						
Manganese	0.000219	mg/L	0.0010						
Molybdenum	0.798	mg/L	0.0010	100	80	120			
Selenium	0.000240	mg/L	0.0010						
Thallium	0.0000405	mg/L	0.0010						
Lab ID: **ICSAB**	Interference Check Sample AB								05/30/18 15:26
Antimony	0.00117	mg/L	0.0010						
Arsenic	0.00927	mg/L	0.0010	93	70	130			
Barium	-7.41E-06	mg/L	0.0010						
Beryllium	3.38E-06	mg/L	0.0010						
Cadmium	0.00942	mg/L	0.0010	94	70	130			
Chromium	0.0191	mg/L	0.0010	96	70	130			
Cobalt	0.0198	mg/L	0.0010	99	70	130			
Lead	0.000198	mg/L	0.0010						
Manganese	0.0186	mg/L	0.0010	93	70	130			
Molybdenum	0.804	mg/L	0.0010	100	70	130			
Selenium	0.00940	mg/L	0.0010	94	70	130			
Thallium	7.04E-06	mg/L	0.0010						
Lab ID: **QCS**	Initial Calibration Verification Standard								05/30/18 14:33
Antimony	0.0498	mg/L	0.0010	100	90	110			
Arsenic	0.0503	mg/L	0.0010	101	90	110			
Barium	0.0495	mg/L	0.0010	99	90	110			
Beryllium	0.0249	mg/L	0.0010	99	90	110			
Cadmium	0.0251	mg/L	0.0010	101	90	110			
Chromium	0.0503	mg/L	0.0010	101	90	110			
Cobalt	0.0518	mg/L	0.0010	103	90	110			
Lead	0.0486	mg/L	0.0010	97	90	110			
Manganese	0.254	mg/L	0.0010	102	90	110			
Molybdenum	0.0471	mg/L	0.0010	94	90	110			
Selenium	0.0504	mg/L	0.0010	101	90	110			
Thallium	0.0487	mg/L	0.0010	97	90	110			
Method: **SW6020**								Batch: 121526	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Batch: 121526
Lab ID: MB-121526	Method Blank				Run: ICPMS207-B_180530A				05/31/18 02:19
Antimony	ND	mg/kg	0.08						
Arsenic	ND	mg/kg	0.6						
Barium	ND	mg/kg	0.1						
Beryllium	ND	mg/kg	0.02						
Cadmium	ND	mg/kg	0.03						
Chromium	ND	mg/kg	0.2						
Cobalt	ND	mg/kg	0.03						
Lead	ND	mg/kg	0.4						
Manganese	ND	mg/kg	0.4						
Molybdenum	0.05	mg/kg	0.04						
Selenium	ND	mg/kg	1						
Thallium	ND	mg/kg	0.01						
Method: SW6020									Batch: 121592
Lab ID: MB-121592	Method Blank				Run: ICPMS207-B_180530A				05/31/18 02:24
Antimony	ND	mg/kg	0.08						
Arsenic	ND	mg/kg	0.6						
Barium	ND	mg/kg	0.1						
Beryllium	ND	mg/kg	0.02						
Cadmium	ND	mg/kg	0.03						
Chromium	ND	mg/kg	0.2						
Cobalt	ND	mg/kg	0.03						
Lead	ND	mg/kg	0.4						
Manganese	0.4	mg/kg	0.4						
Molybdenum	ND	mg/kg	0.04						
Selenium	ND	mg/kg	1						
Thallium	ND	mg/kg	0.01						
Lab ID: SRM3-121592	Standard Reference Material				Run: ICPMS207-B_180530A				05/31/18 02:27
Antimony	61.9	mg/kg	1.0	26	0	120			
Arsenic	189	mg/kg	1.6	96	71	120			
Barium	177	mg/kg	1.0	95	78	120			
Beryllium	70.4	mg/kg	1.0	84	76	120			
Cadmium	95.4	mg/kg	1.0	96	73.2	120			
Chromium	126	mg/kg	1.0	107	73	120			
Cobalt	106	mg/kg	1.0	99	74	120			
Lead	103	mg/kg	1.1	98	74	120			
Manganese	485	mg/kg	1.0	112	80	120			
Molybdenum	117	mg/kg	1.0	92	66	120			
Selenium	203	mg/kg	2.5	99	71	120			
Thallium	97.0	mg/kg	1.0	98	71	120			

Qualifiers:

RL - Analyte reporting limit.
ND - Not detected at the reporting limit.
MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: 121592	
Lab ID: B18051240-098ADIL	Serial Dilution				Run: ICPMS207-B_180530A			05/31/18 03:24	
Antimony	ND	mg/kg	1.0					10	
Arsenic	12.4	mg/kg	7.6					10	N
Barium	132	mg/kg	1.5				1.8	10	
Beryllium	0.691	mg/kg	1.0					10	N
Cadmium	ND	mg/kg	1.0					10	
Chromium	16.9	mg/kg	2.3					10	N
Cobalt	7.07	mg/kg	1.0				0.5	10	
Lead	13.4	mg/kg	5.2					10	N
Manganese	350	mg/kg	5.0				7.0	10	
Molybdenum	0.791	mg/kg	1.0					10	N
Selenium	ND	mg/kg	12					10	
Thallium	0.187	mg/kg	1.0					10	N
Lab ID: B18051240-098APDS1	Post Digestion/Distillation Spike				Run: ICPMS207-B_180530A			05/31/18 03:27	
Antimony	11.5	mg/kg	1.0	93	75	125			
Arsenic	25.5	mg/kg	1.5	105	75	125			
Barium	144	mg/kg	1.0		75	125			A
Beryllium	10.4	mg/kg	1.0	81	75	125			
Cadmium	11.8	mg/kg	1.0	96	75	125			
Chromium	30.0	mg/kg	1.0	104	75	125			
Cobalt	18.6	mg/kg	1.0	96	75	125			
Lead	25.9	mg/kg	1.1	103	75	125			
Manganese	392	mg/kg	1.0		75	125			A
Molybdenum	13.0	mg/kg	1.0	99	75	125			
Selenium	12.1	mg/kg	2.5	100	75	125			
Thallium	12.7	mg/kg	1.0	104	75	125			
Lab ID: B18051240-098AMS3	Sample Matrix Spike				Run: ICPMS207-B_180530A			05/31/18 03:29	
Antimony	14.5	mg/kg	1.0	30	75	125			S
Arsenic	64.9	mg/kg	1.5	110	75	125			
Barium	189	mg/kg	1.0	125	75	125			
Beryllium	21.5	mg/kg	1.0	88	75	125			
Cadmium	23.4	mg/kg	1.0	98	75	125			
Chromium	76.6	mg/kg	1.0	124	75	125			
Cobalt	53.9	mg/kg	1.0	98	75	125			
Lead	63.3	mg/kg	1.0	105	75	125			
Manganese	634	mg/kg	1.0	109	75	125			
Molybdenum	48.2	mg/kg	1.0	99	75	125			
Selenium	46.0	mg/kg	2.4	97	75	125			
Thallium	49.2	mg/kg	1.0	103	75	125			
Lab ID: B18051240-098AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS207-B_180530A			05/31/18 03:32	
Antimony	14.1	mg/kg	1.0	29	75	125	3.1	20	S
Arsenic	63.5	mg/kg	1.5	107	75	125	2.2	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: 121592	
Lab ID: B18051240-098AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS207-B_180530A			05/31/18 03:32	
Barium	193	mg/kg	1.0	134	75	125	2.3	20	S
Beryllium	21.3	mg/kg	1.0	87	75	125	0.9	20	
Cadmium	23.9	mg/kg	1.0	100	75	125	2.2	20	
Chromium	77.3	mg/kg	1.0	126	75	125	0.8	20	S
Cobalt	53.9	mg/kg	1.0	99	75	125	0.0	20	
Lead	61.8	mg/kg	1.0	102	75	125	2.3	20	
Manganese	697	mg/kg	1.0	136	75	125	9.4	20	S
Molybdenum	47.6	mg/kg	1.0	98	75	125	1.4	20	
Selenium	47.1	mg/kg	2.4	99	75	125	2.3	20	
Thallium	47.9	mg/kg	1.0	101	75	125	2.6	20	
Method: SW6020								Batch: 121652	
Lab ID: MB-121652	Method Blank				Run: ICPMS207-B_180530A			05/31/18 03:34	
Antimony	ND	mg/kg	0.08						
Arsenic	ND	mg/kg	0.6						
Barium	ND	mg/kg	0.1						
Beryllium	ND	mg/kg	0.02						
Cadmium	ND	mg/kg	0.03						
Chromium	ND	mg/kg	0.2						
Cobalt	ND	mg/kg	0.03						
Lead	ND	mg/kg	0.4						
Manganese	ND	mg/kg	0.4						
Molybdenum	0.1	mg/kg	0.04						
Selenium	ND	mg/kg	1						
Thallium	0.03	mg/kg	0.01						
Lab ID: SRM3-121652	Standard Reference Material				Run: ICPMS207-B_180530A			05/31/18 03:36	
Antimony	62.3	mg/kg	1.0	26	0	93			
Arsenic	190	mg/kg	1.5	97	71	105			
Barium	179	mg/kg	1.0	96	78	113			
Beryllium	72.3	mg/kg	1.0	87	76	108			
Cadmium	96.2	mg/kg	1.0	97	73.2	105			
Chromium	126	mg/kg	1.0	107	73	109			
Cobalt	108	mg/kg	1.0	100	74	116			
Lead	102	mg/kg	1.1	97	74	109			
Manganese	479	mg/kg	1.0	110	81	117			
Molybdenum	119	mg/kg	1.0	94	66	104			
Selenium	206	mg/kg	2.5	100	71	111			
Thallium	98.1	mg/kg	1.0	99	71	108			
Lab ID: B18051240-118ADIL	Serial Dilution				Run: ICPMS207-B_180530A			05/31/18 04:39	
Antimony	ND	mg/kg	1.0					10	
Arsenic	8.71	mg/kg	7.7					10	N

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration

S - Spike recovery outside of advisory limits.

ND - Not detected at the reporting limit.
N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: 121652	
Lab ID: B18051240-118ADIL	Serial Dilution				Run: ICPMS207-B_180530A			05/31/18 04:39	
Barium	113	mg/kg	1.5				0.5	10	
Beryllium	0.530	mg/kg	1.0					10	N
Cadmium	ND	mg/kg	1.0					10	
Chromium	13.5	mg/kg	2.3					10	N
Cobalt	6.62	mg/kg	1.0				2.7	10	
Lead	11.6	mg/kg	5.3					10	N
Manganese	412	mg/kg	5.1				5.3	10	
Molybdenum	0.516	mg/kg	1.0					10	N
Selenium	ND	mg/kg	12					10	
Thallium	ND	mg/kg	1.0					10	
Lab ID: B18051240-118APDS1	Post Digestion/Distillation Spike				Run: ICPMS207-B_180530A			05/31/18 04:42	
Antimony	11.2	mg/kg	1.0	91	75	125			
Arsenic	21.5	mg/kg	1.6	104	75	125			
Barium	123	mg/kg	1.0		75	125			A
Beryllium	10.4	mg/kg	1.0	81	75	125			
Cadmium	11.6	mg/kg	1.0	93	75	125			
Chromium	26.0	mg/kg	1.0	102	75	125			
Cobalt	17.9	mg/kg	1.0	94	75	125			
Lead	23.6	mg/kg	1.1	95	75	125			
Manganese	444	mg/kg	1.0		75	125			A
Molybdenum	12.9	mg/kg	1.0	98	75	125			
Selenium	12.2	mg/kg	2.5	99	75	125			
Thallium	12.5	mg/kg	1.0	101	75	125			
Lab ID: B18051240-118AMS3	Sample Matrix Spike				Run: ICPMS207-B_180530A			05/31/18 04:49	
Antimony	16.2	mg/kg	1.0	33	75	125			S
Arsenic	60.9	mg/kg	1.6	105	75	125			
Barium	218	mg/kg	1.0	212	75	125			S
Beryllium	21.5	mg/kg	1.0	84	75	125			
Cadmium	24.0	mg/kg	1.0	96	75	125			
Chromium	73.8	mg/kg	1.0	121	75	125			
Cobalt	54.3	mg/kg	1.0	96	75	125			
Lead	61.5	mg/kg	1.1	100	75	125			
Manganese	702	mg/kg	1.0	108	75	125			
Molybdenum	49.3	mg/kg	1.0	97	75	125			
Selenium	48.8	mg/kg	2.5	98	75	125			
Thallium	50.4	mg/kg	1.0	101	75	125			
Lab ID: B18051240-118AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS207-B_180530A			05/31/18 04:51	
Antimony	16.2	mg/kg	1.0	33	75	125	0.3	20	S
Arsenic	62.2	mg/kg	1.6	108	75	125	2.1	20	
Barium	192	mg/kg	1.0	160	75	125	13	20	S
Beryllium	21.7	mg/kg	1.0	86	75	125	1.3	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Batch: 121652
Lab ID: B18051240-118AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS207-B_180530A				05/31/18 04:51
Cadmium	24.1	mg/kg	1.0	97	75	125	0.4	20	
Chromium	76.7	mg/kg	1.0	128	75	125	3.8	20	S
Cobalt	56.0	mg/kg	1.0	100	75	125	3.1	20	
Lead	62.6	mg/kg	1.1	102	75	125	1.9	20	
Manganese	758	mg/kg	1.0	131	75	125	7.6	20	S
Molybdenum	49.8	mg/kg	1.0	99	75	125	1.0	20	
Selenium	50.9	mg/kg	2.5	103	75	125	4.2	20	
Thallium	50.6	mg/kg	1.0	102	75	125	0.4	20	
Method: SW6020									Batch: 121700
Lab ID: MB-121700	Method Blank				Run: ICPMS207-B_180530A				05/31/18 04:54
Antimony	ND	mg/kg	0.08						
Arsenic	ND	mg/kg	0.6						
Barium	ND	mg/kg	0.1						
Beryllium	ND	mg/kg	0.02						
Cadmium	ND	mg/kg	0.03						
Chromium	ND	mg/kg	0.2						
Cobalt	ND	mg/kg	0.03						
Lead	ND	mg/kg	0.4						
Manganese	0.7	mg/kg	0.4						
Molybdenum	0.1	mg/kg	0.04						
Selenium	ND	mg/kg	1						
Thallium	0.03	mg/kg	0.01						
Lab ID: SRM3-121700	Standard Reference Material				Run: ICPMS207-B_180530A				05/31/18 04:56
Antimony	60.8	mg/kg	1.0	25	0	93			
Arsenic	186	mg/kg	1.5	95	71	105			
Barium	178	mg/kg	1.0	95	78	113			
Beryllium	72.9	mg/kg	1.0	87	76	108			
Cadmium	95.0	mg/kg	1.0	96	73.2	105			
Chromium	125	mg/kg	1.0	106	73	109			
Cobalt	108	mg/kg	1.0	100	74	116			
Lead	102	mg/kg	1.0	97	74	109			
Manganese	466	mg/kg	1.0	107	81	117			
Molybdenum	118	mg/kg	1.0	93	66	104			
Selenium	211	mg/kg	2.4	103	71	111			
Thallium	97.9	mg/kg	1.0	99	71	108			
Lab ID: B18051240-153ADIL	Serial Dilution				Run: ICPMS207-B_180530A				05/31/18 05:42
Antimony	ND	mg/kg	1.0					10	
Arsenic	ND	mg/kg	7.8					10	
Barium	154	mg/kg	1.5				0.2	10	
Beryllium	0.457	mg/kg	1.0					10	N

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration

S - Spike recovery outside of advisory limits.

ND - Not detected at the reporting limit.
N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020								Batch: 121700	
Lab ID: B18051240-153ADIL	Serial Dilution				Run: ICPMS207-B_180530A			05/31/18 05:42	
Cadmium	ND	mg/kg	1.0					10	
Chromium	13.5	mg/kg	2.4					10	N
Cobalt	6.45	mg/kg	1.0				5.0	10	
Lead	10.9	mg/kg	5.3					10	N
Manganese	314	mg/kg	5.1				1.5	10	
Molybdenum	ND	mg/kg	1.0					10	
Selenium	ND	mg/kg	12					10	
Thallium	ND	mg/kg	1.0					10	
Lab ID: B18051240-153APDS1	Post Digestion/Distillation Spike				Run: ICPMS207-B_180530A			05/31/18 05:49	
Antimony	11.5	mg/kg	1.0	93	75	125			
Arsenic	19.5	mg/kg	1.6	101	75	125			
Barium	164	mg/kg	1.0		75	125			A
Beryllium	10.1	mg/kg	1.0	78	75	125			
Cadmium	11.7	mg/kg	1.0	93	75	125			
Chromium	25.2	mg/kg	1.0	99	75	125			
Cobalt	17.9	mg/kg	1.0	95	75	125			
Lead	22.9	mg/kg	1.1	97	75	125			
Manganese	334	mg/kg	1.0		75	125			A
Molybdenum	12.9	mg/kg	1.0	98	75	125			
Selenium	11.8	mg/kg	2.5	95	75	125			
Thallium	12.8	mg/kg	1.0	102	75	125			
Lab ID: B18051240-153AMS3	Sample Matrix Spike				Run: ICPMS207-B_180530A			05/31/18 05:52	
Antimony	16.9	mg/kg	1.0	35	75	125			S
Arsenic	56.8	mg/kg	1.5	104	75	125			
Barium	208	mg/kg	1.0	113	75	125			
Beryllium	20.0	mg/kg	1.0	81	75	125			
Cadmium	23.1	mg/kg	1.0	96	75	125			
Chromium	66.9	mg/kg	1.0	112	75	125			
Cobalt	50.9	mg/kg	1.0	93	75	125			
Lead	58.3	mg/kg	1.1	99	75	125			
Manganese	579	mg/kg	1.0	109	75	125			
Molybdenum	47.8	mg/kg	1.0	98	75	125			
Selenium	47.2	mg/kg	2.4	98	75	125			
Thallium	47.7	mg/kg	1.0	99	75	125			
Lab ID: B18051240-153AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS207-B_180530A			05/31/18 05:54	
Antimony	16.2	mg/kg	1.0	34	75	125	3.9	20	S
Arsenic	57.3	mg/kg	1.5	106	75	125	0.8	20	
Barium	249	mg/kg	1.0	201	75	125	18	20	S
Beryllium	20.0	mg/kg	1.0	83	75	125	0.3	20	
Cadmium	22.7	mg/kg	1.0	95	75	125	1.7	20	
Chromium	66.1	mg/kg	1.0	112	75	125	1.1	20	

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Batch: 121700
Lab ID: B18051240-153AMSD3	Sample Matrix Spike Duplicate				Run: ICPMS207-B_180530A				05/31/18 05:54
Cobalt	51.0	mg/kg	1.0	95	75	125	0.2	20	
Lead	57.8	mg/kg	1.0	99	75	125	0.8	20	
Manganese	579	mg/kg	1.0	110	75	125	0.0	20	
Molybdenum	48.6	mg/kg	1.0	101	75	125	1.5	20	
Selenium	46.9	mg/kg	2.4	99	75	125	0.6	20	
Thallium	47.6	mg/kg	1.0	100	75	125	0.1	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **SW7471B**								Analytical Run: HGCV202-B_180518A	
Lab ID: **ICV**	Initial Calibration Verification Standard							05/18/18 09:18	
Mercury	0.00201	mg/kg	1.0	100	90	110			
Method: **SW7471B**								Batch: 121493	
Lab ID: **MB-121493**	Method Blank				Run: HGCV202-B_180518A			05/18/18 09:23	
Mercury	ND	mg/kg	0.005						
Lab ID: **LCS3-121493**	Laboratory Control Sample				Run: HGCV202-B_180518A			05/18/18 09:25	
Mercury	0.218	mg/kg	1.0	109	80	120			
Lab ID: **B18051240-008ADIL**	Serial Dilution				Run: HGCV202-B_180518A			05/18/18 10:05	
Mercury	ND	mg/kg	1.0					10	
Lab ID: **B18051240-008AMS3**	Sample Matrix Spike				Run: HGCV202-B_180518A			05/18/18 10:06	
Mercury	0.217	mg/kg	1.0	104	80	120			
Lab ID: **B18051240-008AMSD3**	Sample Matrix Spike Duplicate				Run: HGCV202-B_180518A			05/18/18 10:08	
Mercury	0.217	mg/kg	1.0	104	80	120		20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW7471B								Analytical Run: HGCV202-B_180522A	
Lab ID: ICV	Initial Calibration Verification Standard							05/22/18 09:21	
Mercury	0.00197	mg/kg	1.0	99	90	110			
Method: SW7471B								Batch: 121554	
Lab ID: MB-121554	Method Blank				Run: HGCV202-B_180522A			05/22/18 14:29	
Mercury	ND	mg/kg	0.005						
Lab ID: LCS3-121554	Laboratory Control Sample				Run: HGCV202-B_180522A			05/22/18 14:30	
Mercury	0.203	mg/kg	1.0	101	80	120			
Lab ID: B18051240-029ADIL	Serial Dilution				Run: HGCV202-B_180522A			05/22/18 15:08	
Mercury	ND	mg/kg	1.0					10	
Lab ID: B18051240-029AMS3	Sample Matrix Spike				Run: HGCV202-B_180522A			05/22/18 15:10	
Mercury	0.210	mg/kg	1.0	100	80	120			
Lab ID: B18051240-029AMSD3	Sample Matrix Spike Duplicate				Run: HGCV202-B_180522A			05/22/18 15:12	
Mercury	0.216	mg/kg	1.0	102	80	120		20	
Method: SW7471B								Batch: 121570	
Lab ID: MB-121570	Method Blank				Run: HGCV202-B_180522A			05/22/18 10:20	
Mercury	ND	mg/kg	0.005						
Lab ID: LCS3-121570	Laboratory Control Sample				Run: HGCV202-B_180522A			05/22/18 10:22	
Mercury	0.207	mg/kg	1.0	104	80	120			
Lab ID: B18051240-048ADIL	Serial Dilution				Run: HGCV202-B_180522A			05/22/18 11:01	
Mercury	ND	mg/kg	1.0					10	
Lab ID: B18051240-048AMS3	Sample Matrix Spike				Run: HGCV202-B_180522A			05/22/18 11:03	
Mercury	0.214	mg/kg	1.0	104	80	120			
Lab ID: B18051240-048AMSD3	Sample Matrix Spike Duplicate				Run: HGCV202-B_180522A			05/22/18 11:05	
Mercury	0.213	mg/kg	1.0	103	80	120		20	
Method: SW7471B								Batch: 121630	
Lab ID: MB-121630	Method Blank				Run: HGCV202-B_180522A			05/22/18 09:27	
Mercury	ND	mg/kg	0.005						
Lab ID: LCS3-121630	Laboratory Control Sample				Run: HGCV202-B_180522A			05/22/18 09:28	
Mercury	0.207	mg/kg	1.0	104	80	120			
Lab ID: B18051240-057ADIL	Serial Dilution				Run: HGCV202-B_180522A			05/22/18 09:54	
Mercury	ND	mg/kg	1.0					10	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **SW7471B**									Batch: 121630
Lab ID: **B18051240-057AMS3**	Sample Matrix Spike				Run: HGCV202-B_180522A				05/22/18 09:56
Mercury	0.211	mg/kg	1.0	100	80	120			
Lab ID: **B18051240-057AMSD3**	Sample Matrix Spike Duplicate				Run: HGCV202-B_180522A				05/22/18 09:58
Mercury	0.208	mg/kg	1.0	99	80	120		20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **SW7471B**								Analytical Run: HGCV202-B_180526A	
Lab ID: **ICV**	Initial Calibration Verification Standard							05/26/18 09:16	
Mercury	0.00195	mg/kg	1.0	97	90	110			
Method: **SW7471B**								Batch: 121676	
Lab ID: **MB-121676**	Method Blank				Run: HGCV202-B_180526A			05/26/18 09:22	
Mercury	ND	mg/kg	0.005						
Lab ID: **LCS3-121676**	Laboratory Control Sample				Run: HGCV202-B_180526A			05/26/18 09:23	
Mercury	0.208	mg/kg	1.0	104	80	120			
Lab ID: **B18051240-078ADIL**	Serial Dilution				Run: HGCV202-B_180526A			05/26/18 10:03	
Mercury	ND	mg/kg	1.0					10	
Lab ID: **B18051240-078AMS3**	Sample Matrix Spike				Run: HGCV202-B_180526A			05/26/18 10:05	
Mercury	0.208	mg/kg	1.0	104	80	120			
Lab ID: **B18051240-078AMSD3**	Sample Matrix Spike Duplicate				Run: HGCV202-B_180526A			05/26/18 10:06	
Mercury	0.213	mg/kg	1.0	104	80	120		20	
Method: **SW7471B**								Batch: 121732	
Lab ID: **MB-121732**	Method Blank				Run: HGCV202-B_180526A			05/26/18 10:56	
Mercury	ND	mg/kg	0.005						
Lab ID: **LCS3-121732**	Laboratory Control Sample				Run: HGCV202-B_180526A			05/26/18 10:58	
Mercury	0.209	mg/kg	1.0	104	80	120			
Lab ID: **B18052038-032ADIL**	Serial Dilution				Run: HGCV202-B_180526A			05/26/18 11:46	
Mercury	0.0340	mg/kg-dry	1.0					10	
Lab ID: **B18052038-032AMS3**	Sample Matrix Spike				Run: HGCV202-B_180526A			05/26/18 11:48	
Mercury	0.302	mg/kg-dry	1.0	97	80	120			
Lab ID: **B18052038-032AMSD3**	Sample Matrix Spike Duplicate				Run: HGCV202-B_180526A			05/26/18 11:49	
Mercury	0.305	mg/kg-dry	1.0	97	80	120		20	
Method: **SW7471B**								Batch: 121763	
Lab ID: **MB-121763**	Method Blank				Run: HGCV202-B_180526A			05/26/18 11:51	
Mercury	ND	mg/kg	0.005						
Lab ID: **LCS3-121763**	Laboratory Control Sample				Run: HGCV202-B_180526A			05/26/18 11:53	
Mercury	0.210	mg/kg	1.0	105	80	120			
Lab ID: **B18051240-102ADIL**	Serial Dilution				Run: HGCV202-B_180526A			05/26/18 12:46	
Mercury	ND	mg/kg	1.0					10	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW7471B									Batch: 121763
Lab ID: B18051240-102MS3	Sample Matrix Spike				Run: HGCV202-B_180526A				05/26/18 12:48
Mercury	0.209	mg/kg	1.0	100	80	120			
Lab ID: B18051240-102MSD3	Sample Matrix Spike Duplicate				Run: HGCV202-B_180526A				05/26/18 12:49
Mercury	0.217	mg/kg	1.0	105	80	120		20	
Method: SW7471B									Batch: 121778
Lab ID: MB-121778	Method Blank				Run: HGCV202-B_180526A				05/26/18 12:55
Mercury	ND	mg/kg	0.005						
Lab ID: LCS3-121778	Laboratory Control Sample				Run: HGCV202-B_180526A				05/26/18 12:56
Mercury	0.209	mg/kg	1.0	104	80	120			
Lab ID: B18051240-122ADIL	Serial Dilution				Run: HGCV202-B_180526A				05/26/18 13:36
Mercury	ND	mg/kg	1.0					10	
Lab ID: B18051240-122AMS3	Sample Matrix Spike				Run: HGCV202-B_180526A				05/26/18 13:38
Mercury	0.213	mg/kg	1.0	98	80	120			
Lab ID: B18051240-122AMSD3	Sample Matrix Spike Duplicate				Run: HGCV202-B_180526A				05/26/18 13:39
Mercury	0.216	mg/kg	1.0	98	80	120		20	
Method: SW7471B									Batch: 121819
Lab ID: MB-121819	Method Blank				Run: HGCV202-B_180526A				05/26/18 13:41
Mercury	ND	mg/kg	0.005						
Lab ID: LCS3-121819	Laboratory Control Sample				Run: HGCV202-B_180526A				05/26/18 13:43
Mercury	0.205	mg/kg	1.0	102	80	120			
Lab ID: B18051240-142ADIL	Serial Dilution				Run: HGCV202-B_180526A				05/26/18 14:26
Mercury	0.0288	mg/kg	1.0					10	
Lab ID: B18051240-142AMS3	Sample Matrix Spike				Run: HGCV202-B_180526A				05/26/18 14:27
Mercury	0.223	mg/kg	1.0	98	80	120			
Lab ID: B18051240-142AMSD3	Sample Matrix Spike Duplicate				Run: HGCV202-B_180526A				05/26/18 14:29
Mercury	0.231	mg/kg	1.0	101	80	120		20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Client: Talen Energy Supply LLC
Report Date: 06/28/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **SW7471B**								Analytical Run: HGCV202-B_180530B	
Lab ID: **ICV**	Initial Calibration Verification Standard							05/30/18 15:43	
Mercury	0.00198	mg/kg	1.0	99	90	110			
Method: **SW7471B**								Batch: 121859	
Lab ID: **MB-121859**	Method Blank				Run: HGCV202-B_180530B			05/30/18 15:48	
Mercury	ND	mg/kg	0.005						
Lab ID: **LCS3-121859**	Laboratory Control Sample				Run: HGCV202-B_180530B			05/30/18 15:50	
Mercury	0.205	mg/kg	1.0	103	80	120			
Lab ID: **B18051240-153ADIL**	Serial Dilution				Run: HGCV202-B_180530B			05/30/18 16:14	
Mercury	ND	mg/kg	1.0					10	
Lab ID: **B18051240-153AMS3**	Sample Matrix Spike				Run: HGCV202-B_180530B			05/30/18 16:15	
Mercury	0.138	mg/kg	1.0	72	80	120			S
Lab ID: **B18051240-153AMSD3**	Sample Matrix Spike Duplicate				Run: HGCV202-B_180530B			05/30/18 16:17	
Mercury	0.149	mg/kg	1.0	77	80	120			S
Lab ID: **B18051240-153AMS3**	Sample Matrix Spike				Run: HGCV202-B_180530B			05/30/18 16:55	
Mercury	0.157	mg/kg	1.0	81	80	120			
Lab ID: **B18051240-153AMSD3**	Sample Matrix Spike Duplicate				Run: HGCV202-B_180530B			05/30/18 16:57	
Mercury	0.149	mg/kg	1.0	77	80	120	0.0	20	S

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.
S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Billings, MT Branch

Revised Date: 08/06/18

Client: Talen Energy Supply LLC

Report Date: 06/29/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill

Work Order: B18051240

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: **SW6010B**									Analytical Run: ICP204-B_180803A	
Lab ID: **QCS**	Initial Calibration Verification Standard								08/03/18 13:24	
Boron		0.752	mg/L	0.10	94	90	110			
Lab ID: **ICSA**	Interference Check Sample A								08/03/18 13:28	
Boron		-0.0164	mg/L	0.10						
Lab ID: **ICSAB**	Interference Check Sample AB								08/03/18 13:32	
Boron		0.923	mg/L	0.10	92	80	120			
Method: **SW6010B**									Batch: 124048	
Lab ID: **MB-124048**	Method Blank					Run: ICP204-B_180803A			08/03/18 19:51	
Boron		0.07	mg/L	0.02						
Lab ID: **LCS-124048**	Laboratory Control Sample					Run: ICP204-B_180803A			08/03/18 19:55	
Boron		0.567	mg/L	0.050	99	80	120			
Lab ID: **LCSD-124048**	Laboratory Control Sample Duplicate					Run: ICP204-B_180803A			08/03/18 19:59	
Boron		0.551	mg/L	0.050	96	80	120	2.9	20	
Lab ID: **B18051240-050BDIL**	Serial Dilution					Run: ICP204-B_180803A			08/03/18 20:14	
Boron		6.15	mg/L	0.10				5.8	10	
Lab ID: **B18051240-050BMS3**	Sample Matrix Spike					Run: ICP204-B_180803A			08/03/18 20:18	
Boron		6.31	mg/L	0.050		75	125			A
Lab ID: **B18051240-052BMS3**	Sample Matrix Spike					Run: ICP204-B_180803A			08/03/18 20:26	
Boron		4.05	mg/L	0.050		75	125			A
Lab ID: **B18051240-061BMS3**	Sample Matrix Spike					Run: ICP204-B_180803A			08/03/18 20:34	
Boron		2.92	mg/L	0.050		75	125			A

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

A - The analyte level was greater than four times the spike level. In accordance with the method % recovery is not calculated.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Revised Date: 08/06/18

Client: Talen Energy Supply LLC

Report Date: 06/29/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill

Work Order: B18051240

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Analytical Run: ICPMS206-B_180802A	
Lab ID: QCS	4	Initial Calibration Verification Standard							08/02/18 11:42	
Arsenic		0.0508	mg/L	0.0010	102	90	110			
Barium		0.0501	mg/L	0.0010	100	90	110			
Cobalt		0.0516	mg/L	0.0010	103	90	110			
Manganese		0.254	mg/L	0.0010	102	90	110			
Lab ID: ICSA	4	Interference Check Sample A							08/02/18 12:11	
Arsenic		0.0000296	mg/L	0.0010						
Barium		0.0000626	mg/L	0.0010						
Cobalt		0.000127	mg/L	0.0010						
Manganese		0.000138	mg/L	0.0010						
Lab ID: ICSAB	4	Interference Check Sample AB							08/02/18 12:16	
Arsenic		0.0100	mg/L	0.0010	100	70	130			
Barium		0.0000626	mg/L	0.0010						
Cobalt		0.0190	mg/L	0.0010	95	70	130			
Manganese		0.0191	mg/L	0.0010	96	70	130			
Method: SW6020									Batch: 124048	
Lab ID: MB-124048	4	Method Blank				Run: ICPMS206-B_180802A			08/03/18 04:01	
Arsenic		ND	mg/L	0.0003						
Barium		0.002	mg/L	0.0002						
Cobalt		ND	mg/L	0.00007						
Manganese		ND	mg/L	0.0002						
Lab ID: LCS-124048	4	Laboratory Control Sample				Run: ICPMS206-B_180802A			08/03/18 04:05	
Arsenic		0.548	mg/L	0.0010	110	80	120			
Barium		5.89	mg/L	0.050	107	80	120			
Cobalt		0.520	mg/L	0.0050	104	80	120			
Manganese		2.51	mg/L	0.0010	100	80	120			
Lab ID: LCSD-124048	4	Laboratory Control Sample Duplicate				Run: ICPMS206-B_180802A			08/03/18 04:09	
Arsenic		0.535	mg/L	0.0010	107	80	120	2.4	20	
Barium		5.68	mg/L	0.050	103	80	120	3.6	20	
Cobalt		0.505	mg/L	0.0050	101	80	120	2.9	20	
Manganese		2.48	mg/L	0.0010	99	80	120	1.2	20	
Lab ID: B18051240-020BDIL	4	Serial Dilution				Run: ICPMS206-B_180802A			08/03/18 04:22	
Arsenic		ND	mg/L	0.0013					10	
Barium		0.0144	mg/L	0.050					10	
Cobalt		0.000469	mg/L	0.0050					10	N
Manganese		ND	mg/L	0.0011					10	
Lab ID: B18051240-020BMS3	4	Sample Matrix Spike				Run: ICPMS206-B_180802A			08/03/18 05:25	
Arsenic		0.532	mg/L	0.0010	106	75	125			
Barium		5.80	mg/L	0.050	105	75	125			
Cobalt		0.496	mg/L	0.0050	99	75	125			

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Revised Date: 08/06/18

Client: Talen Energy Supply LLC

Report Date: 06/29/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill

Work Order: B18051240

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020										Batch: 124048
Lab ID: B18051240-020BMS3	4	Sample Matrix Spike				Run: ICPMS206-B_180802A				08/03/18 05:25
Manganese		2.44	mg/L	0.0010	98	75	125			
Lab ID: B18051240-023BMS3	4	Sample Matrix Spike				Run: ICPMS206-B_180802A				08/03/18 05:29
Arsenic		0.548	mg/L	0.0010	109	75	125			
Barium		5.81	mg/L	0.050	106	75	125			
Cobalt		0.522	mg/L	0.0050	104	75	125			
Manganese		2.50	mg/L	0.0010	100	75	125			
Lab ID: B18051240-030BMS3	4	Sample Matrix Spike				Run: ICPMS206-B_180802A				08/03/18 05:33
Arsenic		2.71	mg/L	0.0013	108	75	125			
Barium		29.4	mg/L	0.050	107	75	125			
Cobalt		2.67	mg/L	0.0050	107	75	125			
Manganese		12.6	mg/L	0.0011	100	75	125			
Lab ID: B18051240-031BMS3	4	Sample Matrix Spike				Run: ICPMS206-B_180802A				08/03/18 05:37
Arsenic		2.74	mg/L	0.0013	109	75	125			
Barium		29.7	mg/L	0.050	108	75	125			
Cobalt		2.63	mg/L	0.0050	105	75	125			
Manganese		12.6	mg/L	0.0011	101	75	125			
Lab ID: B18051240-033BMS3	4	Sample Matrix Spike				Run: ICPMS206-B_180802A				08/03/18 05:41
Arsenic		1.06	mg/L	0.0010	106	75	125			
Barium		11.5	mg/L	0.050	105	75	125			
Cobalt		1.01	mg/L	0.0050	101	75	125			
Manganese		4.93	mg/L	0.0010	98	75	125			
Lab ID: B18051240-034BMS3	4	Sample Matrix Spike				Run: ICPMS206-B_180802A				08/03/18 06:02
Arsenic		1.07	mg/L	0.0010	106	75	125			
Barium		11.9	mg/L	0.050	108	75	125			
Cobalt		1.03	mg/L	0.0050	103	75	125			
Manganese		4.98	mg/L	0.0010	99	75	125			
Lab ID: B18051240-036BMS3	4	Sample Matrix Spike				Run: ICPMS206-B_180802A				08/03/18 06:06
Arsenic		1.06	mg/L	0.0010	106	75	125			
Barium		11.7	mg/L	0.050	106	75	125			
Cobalt		1.04	mg/L	0.0050	104	75	125			
Manganese		4.93	mg/L	0.0010	98	75	125			
Lab ID: B18051240-041BMS3	4	Sample Matrix Spike				Run: ICPMS206-B_180802A				08/03/18 06:10
Arsenic		2.69	mg/L	0.0013	107	75	125			
Barium		29.6	mg/L	0.050	108	75	125			
Cobalt		2.63	mg/L	0.0050	105	75	125			
Manganese		12.7	mg/L	0.0011	101	75	125			
Lab ID: B18051240-046BMS3	4	Sample Matrix Spike				Run: ICPMS206-B_180802A				08/03/18 06:14
Arsenic		2.70	mg/L	0.0013	108	75	125			

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

QA/QC Summary Report

Prepared by Billings, MT Branch

Revised Date: 08/06/18

Client: Talen Energy Supply LLC

Report Date: 06/29/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill

Work Order: B18051240

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020										Batch: 124048
Lab ID: B18051240-046BMS3	4	Sample Matrix Spike				Run: ICPMS206-B_180802A				08/03/18 06:14
Barium		29.3	mg/L	0.050	106	75	125			
Cobalt		2.62	mg/L	0.0050	104	75	125			
Manganese		12.7	mg/L	0.0011	101	75	125			
Lab ID: B18051240-050BMS3	4	Sample Matrix Spike				Run: ICPMS206-B_180802A				08/03/18 06:18
Arsenic		0.530	mg/L	0.0010	106	75	125			
Barium		5.79	mg/L	0.050	104	75	125			
Cobalt		0.508	mg/L	0.0050	102	75	125			
Manganese		2.44	mg/L	0.0010	98	75	125			
Lab ID: B18051240-052BMS3	4	Sample Matrix Spike				Run: ICPMS206-B_180802A				08/03/18 06:22
Arsenic		0.534	mg/L	0.0010	106	75	125			
Barium		5.74	mg/L	0.050	103	75	125			
Cobalt		0.503	mg/L	0.0050	100	75	125			
Manganese		2.43	mg/L	0.0010	97	75	125			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Billings, MT Branch

Revised Date: 08/06/18

Client: Talen Energy Supply LLC

Report Date: 06/29/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill

Work Order: B18051240

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020									Analytical Run: ICPMS207-B_180803A	
Lab ID: ICSA	4	Interference Check Sample A							08/03/18 16:09	
Arsenic		-0.0000196	mg/L	0.0010						
Barium		0.0000932	mg/L	0.0010						
Cobalt		0.000283	mg/L	0.0010						
Manganese		0.0000112	mg/L	0.0010						
Lab ID: ICSAB	4	Interference Check Sample AB							08/03/18 16:13	
Arsenic		0.0102	mg/L	0.0010	102	70	130			
Barium		0.0000840	mg/L	0.0010						
Cobalt		0.0196	mg/L	0.0010	98	70	130			
Manganese		0.0197	mg/L	0.0010	99	70	130			
Lab ID: QCS	4	Initial Calibration Verification Standard							08/04/18 13:11	
Arsenic		0.0521	mg/L	0.0050	104	90	110			
Barium		0.0496	mg/L	0.10	99	90	110			
Cobalt		0.0494	mg/L	0.010	99	90	110			
Manganese		0.261	mg/L	0.010	105	90	110			
Method: SW6020									Batch: 124048	
Lab ID: MB-124048	4	Method Blank				Run: ICPMS207-B_180803A			08/04/18 20:18	
Arsenic		ND	mg/L	0.0003						
Barium		0.002	mg/L	0.0002						
Cobalt		0.00007	mg/L	0.00007						
Manganese		0.0005	mg/L	0.0002						
Lab ID: LCS-124048	4	Laboratory Control Sample				Run: ICPMS207-B_180803A			08/04/18 20:22	
Arsenic		0.535	mg/L	0.0010	107	80	120			
Barium		5.27	mg/L	0.050	96	80	120			
Cobalt		0.476	mg/L	0.0050	95	80	120			
Manganese		2.62	mg/L	0.0010	105	80	120			
Lab ID: LCSD-124048	4	Laboratory Control Sample Duplicate				Run: ICPMS207-B_180803A			08/04/18 20:26	
Arsenic		0.526	mg/L	0.0010	105	80	120	1.5	20	
Barium		5.31	mg/L	0.050	97	80	120	0.8	20	
Cobalt		0.474	mg/L	0.0050	95	80	120	0.3	20	
Manganese		2.57	mg/L	0.0010	103	80	120	2.0	20	
Lab ID: B18051240-119BDIL	4	Serial Dilution				Run: ICPMS207-B_180803A			08/04/18 20:38	
Arsenic		ND	mg/L	0.0067					10	
Barium		0.0362	mg/L	0.050					10	N
Cobalt		0.00218	mg/L	0.0050					10	N
Manganese		0.0252	mg/L	0.0053					10	N
Lab ID: B18051240-119BMS3	4	Sample Matrix Spike				Run: ICPMS207-B_180803A			08/04/18 21:16	
Arsenic		2.61	mg/L	0.0013	105	75	125			
Barium		26.7	mg/L	0.050	97	75	125			
Cobalt		2.37	mg/L	0.0050	95	75	125			

Qualifiers:

RL - Analyte reporting limit.

MDC - Minimum detectable concentration

ND - Not detected at the reporting limit.

N - The analyte concentration was not sufficiently high to calculate a RPD for the serial dilution test.

QA/QC Summary Report

Prepared by Billings, MT Branch

Revised Date: 08/06/18

Client: Talen Energy Supply LLC

Report Date: 06/29/18

Project: Talen Montana, LLC Soil Sampling at Historic Spill

Work Order: B18051240

Analyte	Count	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: SW6020										Batch: 124048
Lab ID: B18051240-119BMS3	4	Sample Matrix Spike				Run: ICPMS207-B_180803A				08/04/18 21:16
Manganese		12.7	mg/L	0.0011	101	75	125			
Lab ID: B18051240-120BMS3	4	Sample Matrix Spike				Run: ICPMS207-B_180803A				08/04/18 21:20
Arsenic		5.11	mg/L	0.0027	102	75	125			
Barium		52.3	mg/L	0.050	95	75	125			
Cobalt		4.77	mg/L	0.0050	95	75	125			
Manganese		25.4	mg/L	0.0021	100	75	125			
Lab ID: B18051240-136BMS3	4	Sample Matrix Spike				Run: ICPMS207-B_180803A				08/04/18 21:24
Arsenic		1.06	mg/L	0.0010	106	75	125			
Barium		10.8	mg/L	0.050	98	75	125			
Cobalt		0.942	mg/L	0.0050	94	75	125			
Manganese		5.09	mg/L	0.0010	102	75	125			
Lab ID: B18051240-141BMS3	4	Sample Matrix Spike				Run: ICPMS207-B_180803A				08/04/18 21:28
Arsenic		5.18	mg/L	0.0027	103	75	125			
Barium		54.5	mg/L	0.050	99	75	125			
Cobalt		4.79	mg/L	0.0050	96	75	125			
Manganese		25.4	mg/L	0.0021	101	75	125			
Lab ID: B18051240-150BMS3	4	Sample Matrix Spike				Run: ICPMS207-B_180803A				08/04/18 21:36
Arsenic		5.17	mg/L	0.0027	103	75	125			
Barium		54.1	mg/L	0.050	98	75	125			
Cobalt		4.85	mg/L	0.0050	97	75	125			
Manganese		25.5	mg/L	0.0021	101	75	125			

Qualifiers:

RL - Analyte reporting limit.

ND - Not detected at the reporting limit.

MDC - Minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Talen Energy Supply LLC
Report Date: 06/26/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0									Batch: RA226-8941
Lab ID: LCS-RA226-8941	Laboratory Control Sample				Run: G5000W_180522B				06/04/18 09:22
Radium 226	9.4	pCi/L		92	80	120			
Lab ID: MB-RA226-8941	Method Blank				Run: G5000W_180522B				06/04/18 09:22
Radium 226	0.2	pCi/L							
Radium 226 precision (±)	0.1	pCi/L							
Radium 226 MDC	0.2	pCi/L							
Lab ID: B18051240-013CMS	Sample Matrix Spike				Run: G5000W_180522B				06/04/18 11:20
Radium 226	19	pCi/L		92	70	130			
Lab ID: B18051240-013CMSD	Sample Matrix Spike Duplicate				Run: G5000W_180522B				06/04/18 11:20
Radium 226	19	pCi/L		93	70	130	0.8	20	
Method: E903.0									Batch: 51672
Lab ID: MB-51672	Method Blank				Run: G542M_180524E				06/05/18 12:49
Radium 226	0.006	pCi/g-dry							U
Radium 226 precision (±)	0.006	pCi/g-dry							
Radium 226 MDC	0.009	pCi/g-dry							
Lab ID: LCS1-51672	Laboratory Control Sample				Run: G542M_180524E				06/05/18 12:49
Radium 226	2.1	pCi/g-dry		84	67	120			
Lab ID: C18050562-054AMS1	Sample Matrix Spike				Run: G542M_180524E				06/05/18 12:49
Radium 226	2.0	pCi/g-dry		68	70	130			S
Lab ID: C18050562-054AMSD1	Sample Matrix Spike Duplicate				Run: G542M_180524E				06/05/18 12:49
Radium 226	2.3	pCi/g-dry		80	70	130	14	20	
Method: E903.0									Batch: 51689
Lab ID: MB-51689	Method Blank				Run: G542M_180529D				06/11/18 14:29
Radium 226	0.009	pCi/g-dry							U
Radium 226 precision (±)	0.007	pCi/g-dry							
Radium 226 MDC	0.009	pCi/g-dry							
Lab ID: LCS1-51689	Laboratory Control Sample				Run: G542M_180529D				06/11/18 14:29
Radium 226	2.1	pCi/g-dry		84	67	120			
Lab ID: B18051240-028AMS1	Sample Matrix Spike				Run: G542M_180529D				06/11/18 14:29
Radium 226	2.2	pCi/g-dry		71	70	130			
Lab ID: B18051240-028AMSD1	Sample Matrix Spike Duplicate				Run: G542M_180529D				06/11/18 14:29
Radium 226	2.6	pCi/g-dry		88	70	130	17	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
ND - Not detected at the reporting limit.
S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Talen Energy Supply LLC
Report Date: 06/26/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0									Batch: 51720
Lab ID: MB-51720	Method Blank				Run: G542M_180605B				06/13/18 14:20
Radium 226	0.008	pCi/g-dry							
Radium 226 precision (±)	0.006	pCi/g-dry							
Radium 226 MDC	0.007	pCi/g-dry							
Lab ID: LCS1-51720	Laboratory Control Sample				Run: G542M_180605B				06/13/18 14:20
Radium 226	1.9	pCi/g-dry		76	67	120			
Lab ID: B18051240-064AMS1	Sample Matrix Spike				Run: G542M_180605B				06/13/18 14:20
Radium 226	1.5	pCi/g-dry		49	70	130			S
- Spike response is not in range for this analysis. Since the LCS and the RPD recoveries are in range, the response is considered to be matrix related.									
Lab ID: B18051240-064AMSD1	Sample Matrix Spike Duplicate				Run: G542M_180605B				06/13/18 14:20
Radium 226	1.3	pCi/g-dry		45	70	130	7.9	20	S
- Spike response is not in range for this analysis. Since the LCS and the RPD recoveries are in range, the response is considered to be matrix related.									
Method: E903.0									Batch: 51704
Lab ID: MB-51704	Method Blank				Run: G542M_180606D				06/18/18 10:10
Radium 226	0.01	pCi/g-dry							
Radium 226 precision (±)	0.007	pCi/g-dry							
Radium 226 MDC	0.009	pCi/g-dry							
Lab ID: LCS1-51704	Laboratory Control Sample				Run: G542M_180606D				06/18/18 10:10
Radium 226	2.4	pCi/g-dry		95	67	120			
Lab ID: B18051240-048AMS	Sample Matrix Spike				Run: G542M_180606D				06/18/18 10:10
Radium 226	2.9	pCi/g-dry		88	70	130			
Lab ID: B18051240-048AMSD	Sample Matrix Spike Duplicate				Run: G542M_180606D				06/18/18 10:10
Radium 226	2.6	pCi/g-dry		77	70	130	12	20	
Method: E903.0									Batch: 51732
Lab ID: MB-51732	Method Blank				Run: G542M_180607A				06/19/18 11:43
Radium 226	0.004	pCi/g-dry							U
Radium 226 precision (±)	0.006	pCi/g-dry							
Radium 226 MDC	0.009	pCi/g-dry							
Lab ID: LCS1-51732	Laboratory Control Sample				Run: G542M_180607A				06/19/18 11:43
Radium 226	2.2	pCi/g-dry		92	67	120			
Lab ID: B18051240-103AMS1	Sample Matrix Spike				Run: G542M_180607A				06/19/18 11:43
Radium 226	2.6	pCi/g-dry		72	70	130			
Lab ID: B18051240-103AMS1D	Sample Matrix Spike Duplicate				Run: G542M_180607A				06/19/18 11:43
Radium 226	2.6	pCi/g-dry		76	70	130	2.5	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
U - Not detected at minimum detectable concentration
ND - Not detected at the reporting limit.
S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Talen Energy Supply LLC
Report Date: 06/26/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0									Batch: 51746
Lab ID: MB-51746	Method Blank				Run: G542M_180612A				06/20/18 12:54
Radium 226	0.01	pCi/g-dry							
Radium 226 precision (±)	0.007	pCi/g-dry							
Radium 226 MDC	0.009	pCi/g-dry							
Lab ID: LCS1-51746	Laboratory Control Sample				Run: G542M_180612A				06/20/18 12:54
Radium 226	2.2	pCi/g-dry		90	67	120			
Lab ID: B18051240-139AMS1	Sample Matrix Spike				Run: G542M_180612A				06/20/18 12:54
Radium 226	2.8	pCi/g-dry		87	70	130			
Lab ID: B18051240-139AMS1D	Sample Matrix Spike Duplicate				Run: G542M_180612A				06/20/18 12:54
Radium 226	2.6	pCi/g-dry		80	70	130	8.0	20	
Method: E903.0									Batch: 51688
Lab ID: MB-51688	Method Blank				Run: G542M-2_180529B				06/10/18 11:13
Radium 226	0.01	pCi/g-dry							
Radium 226 precision (±)	0.006	pCi/g-dry							
Radium 226 MDC	0.007	pCi/g-dry							
Lab ID: LCS1-51688	Laboratory Control Sample				Run: G542M-2_180529B				06/10/18 11:13
Radium 226	2.1	pCi/g-dry		86	67	120			
Lab ID: B18051240-007AMS1	Sample Matrix Spike				Run: G542M-2_180529B				06/10/18 11:13
Radium 226	2.1	pCi/g-dry		65	70	130			S
- Spike response is not in range for this analysis. Since the LCS and the RPD recoveries are in range, the response is considered to be matrix related.									
Lab ID: B18051240-007AMSD1	Sample Matrix Spike Duplicate				Run: G542M-2_180529B				06/10/18 11:13
Radium 226	2.2	pCi/g-dry		72	70	130	7.6	20	
Method: E903.0									Batch: 51731
Lab ID: MB-51731	Method Blank				Run: G542M-2_180606A				06/19/18 09:53
Radium 226	0.010	pCi/g-dry							
Radium 226 precision (±)	0.006	pCi/g-dry							
Radium 226 MDC	0.007	pCi/g-dry							
Lab ID: LCS1-51731	Laboratory Control Sample				Run: G542M-2_180606A				06/19/18 09:53
Radium 226	1.9	pCi/g-dry		80	67	120			
Lab ID: B18051240-085AMS1	Sample Matrix Spike				Run: G542M-2_180606A				06/19/18 09:53
Radium 226	2.2	pCi/g-dry		66	70	130			S
- Spike response is not in range for this analysis. Since the LCS and the RPD recoveries are in range, the response is considered to be matrix related.									
Lab ID: B18051240-085AMSD1	Sample Matrix Spike Duplicate				Run: G542M-2_180606A				06/19/18 09:53
Radium 226	2.3	pCi/g-dry		70	70	130	5.5	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.
S - Spike recovery outside of advisory limits.

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Talen Energy Supply LLC
Report Date: 06/26/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: E903.0									Batch: 51745
Lab ID: MB-51745	Method Blank				Run: G542M-2_180613B				06/26/18 11:25
Radium 226	0.006	pCi/g-dry							U
Radium 226 precision (±)	0.006	pCi/g-dry							
Radium 226 MDC	0.008	pCi/g-dry							
Lab ID: LCS1-51745	Laboratory Control Sample				Run: G542M-2_180613B				06/26/18 11:25
Radium 226	2.1	pCi/g-dry		87	67	120			
Lab ID: B18051240-121AMS1	Sample Matrix Spike				Run: G542M-2_180613B				06/26/18 11:25
Radium 226	2.7	pCi/g-dry		87	70	130			
Lab ID: B18051240-121AMSD1	Sample Matrix Spike Duplicate				Run: G542M-2_180613B				06/26/18 11:25
Radium 226	2.4	pCi/g-dry		75	70	130	13	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Talen Energy Supply LLC
Report Date: 06/26/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: RA-05									Batch: RA228-5779
Lab ID: LCS-228-RA226-8941	Laboratory Control Sample				Run: TENNELEC-3_180522C				05/29/18 12:26
Radium 228	9.8	pCi/L		103	80	120			
Lab ID: MB-RA226-8941	Method Blank				Run: TENNELEC-3_180522C				05/29/18 12:26
Radium 228	0.2	pCi/L							U
Radium 228 precision (±)	0.9	pCi/L							
Radium 228 MDC	1	pCi/L							
Lab ID: B18051240-070CMS	Sample Matrix Spike				Run: TENNELEC-3_180522C				05/29/18 12:26
Radium 228	16	pCi/L		90	70	130			
Lab ID: B18051240-070CMSD	Sample Matrix Spike Duplicate				Run: TENNELEC-3_180522C				05/29/18 12:26
Radium 228	16	pCi/L		87	70	130	4.0	20	
Method: RA-05									Batch: 51672
Lab ID: MB-51672	Method Blank				Run: TENNELEC-3_180524B				05/31/18 14:47
Radium 228	0.07	pCi/g-dry							U
Radium 228 precision (±)	0.05	pCi/g-dry							
Radium 228 MDC	0.08	pCi/g-dry							
Lab ID: LCS4-51672	Laboratory Control Sample				Run: TENNELEC-3_180524B				05/31/18 16:33
Radium 228	2.2	pCi/g-dry		94	80	120			
Lab ID: C18050562-055AMS4	Sample Matrix Spike				Run: TENNELEC-3_180524B				05/31/18 16:33
Radium 228	2.9	pCi/g-dry		89	70	130			
Lab ID: C18050562-055AMS4D	Sample Matrix Spike Duplicate				Run: TENNELEC-3_180524B				05/31/18 16:33
Radium 228	2.7	pCi/g-dry		84	70	130	5.4	20	
Method: RA-05									Batch: 51688
Lab ID: MB-51688	Method Blank				Run: TENNELEC-3_180529C				06/04/18 12:48
Radium 228	0.07	pCi/g-dry							
Radium 228 precision (±)	0.04	pCi/g-dry							
Radium 228 MDC	0.06	pCi/g-dry							
Lab ID: LCS4-51688	Laboratory Control Sample				Run: TENNELEC-3_180529C				06/04/18 14:22
Radium 228	1.1	pCi/g-dry		95	80	120			
Lab ID: B18051240-008AMS4	Sample Matrix Spike				Run: TENNELEC-3_180529C				06/04/18 14:21
Radium 228	1.6	pCi/g-dry		99	70	130			
Lab ID: B18051240-008AMS4D	Sample Matrix Spike Duplicate				Run: TENNELEC-3_180529C				06/04/18 14:21
Radium 228	1.6	pCi/g-dry		95	70	130	2.7	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Talen Energy Supply LLC
Report Date: 06/26/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: RA-05									Batch: 51689
Lab ID: MB-51689	Method Blank				Run: TENNELEC-3_180529D				06/06/18 14:02
Radium 228	0.06	pCi/g-dry							U
Radium 228 precision (±)	0.04	pCi/g-dry							
Radium 228 MDC	0.07	pCi/g-dry							
Lab ID: LCS4-51689	Laboratory Control Sample				Run: TENNELEC-3_180529D				06/06/18 15:40
Radium 228	2.3	pCi/g-dry		97	80	120			
Lab ID: B18051240-029AMS4	Sample Matrix Spike				Run: TENNELEC-3_180529D				06/06/18 15:40
Radium 228	2.4	pCi/g-dry		86	70	130			
Lab ID: B18051240-029AMS4D	Sample Matrix Spike Duplicate				Run: TENNELEC-3_180529D				06/06/18 15:40
Radium 228	2.6	pCi/g-dry		94	70	130	8.8	20	
Method: RA-05									Batch: 51720
Lab ID: MB-51720	Method Blank				Run: TENNELEC-3_180605B				06/08/18 12:00
Radium 228	0.02	pCi/g-dry							U
Radium 228 precision (±)	0.05	pCi/g-dry							
Radium 228 MDC	0.08	pCi/g-dry							
Lab ID: LCS4-51720	Laboratory Control Sample				Run: TENNELEC-3_180605B				06/08/18 13:34
Radium 228	2.6	pCi/g-dry		116	80	120			
Lab ID: B18051240-076AMS4	Sample Matrix Spike				Run: TENNELEC-3_180605B				06/08/18 13:34
Radium 228	2.5	pCi/g-dry		76	70	130			
Lab ID: B18051240-076AMS4D	Sample Matrix Spike Duplicate				Run: TENNELEC-3_180605B				06/08/18 13:34
Radium 228	2.6	pCi/g-dry		84	70	130	5.0	20	
Method: RA-05									Batch: 51704
Lab ID: MB-51704	Method Blank				Run: TENNELEC-3_180606A				06/13/18 12:54
Radium 228	0.05	pCi/g-dry							
Radium 228 precision (±)	0.03	pCi/g-dry							
Radium 228 MDC	0.05	pCi/g-dry							
Lab ID: LCS4-51704	Laboratory Control Sample				Run: TENNELEC-3_180606A				06/13/18 14:29
Radium 228	1.9	pCi/g-dry		82	80	120			
Lab ID: B18051240-051AMS4	Sample Matrix Spike				Run: TENNELEC-3_180606A				06/13/18 14:28
Radium 228	2.7	pCi/g-dry		83	70	130			
Lab ID: B18051240-051AMS4D	Sample Matrix Spike Duplicate				Run: TENNELEC-3_180606A				06/13/18 14:28
Radium 228	2.6	pCi/g-dry		79	70	130	3.9	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Talen Energy Supply LLC
Report Date: 06/26/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: RA-05									Batch: 51731
Lab ID: MB-51731	Method Blank				Run: TENNELEC-3_180606C				06/14/18 11:49
Radium 228	0.08	pCi/g-dry							
Radium 228 precision (±)	0.04	pCi/g-dry							
Radium 228 MDC	0.07	pCi/g-dry							
Lab ID: LCS4-51731	Laboratory Control Sample				Run: TENNELEC-3_180606C				06/14/18 13:29
Radium 228	2.1	pCi/g-dry		89	80	120			
Lab ID: B18051240-086AMS4	Sample Matrix Spike				Run: TENNELEC-3_180606C				06/14/18 13:29
Radium 228	2.6	pCi/g-dry		73	70	130			
Lab ID: B18051240-086AMS4D	Sample Matrix Spike Duplicate				Run: TENNELEC-3_180606C				06/14/18 13:29
Radium 228	2.6	pCi/g-dry		74	70	130	1.4	20	
Method: RA-05									Batch: 51732
Lab ID: MB-51732	Method Blank				Run: TENNELEC-3_180607B				06/14/18 13:32
Radium 228	0.001	pCi/g-dry							U
Radium 228 precision (±)	0.04	pCi/g-dry							
Radium 228 MDC	0.06	pCi/g-dry							
Lab ID: LCS4-51732	Laboratory Control Sample				Run: TENNELEC-3_180607B				06/14/18 15:15
Radium 228	2.5	pCi/g-dry		111	80	120			
Lab ID: B18051240-104AMS4	Sample Matrix Spike				Run: TENNELEC-3_180607B				06/14/18 15:15
Radium 228	2.7	pCi/g-dry		98	70	130			
Lab ID: B18051240-104AMS4D	Sample Matrix Spike Duplicate				Run: TENNELEC-3_180607B				06/14/18 15:15
Radium 228	2.7	pCi/g-dry		96	70	130	0.4	20	
Method: RA-05									Batch: 51746
Lab ID: MB-51746	Method Blank				Run: TENNELEC-3_180612B				06/15/18 14:17
Radium 228	0.005	pCi/g-dry							U
Radium 228 precision (±)	0.04	pCi/g-dry							
Radium 228 MDC	0.07	pCi/g-dry							
Lab ID: LCS4-51746	Laboratory Control Sample				Run: TENNELEC-3_180612B				06/15/18 15:50
Radium 228	2.2	pCi/g-dry		91	80	120			
Lab ID: C18060054-001BMS4	Sample Matrix Spike				Run: TENNELEC-3_180612B				06/15/18 15:50
Radium 228	2.2	pCi/g-dry		87	70	130			
Lab ID: C18060054-001BMS4D	Sample Matrix Spike Duplicate				Run: TENNELEC-3_180612B				06/15/18 15:50
Radium 228	2.4	pCi/g-dry		97	70	130	11	20	

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

QA/QC Summary Report

Prepared by Casper, WY Branch

Client: Talen Energy Supply LLC
Report Date: 06/26/18
Project: Talen Montana, LLC Soil Sampling at Historic Spill
Work Order: B18051240

Analyte	Result	Units	RL	%REC	Low Limit	High Limit	RPD	RPDLimit	Qual
Method: RA-05									Batch: RA228-5811
Lab ID: MB-51745	Method Blank				Run: TENNELEC-3_180613B				06/21/18 12:02
Radium 228	0.04	pCi/g-dry							U
Radium 228 precision (±)	0.04	pCi/g-dry							
Radium 228 MDC	0.07	pCi/g-dry							
Lab ID: LCS4-51745	Laboratory Control Sample				Run: TENNELEC-3_180613B				06/21/18 13:39
Radium 228	2.6	pCi/g-dry		106	80	120			
Lab ID: B18051240-122AMS4	Sample Matrix Spike				Run: TENNELEC-3_180613B				06/21/18 13:39
Radium 228	2.9	pCi/g-dry		85	70	130			

Qualifiers:

RL - Analyte reporting limit.
MDC - Minimum detectable concentration
ND - Not detected at the reporting limit.
U - Not detected at minimum detectable concentration

Work Order Receipt Checklist

Talen Energy Supply LLC

B18051240

Login completed by: Richard L. Shular
Date Received: 5/11/2018
Reviewed by: BL2000\raschim
Received by: snk
Reviewed Date: 5/17/2018
Carrier name: Hand Del

Shipping container/cooler in good condition?	Yes ☑	No ☐	Not Present ☐
Custody seals intact on all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Present ☑
Custody seals intact on all sample bottles?	Yes ☐	No ☐	Not Present ☑
Chain of custody present?	Yes ☑	No ☐	
Chain of custody signed when relinquished and received?	Yes ☑	No ☐	
Chain of custody agrees with sample labels?	Yes ☑	No ☐	
Samples in proper container/bottle?	Yes ☑	No ☐	
Sample containers intact?	Yes ☑	No ☐	
Sufficient sample volume for indicated test?	Yes ☑	No ☐	
All samples received within holding time? (Exclude analyses that are considered field parameters such as pH, DO, Res Cl, Sulfite, Ferrous Iron, etc.)	Yes ☑	No ☐	
Temp Blank received in all shipping container(s)/cooler(s)?	Yes ☐	No ☐	Not Applicable ☑
Container/Temp Blank temperature:	°C		
Water - VOA vials have zero headspace?	Yes ☐	No ☐	No VOA vials submitted ☑
Water - pH acceptable upon receipt?	Yes ☑	No ☐	Not Applicable ☐

Standard Reporting Procedures:

Lab measurement of analytes considered field parameters that require analysis within 15 minutes of sampling such as pH, Dissolved Oxygen and Residual Chlorine, are qualified as being analyzed outside of recommended holding time.

Solid/soil samples are reported on a wet weight basis (as received) unless specifically indicated. If moisture corrected, data units are typically noted as –dry. For agricultural and mining soil parameters/characteristics, all samples are dried and ground prior to sample analysis.

Contact and Corrective Action Comments:

The Temperature Blank temperature for shipping container 1 was 0.9°C with ice, shipping container 2 was 12.6°C, shipping container 3 was 14°C, shipping container 10 was 12.2°C, the temperature of the sample(s) for shipping container 4 was 12.8°C, shipping container 5 was 12.4°C, shipping container 6 was12.2°C, shipping container 7 was 12.2°C, shipping container 8 was 12.6°C, shipping container 9 was 12.4°C, shipping container 11 was 12.8°C, shipping container 12 was 12.0°C, and shipping container13 was 12.6°C.

A sample was received without sample identification with a sample time of 5/9/18 at 5:00pm. Proceed with sample identification as TLN-1805-124 per Shari Endy, Energy Laboratories Project Manager.

Chain of Custody and Analytical Request Record

PLEASE PRINT; provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: Hydrometrics, Inc.	Project Name, PWS#, Permit #, Etc. Talen Montana, LLC – Soil Sampling at Historic Spills (12073.18 Task 400)	
Report Mail Address: **Kordelle Stephenson** **PO Box 38** **Colstrip, MT 59323**	Contact Name: Rich Labbe or Al Hilty Voice: 656-1172 Fax: 656-8912 Email: ahilty@hydrometrics.com	Sampler Name if other than Contact: John Bergin 690-8304 Garry Hoffman 671-8177
Invoice Address: **TALEN MONTANA, LLC**; ATTN: A.P. GENTW13 P.O. Box 25223 Lehigh Valley, PA 18002-5223	Invoice Contact & Phone #: Kordelle Stephenson 406-748-5364	Purchase Order #: **Ariba #21057984** **Contract #622268-04** ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____

Special Report Formats – ELI must be notified prior to sample submittal for the following:

NELAC ☐ A2LA ☐ Level IV ☐ Other ____

EDD/EDT ☐ Format ____

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments:
Please email copy of sample results to Jenny Vanek Hydrometrics jvanek@hydrometrics.com and to Kordelle Stephenson Talen Montana kordelle.stephenson@talenenergy.com

Receipt Temp ____ ° C

Cooler ID(s) ____

Custody Seal Y N
Intact Y N
Signature Y N
Match

SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air, Water Soils/Solids, Vegetation, Bioassay Other)	EC, pH	HCO3, Bromide, CO3, Ca, Chloride, Fluoride, Magnesium, K	SAR, Sodium Sulfate	Antimony, Ar, Barium, Beryllium, Boron, Cadmium, Chromium	Cobalt, Lead, Manganese, Mercury, Selenium, Thallium, Lithium	Molybdenum	Radium 226 and Radium 228			SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	LAB ID
TLN-1805- 064	5/8/18	1340	1 Soil	X	X	X	X	X	X	X			X	X		B805240-001
TLN-1805- 065		1345	1 Soil	X	X	X	X	X	X	X			X	X		-002
TLN-1805- 066		1410	1 Soil	X	X	X	X	X	X	X			X	X		-003
TLN-1805- 067		1415	1 Soil	X	X	X	X	X	X	X			X	X		-004
TLN-1805- 068		1445	1 Soil	X	X	X	X	X	X	X			X	X		-005
TLN-1805- 069		1455	1 Soil	X	X	X	X	X	X	X			X	X		-006
TLN-1805- 070		1505	1 Soil	X	X	X	X	X	X	X			X	X		-007
TLN-1805- 071		1515	1 Soil	X	X	X	X	X	X	X			X	X		-008
TLN-1805- 072		1530	1 Soil	X	X	X	X	X	X	X			X	X		-009
TLN-1805- 073		1540	1 Soil	X	X	X	X	X	X	X			X	X		-010
TLN-1805- 074		1555	1 Soil	X	X	X	X	X	X	X			X	X		-011

LABORATORY USE ONLY

Custody Record MUST be Signed				
Relinquished by: [signature]	Date/Time: 5/11/18 1110	Shipped by:	Received by:	Date/Time:
Relinquished by:	Date/Time:	Shipped by:	Received by: [signature]	Date/Time: 5-11-18 11:10
Sample Disposal:	Return to Client ☐	Lab Disposal ☐	LABORATORY USE ONLY Sample Type	# of fractions

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

PLEASE PRINT; provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: Hydrometrics, Inc.	Project Name, PWS#, Permit #, Etc. Talen Montana, LLC – Soil Sampling at Historic Spills (12073.18 Task 400)
Report Mail Address: **Kordelle Stephenson** **PO Box 38** **Colstrip, MT 59323**	Contact Name: Rich Labbe or Al Hilty Voice: 656-1172 Fax: 656-8912 Email: ahilty@hydrometrics.com	Sampler Name if other than Contact: John Bergin 690-8304 Garry Hoffman 671-8177
Invoice Address: **TALEN MONTANA, LLC;** ATTN: A.P. GENTW13 P.O. Box 25223 Lehigh Valley, PA 18002-5223	Invoice Contact & Phone #: Kordelle Stephenson 406-748-5364	Purchase Order #: **Ariba #21057984** **Contract #622268-04** ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐
Other _____
Special Report Formats – ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☐
Other _____
EDD/EDT ☐ Format _____

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments:
Please email copy of sample results to Jenny Vanek Hydrometrics jvanek@hydrometrics.com and to Kordelle Stephenson Talen Montana kordelle.stephenson@talenenergy.com

Receipt Temp _____ ° C
Cooler ID(s) _____
Custody Seal Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	Number of Containers / Sample Type: A W S V B O / Air, Water, Soils/Solids, Vegetation, Bioassay, Other / MATRIX	ANALYSIS REQUESTED: EC, pH	HCO3, Bromide, CO3, Ca, Chloride, Fluoride, Magnesium, K	SAR, Sodium Sulfate	Antimony, Ar, Barium, Beryllium, Boron, Cadmium, Chromium	Cobalt, Lead, Manganese, Mercury, Selenium, Thallium, Lithium	Molybdenum	Radium 226 and Radium 228			SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	LAB ID
TLN-1805- 075	5/8/18	1605	1 Soil	X	X	X	X	X	X	X			X	X		1805240-012
TLN-1805- 076	5/9/18	0940	1 ~~Soil~~ Water	X	X	X	X	X	X	X			X	X		-013
TLN-1805- 077		1000	1 Soil	X	X	X	X	X	X	X			X	X		-014
TLN-1805- 078		1002	1 Soil	X	X	X	X	X	X	X			X	X		-015
TLN-1805- 079		1005	1 Soil	X	X	X	X	X	X	X			X	X		-016
TLN-1805- 080		1045	1 Soil	X	X	X	X	X	X	X			X	X		-017
TLN-1805- 081		1100	1 Soil	X	X	X	X	X	X	X			X	X		-018
TLN-1805- 082		1105	1 Soil	X	X	X	X	X	X	X			X	X		-019
TLN-1805- 083		1115	1 Soil	X	X	X	X	X	X	X			X	X		-020
TLN-1805- 084		1120	1 Soil	X	X	X	X	X	X	X			X	X		-021
TLN-1805- 085		1125	1 Soil	X	X	X	X	X	X	X			X	X		-022

LABORATORY USE ONLY

Custody Record MUST be Signed	Relinquished by: [signature]	Date/Time: 5/10/18 1110	Shipped by:
	Relinquished by:	Date/Time:	Shipped by:
	Sample Disposal:	Return to Client ☐	Lab Disposal ☐

Received by:	Date/Time:
Received by: [signature]	Date/Time: 5/11/18 11:10
LABORATORY USE ONLY	
Sample Type _____	# of fractions _____

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Chain of Custody and Analytical Request Record

PLEASE PRINT; provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: Hydrometrics, Inc.	Project Name, PWS#, Permit #, Etc. Talen Montana, LLC – Soil Sampling at Historic Spills (12073.18 Task 400)	
Report Mail Address: **Kordelle Stephenson** **PO Box 38** **Colstrip, MT 59323**	Contact Name: Rich Labbe or Al Hilty Voice: 656-1172 Fax: 656-8912 Email: ahilty@hydrometrics.com	Sampler Name if other than Contact: John Bergin 690-8304 Garry Hoffman 671-8177
Invoice Address: **TALEN MONTANA, LLC;** ATTN: A.P. GENTW13 P.O. Box 25223 Lehigh Valley, PA 18002-5223	Invoice Contact & Phone #: Kordelle Stephenson 406-748-5364	Purchase Order #: **Ariba #21057984** **Contract #622268-04** ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐
Other _____
Special Report Formats – ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☐
Other _____
EDD/EDT ☐ Format _____

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments:
Please email copy of sample results to Jenny Vanek Hydrometrics ivanek@hydrometrics.com and to Kordelle Stephenson Talen Montana kordelle.stephenson@talenenergy.com

Receipt Temp _____ ° C
Cooler ID(s) _____
Custody Seal Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air, Water Soils/Solids, Vegetation, Bioassay Other)	EC, pH	HCO3,Bromide, CO3,Ca, Chloride, Fluoride, Magnesium, K	SAR, Sodium Sulfate	Antimony, Ar, Barium, Beryllium, Boron, Cadmium, Chromium	Cobalt, Lead, Manganese, Mercury, Selenium, Thallium, Lithium	Molybdenum	Radium 226 and Radium 228			SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	LAB ID
TLN-1805- 086	5/9/18	1135	1 Soil	X	X	X	X	X	X	X			X	X		1805240-023
TLN-1805- 087	~~1535~~	1150	1 Soil	X	X	X	X	X	X	X			X	X		-024
TLN-1805- 088		1155	1 Soil	X	X	X	X	X	X	X			X	X		-025
TLN-1805- 089		1205	1 Soil	X	X	X	X	X	X	X			X	X		-026
TLN-1805- 090		1240	1 Soil	X	X	X	X	X	X	X			X	X		-027
TLN-1805- 091		1245	1 Soil	X	X	X	X	X	X	X			X	X		-028
TLN-1805- 092		1255	1 Soil	X	X	X	X	X	X	X			X	X		-029
TLN-1805- 093		1310	1 Soil	X	X	X	X	X	X	X			X	X		-030
TLN-1805- 094		1312	1 Soil	X	X	X	X	X	X	X			X	X		-031
TLN-1805- 095		1315	1 Soil	X	X	X	X	X	X	X			X	X		-032
TLN-1805- 096		1325	1 Soil	X	X	X	X	X	X	X			X	X		-033

LABORATORY USE ONLY

Custody Record MUST be Signed				
	Relinquished by:	Date/Time: 5/11/18 1110	Shipped by:	Received by: Sarah Kirch Date/Time: 5-11-18 11:10
	Relinquished by:	Date/Time:	Shipped by:	Received by: Date/Time:
	Sample Disposal: Return to Client ☐		Lab Disposal ☐	LABORATORY USE ONLY Sample Type _____ # of fractions _____

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Chain of Custody and Analytical Request Record

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Company Name: Hydrometrics, Inc.	Project Name, PWS#, Permit #, Etc.: Talen Montana, LLC – Soil Sampling at Historic Spills (12073.18 Task 400)	
Report Mail Address: **Kordelle Stephenson** **PO Box 38** **Colstrip, MT 59323**	Contact Name: Rich Labbe or Al Hilty Voice: 656-1172 Fax: 656-8912 Email: ahilty@hydrometrics.com	Sampler Name if other than Contact: John Bergin 690-8304 Garry Hoffman 671-8177
Invoice Address: **TALEN MONTANA, LLC**; ATTN: A.P. GENTW13 P.O. Box 25223 Lehigh Valley, PA 18002-5223	Invoice Contact & Phone #: Kordelle Stephenson 406-748-5364	Purchase Order #: **Ariba #21057984** **Contract #622268-04** ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other ____

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NELAC ☐ A2LA ☐ Level IV ☐ Other ____

EDD/EDT ☐ Format ____

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Receipt Temp ____ ° C

Cooler ID(s) ____

Custody Seal Intact Y N

Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	Number of Containers / Sample Type: A W S V B O / Air, Water, Soils/Solids, Vegetation, Bioassay, Other / MATRIX	ANALYSIS REQUESTED: EC, pH	HCO3, Bromide, CO3, Ca, Chloride, Fluoride, Magnesium, K	SAR, Sodium Sulfate	Antimony, Ar, Barium, Beryllium, Boron, Cadmium, Chromium	Cobalt, Lead, Manganese, Mercury, Selenium, Thallium, Lithium	Molybdenum	Radium 226 and Radium 228			SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	LAB ID
TLN-1805- 097	5/9/18	1355	1 Soil	X	X	X	X	X	X	X			X	X		L1805240-034
TLN-1805- 098		1400	1 Soil	X	X	X	X	X	X	X			X	X		-035
TLN-1805- 099		1410	1 Soil	X	X	X	X	X	X	X			X	X		-036
TLN-1805- 100		1415	1 Soil	X	X	X	X	X	X	X			X	X		-037
TLN-1805- 101		1420	1 Soil	X	X	X	X	X	X	X			X	X		-038
TLN-1805- 102		1425	1 Soil	X	X	X	X	X	X	X			X	X		-039
TLN-1805- 103		1430	1 Soil	X	X	X	X	X	X	X			X	X		-040
TLN-1805- 104		1440	1 Soil	X	X	X	X	X	X	X			X	X		-041
TLN-1805- 105		1450	1 Soil	X	X	X	X	X	X	X			X	X		-042
TLN-1805- 106		1455	1 Soil	X	X	X	X	X	X	X			X	X		-043
TLN-1805- 107	↓	1500	1 Soil	X	X	X	X	X	X	X			X	X		-044

LABORATORY USE ONLY

Custody Record MUST be Signed			
Relinquished by: [signature]	Date/Time: 5/11/18 1110	Shipped by:	Received by: ____ Date/Time: ____
Relinquished by:	Date/Time:	Shipped by:	Received by: Sarah Kisch Date/Time: 5-11-18 11:10
Sample Disposal:	Return to Client ☐	Lab Disposal ☐	LABORATORY USE ONLY Sample Type ____ # of fractions ____

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Chain of Custody and Analytical Request Record

PLEASE PRINT; provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: Hydrometrics, Inc.	Project Name, PWS#, Permit #, Etc. Talen Montana, LLC – Soil Sampling at Historic Spills (12073.18 Task 400)
Report Mail Address: **Kordelle Stephenson** **PO Box 38** **Colstrip, MT 59323**	Contact Name: Rich Labbe or Al Hilty Voice: 656-1172 Fax: 656-8912 Email: ahilty@hydrometrics.com
Invoice Address: **TALEN MONTANA, LLC;** ATTN: A.P. GENTW13 P.O. Box 25223 Lehigh Valley, PA 18002-5223	Invoice Contact & Phone #: Kordelle Stephenson 406-748-5364

Sampler Name if other than Contact:
John Bergin 690-8304
Garry Hoffman 671-8177

Purchase Order #:
Ariba #21057984
Contract #622268-04

ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐
Other _____
Special Report Formats – ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☐
Other _____
EDD/EDT ☐ Format _____

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Comments:
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Receipt Temp _____ ° C
Cooler ID(s) _____
Custody Seal Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air, Water Soils/Solids, Vegetation, Bioassay Other)	EC, pH	HCO3, Bromide, CO3,Ca, Chloride, Fluoride, Magnesium, K	SAR, Sodium Sulfate	Antimony, Ar, Barium, Beryllium, Boron, Cadmium, Chromium	Cobalt, Lead, Manganese, Mercury, Selenium, Thallium, Lithium	Molybdenum	Radium 226 and Radium 228			SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	LAB ID
TLN-1805- 108	5/9/18	1505	1 Soil	X	X	X	X	X	X	X			X	X		1805R40-045
TLN-1805- 109		1510	1 Soil	X	X	X	X	X	X	X			X	X		-046
TLN-1805- 110		1555	1 Soil	X	X	X	X	X	X	X			X	X		-047
TLN-1805- 111		1600	1 Soil	X	X	X	X	X	X	X			X	X		-048
TLN-1805- 112		1605	1 Soil	X	X	X	X	X	X	X			X	X		-049
TLN-1805- 113		1610	1 Soil	X	X	X	X	X	X	X			X	X		-050
TLN-1805- 114		1615	1 Soil	X	X	X	X	X	X	X			X	X		-051
TLN-1805- 115		1620	1 Soil	X	X	X	X	X	X	X			X	X		-052
TLN-1805- 116		1625	1 Soil	X	X	X	X	X	X	X			X	X		-053
TLN-1805- 117		1630	1 Soil	X	X	X	X	X	X	X			X	X		-054
TLN-1805- 118		1635	1 Soil	X	X	X	X	X	X	X			X	X		-055

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by:	Date/Time: 5/11/18 1110	Shipped by:	Received by: Sarah Kisch Date/Time: 5-11-18 11:10
Relinquished by:	Date/Time:	Shipped by:	Received by: Date/Time:
Sample Disposal: Return to Client ☐		Lab Disposal ☐	LABORATORY USE ONLY Sample Type _____ # of fractions _____

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Chain of Custody and Analytical Request Record

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Company Name: Hydrometrics, Inc.	Project Name, PWS#, Permit #, Etc. Talen Montana, LLC – Soil Sampling at Historic Spills (12073.18 Task 400)
Report Mail Address: **Kordelle Stephenson** **PO Box 38** **Colstrip, MT 59323**	Contact Name: Rich Labbe or Al Hilty Voice: 656-1172 Fax: 656-8912 Email: ahilty@hydrometrics.com
Sampler Name if other than Contact: John Bergin 690-8304 Garry Hoffman 671-8177	
Invoice Address: **TALEN MONTANA, LLC;** ATTN: A.P. GENTW13 P.O. Box 25223 Lehigh Valley, PA 18002-5223	Invoice Contact & Phone #: Kordelle Stephenson 406-748-5364
Purchase Order #: **Ariba #21057984** **Contract #622268-04**	ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other _____

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NELAC ☐ A2LA ☐ Level IV ☐

Other _____

EDD/EDT ☐ Format _____

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Receipt Temp _____ ° C

Cooler ID(s) _____

Custody Seal Intact Y N

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TLN-1805- 119	5/9/18	1640	1 Soil	X	X	X	X	X	X	X			X	X		805|240-56
TLN-1805- 120		1642	1 Soil	X	X	X	X	X	X	X			X	X		-57
TLN-1805- 121		1645	1 Soil	X	X	X	X	X	X	X			X	X		-58
TLN-1805- 122		1650	1 Soil	X	X	X	X	X	X	X			X	X		-59
TLN-1805- 123		1655	1 Soil	X	X	X	X	X	X	X			X	X		-60
TLN-1805- 124		1700	1 Soil	X	X	X	X	X	X	X			X	X		-61
TLN-1805- 125		1705	1 Soil	X	X	X	X	X	X	X			X	X		-62
TLN-1805- 126		1710	1 Soil	X	X	X	X	X	X	X			X	X		-63
TLN-1805- 127		1715	1 Soil	X	X	X	X	X	X	X			X	X		-64
TLN-1805- 128		1720	1 Soil	X	X	X	X	X	X	X			X	X		-65
TLN-1805- 129		1722	1 Soil	X	X	X	X	X	X	X			X	X		-66

LABORATORY USE ONLY

Custody Record MUST be Signed		
Relinquished by:	Date/Time: 5/11/18 1110	Shipped by:
Relinquished by:	Date/Time:	Shipped by:
Sample Disposal:	Return to Client ☐	Lab Disposal ☐

Received by:	Date/Time:
Received by: Sarah Kisch	Date/Time: 5/11/18 11:10
LABORATORY USE ONLY Sample Type _____ # of fractions _____	

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Report Mail Address: **Kordelle Stephenson** **PO Box 38** **Colstrip, MT 59323**	Contact Name: Rich Labbe or Al Hilty Voice: 656-1172 Fax: 656-8912 Email: ahilty@hydrometrics.com
Invoice Address: **TALEN MONTANA, LLC;** ATTN: A.P. GENTW13 P.O. Box 25223 Lehigh Valley, PA 18002-5223	Invoice Contact & Phone #: Kordelle Stephenson 406-748-5364
Report Required For: POTW/WWTP ☐ DW ☐ Other _____ Special Report Formats – ELI must be notified prior to sample submittal for the following: NELAC ☐ A2LA ☐ Level IV ☐ Other _____ EDD/EDT ☐ Format _____	Sampler Name if other than Contact: John Bergin 690-8304 Garry Hoffman 671-8177
	Purchase Order #: **Ariba #21057984** **Contract #622268-04** ELI Quote #:

SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	Number of Containers / Sample Type: A W S V B O / Air, Water Soils/Solids, Vegetation, Bioassay Other / MATRIX	EC, pH	HCO3 Bromide, CO3,Ca, Chloride, Fluoride, Magnesium, K	SAR, Sodium Sulfate	Antimony, Ar, Barium, Beryllium, Boron, Cadmium, Chromium	Cobalt, Lead, Manganese, Mercury, Selenium, Thallium, Lithium	Molybdenum	Radium 226 and Radium 228			SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	LAB ID
TLN-1805- 130	5/9/18	1725	1 Soil	X	X	X	X	X	X	X			X	X		1805S1240-067
TLN-1805- 131	↓	1730	1 Soil	X	X	X	X	X	X	X			X	X		-068
TLN-1805- 132	↓	1735	1 Soil	X	X	X	X	X	X	X			X	X		-069
TLN-1805- 133	5/10/18	0800	1 ~~Soil~~ Water	X	X	X	X	X	X	X			X	X		-070
TLN-1805- 134		0820	1 Soil	X	X	X	X	X	X	X			X	X		-071
TLN-1805- 135		0825	1 Soil	X	X	X	X	X	X	X			X	X		-072
TLN-1805- 136		0830	1 Soil	X	X	X	X	X	X	X			X	X		-073
TLN-1805- 137		0840	1 Soil	X	X	X	X	X	X	X			X	X		-074
TLN-1805- 138		0845	1 Soil	X	X	X	X	X	X	X			X	X		-075
TLN-1805- 139		0850	1 Soil	X	X	X	X	X	X	X			X	X		-076
TLN-1805- 140	↓	0855	1 Soil	X	X	X	X	X	X	X			X	X		-077

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Receipt Temp _____ ° C
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Custody Seal Intact Y N
Signature Match Y N

LABORATORY USE ONLY

Custody Record MUST be Signed				
	Relinquished by: [signature]	Date/Time: 5/11/18 1110	Shipped by:	Received by: Date/Time:
	Relinquished by:	Date/Time:	Shipped by:	Received by: Sarah Kirsch Date/Time: 5-11-18 11:10
	Sample Disposal: Return to Client ☐		Lab Disposal ☐	LABORATORY USE ONLY Sample Type _____ # of fractions _____

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Company Name:
Hydrometrics, Inc.

Project Name, PWS#, Permit #, Etc.
Talen Montana, LLC – Soil Sampling at Historic Spills (12073.18 Task 400)

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Kordelle Stephenson
PO Box 38
Colstrip, MT 59323

Contact Name: Rich Labbe or Al Hilty
Voice: 656-1172
Fax: 656-8912
Email: ahilty@hydrometrics.com

Sampler Name if other than Contact:
John Bergin 690-8304
Garry Hoffman 671-8177

Invoice Address:
TALEN MONTANA, LLC; ATTN: A.P. GENTW13
P.O. Box 25223
Lehigh Valley, PA 18002-5223

Invoice Contact & Phone #:
Kordelle Stephenson
406-748-5364

Purchase Order #:
Ariba #21057984
Contract #622268-04

ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐
Other ____
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Receipt Temp ____ ° C
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Custody Seal Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air, Water Soils/Solids, Vegetation, Bioassay Other)	EC, pH	HCO3,Bromide, CO3,Ca, Chloride, Fluoride, Magnesium, K	SAR, Sodium Sulfate	Antimony, Ar, Barium, Beryllium, Boron, Cadmium, Chromium	Cobalt, Lead, Manganese, Mercury, Selenium, Thallium, Lithium	Molybdenum	Radium 226 and Radium 228			SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	LAB ID
TLN-1805- 141	5/10/18	0960	1 Soil	X	X	X	X	X	X	X			X	X		L1805120-078
TLN-1805- 142		0910	1 Soil	X	X	X	X	X	X	X			X	X		-079
TLN-1805- 143		0920	1 Soil	X	X	X	X	X	X	X			X	X		-080
TLN-1805- 144		0925	1 Soil	X	X	X	X	X	X	X			X	X		-081
TLN-1805- 145		0935	1 Soil	X	X	X	X	X	X	X			X	X		-082
TLN-1805- 146		0935	1 Soil	X	X	X	X	X	X	X			X	X		-083
TLN-1805- 147		0937	1 Soil	X	X	X	X	X	X	X			X	X		-084
TLN-1805- 148		0940	1 Soil	X	X	X	X	X	X	X			X	X		-085
TLN-1805- 149		0950	1 Soil	X	X	X	X	X	X	X			X	X		-086
TLN-1805- 150		0955	1 Soil	X	X	X	X	X	X	X			X	X		-087
TLN-1805- 151	″	1025	1 Soil	X	X	X	X	X	X	X			X	X		-088

LABORATORY USE ONLY

Custody Record MUST be Signed

Relinquished by: [signature] Date/Time: 5/10/18 1110 Shipped by:
Relinquished by: Date/Time: Shipped by:
Sample Disposal: Return to Client ☐ Lab Disposal ☐

Received by: Date/Time:
Received by: [signature] Date/Time: 5/11/18 11:10

LABORATORY USE ONLY
Sample Type ____ # of fractions ____

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

Chain of Custody and Analytical Request Record

PLEASE PRINT; provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: Hydrometrics, Inc.	Project Name, PWS#, Permit #, Etc. Talen Montana, LLC – Soil Sampling at Historic Spills (12073.18 Task 400)
Report Mail Address: **Kordelle Stephenson** **PO Box 38** **Colstrip, MT 59323**	Contact Name: Rich Labbe or Al Hilty Voice: 656-1172 Fax: 656-8912 Email: ahilty@hydrometrics.com Sampler Name if other than Contact: John Bergin 690-8304 Garry Hoffman 671-8177
Invoice Address: **TALEN MONTANA, LLC;** ATTN: A.P. GENTW13 P.O. Box 25223 Lehigh Valley, PA 18002-5223	Invoice Contact & Phone #: Kordelle Stephenson 406-748-5364 Purchase Order #: **Ariba #21057984** **Contract #622268-04** ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐
Other ____
Special Report Formats – ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☐
Other ____
EDD/EDT ☐ Format ____

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments:
Please email copy of sample results to Jenny Vanek Hydrometrics jvanek@hydrometrics.com and to Kordelle Stephenson Talen Montana kordelle.stephenson@talenenergy.com

Receipt Temp ____ ° C
Cooler ID(s) ____
Custody Seal Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air, Water Soils/Solids, Vegetation, Bioassay Other)	EC, pH	HCO3,Bromide, CO3,Ca, Chloride, Fluoride, Magnesium, K	SAR, Sodium Sulfate	Antimony, Ar, Barium, Beryllium, Boron, Cadmium, Chromium	Cobalt, Lead, Manganese, Mercury, Selenium, Thallium, Lithium	Molybdenum	Radium 226 and Radium 228			SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	LAB ID
TLN-1805- 152	5/10/18	1030	1 Soil	X	X	X	X	X	X	X			X	X		1805 1240-089
TLN-1805- 153		1035	1 Soil	X	X	X	X	X	X	X			X	X		-090
TLN-1805- 154		1040	1 Soil	X	X	X	X	X	X	X			X	X		-091
TLN-1805- 155		1045	1 Soil	X	X	X	X	X	X	X			X	X		-092
TLN-1805- 156		1050	1 Soil	X	X	X	X	X	X	X			X	X		-093
TLN-1805- 157		1055	1 Soil	X	X	X	X	X	X	X			X	X		-094
TLN-1805- 158		1100	1 Soil	X	X	X	X	X	X	X			X	X		-095
TLN-1805- 159		1125	1 Soil	X	X	X	X	X	X	X			X	X		-096
TLN-1805- 160		1130	1 Soil	X	X	X	X	X	X	X			X	X		-097
TLN-1805- 161		1135	1 Soil	X	X	X	X	X	X	X			X	X		-098
TLN-1805- 162		1140	1 Soil	X	X	X	X	X	X	X			X	X		-099

LABORATORY USE ONLY

Custody Record MUST be Signed				
Relinquished by: [signature]	Date/Time: 5/10/18 1110	Shipped by:	Received by:	Date/Time:
Relinquished by:	Date/Time:	Shipped by:	Received by: [signature]	Date/Time: 5-11-18 11:10
Sample Disposal:	Return to Client ☐	Lab Disposal ☐	LABORATORY USE ONLY Sample Type ____ # of fractions ____	

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Chain of Custody and Analytical Request Record

PLEASE PRINT; provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: Hydrometrics, Inc.	Project Name, PWS#, Permit #, Etc. Talen Montana, LLC – Soil Sampling at Historic Spills (12073.18 Task 400)
Report Mail Address: **Kordelle Stephenson** **PO Box 38** **Colstrip, MT 59323**	Contact Name: Rich Labbe or Al Hilty Voice: 656-1172 Fax: 656-8912 Email: ahilty@hydrometrics.com
Invoice Address: **TALEN MONTANA, LLC;** ATTN: A.P. GENTW13 P.O. Box 25223 Lehigh Valley, PA 18002-5223	Invoice Contact & Phone #: Kordelle Stephenson 406-748-5364
Report Required For: POTW/WWTP ☐ DW ☐ Other ____ Special Report Formats – ELI must be notified prior to sample submittal for the following: NELAC ☐ A2LA ☐ Level IV ☐ Other ____ EDD/EDT ☐ Format ____	Sampler Name if other than Contact: John Bergin 690-8304 Garry Hoffman 671-8177
	Purchase Order #: **Ariba #21057984** **Contract #622268-04** ELI Quote #:

SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	Number of Containers / Sample Type: A W S V B O / Air, Water Soils/Solids, Vegetation, Bioassay Other / MATRIX	ANALYSIS REQUESTED: EC, pH	HCO3,Bromide, CO3,Ca, Chloride, Fluoride, Magnesium, K	SAR, Sodium Sulfate	Antimony, Ar, Barium, Beryllium, Boron, Cadmium, Chromium	Cobalt, Lead, Manganese, Mercury, Selenium, Thallium, Lithium	Molybdenum	Radium 226 and Radium 228			SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	LAB ID
TLN-1805- 163	5/10/18	1145	1 Soil	X	X	X	X	X	X	X			X	X		1805S1240-100
TLN-1805- 164		1150	1 Soil	X	X	X	X	X	X	X			X	X		-101
TLN-1805- 165		1155	1 Soil	X	X	X	X	X	X	X			X	X		-102
TLN-1805- 166		1157	1 Soil	X	X	X	X	X	X	X			X	X		-103
TLN-1805- 167		1200	1 Soil	X	X	X	X	X	X	X			X	X		-104
TLN-1805- 168		1205	1 Soil	X	X	X	X	X	X	X			X	X		-105
TLN-1805- 169		1210	1 Soil	X	X	X	X	X	X	X			X	X		-106
TLN-1805- 170		1215	1 Soil	X	X	X	X	X	X	X			X	X		-107
TLN-1805- 171		1220	1 Soil	X	X	X	X	X	X	X			X	X		-108
TLN-1805- 172		1225	1 Soil	X	X	X	X	X	X	X			X	X		-109
TLN-1805- 173		1230	1 Soil	X	X	X	X	X	X	X			X	X		-110

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments:
Please email copy of sample results to Jenny Vanek Hydrometrics jvanek@hydrometrics.com and to Kordelle Stephenson Talen Montana kordelle.stephenson@talenenergy.com

Receipt Temp ____ ° C
Cooler ID(s) ____
Custody Seal Intact Y N
Signature Match Y N

LABORATORY USE ONLY

Custody Record MUST be Signed				
Relinquished by:		Date/Time: 5/11/18 1110	Shipped by:	Received by: Date/Time:
Relinquished by:		Date/Time:	Shipped by:	Received by: Sarah Kosh Date/Time: 5/11/18 11:10
Sample Disposal:	Return to Client ☐	Lab Disposal ☐		LABORATORY USE ONLY Sample Type ____ # of fractions ____

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Chain of Custody and Analytical Request Record

PLEASE PRINT; provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: Hydrometrics, Inc.	Project Name, PWS#, Permit #, Etc. Talen Montana, LLC – Soil Sampling at Historic Spills (12073.18 Task 400)
Report Mail Address: **Kordelle Stephenson** **PO Box 38** **Colstrip, MT 59323**	Contact Name: Rich Labbe or Al Hilty Voice: 656-1172 Fax: 656-8912 Email: ahilty@hydrometrics.com
Sampler Name if other than Contact: John Bergin 690-8304 Garry Hoffman 671-8177	
Invoice Address: **TALEN MONTANA, LLC;** ATTN: A.P. GENTW13 P.O. Box 25223 Lehigh Valley, PA 18002-5223	Invoice Contact & Phone #: Kordelle Stephenson 406-748-5364
Purchase Order #: **Ariba #21057984** **Contract #622268-04**	ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐
Other _____
Special Report Formats – ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☐
Other _____
EDD/EDT ☐ Format _____

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments:
Please email copy of sample results to Jenny Vanek Hydrometrics jvanek@hydrometrics.com and to Kordelle Stephenson Talen Montana kordelle.stephenson@talenenergy.com

Receipt Temp _____ ° C
Cooler ID(s) _____
Custody Seal Intact Y N
Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	Number of Containers / Sample Type: A W S V B O / Air, Water Soils/Solids, Vegetation, Bioassay Other / MATRIX	ANALYSIS REQUESTED: EC, pH	HCO3, Bromide, CO3, Ca, Chloride, Fluoride, Magnesium, K	SAR, Sodium Sulfate	Antimony, Ar, Barium, Beryllium, Boron, Cadmium, Chromium	Cobalt, Lead, Manganese, Mercury, Selenium, Thallium, Lithium	Molybdenum	Radium 226 and Radium 228			SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	LABORATORY USE ONLY: LAB ID
TLN-1805- 174	5/10/18	1235	1 Soil	X	X	X	X	X	X	X			X	X		L180S1240-111
TLN-1805- 175		1240	1 Soil	X	X	X	X	X	X	X			X	X		-112
TLN-1805- 176		1245	1 Soil	X	X	X	X	X	X	X			X	X		-113
TLN-1805- 177		1250	1 Soil	X	X	X	X	X	X	X			X	X		-114
TLN-1805- 178		1255	1 Soil	X	X	X	X	X	X	X			X	X		-115
TLN-1805- 179		1300	1 Soil	X	X	X	X	X	X	X			X	X		-116
TLN-1805- 180		1302	1 Soil	X	X	X	X	X	X	X			X	X		-117
TLN-1805- 181		1305	1 Soil	X	X	X	X	X	X	X			X	X		-118
TLN-1805- 182		1310	1 Soil	X	X	X	X	X	X	X			X	X		-119
TLN-1805- 183		1315	1 Soil	X	X	X	X	X	X	X			X	X		-120
TLN-1805- 184		1320	1 Soil	X	X	X	X	X	X	X			X	X		-121

Custody Record MUST be Signed				
Relinquished by: [signature]	Date/Time: 5/11/18 1110	Shipped by:	Received by:	Date/Time:
Relinquished by:	Date/Time:	Shipped by:	Received by: [signature]	Date/Time: 5/11/18 11:10
Sample Disposal: Return to Client ☐		Lab Disposal ☐	LABORATORY USE ONLY Sample Type _____ # of fractions _____	

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Chain of Custody and Analytical Request Record

PLEASE PRINT; provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: Hydrometrics, Inc.	Project Name, PWS#, Permit #, Etc. Talen Montana, LLC – Soil Sampling at Historic Spills (12073.18 Task 400)
Report Mail Address: **Kordelle Stephenson** **PO Box 38** **Colstrip, MT 59323**	Contact Name: Rich Labbe or Al Hilty Voice: 656-1172 Fax: 656-8912 Email: ahilty@hydrometrics.com
Sampler Name if other than Contact: John Bergin 690-8304 Garry Hoffman 671-8177	
Invoice Address: **TALEN MONTANA, LLC;** ATTN: A.P. GENTW13 P.O. Box 25223 Lehigh Valley, PA 18002-5223	Invoice Contact & Phone #: Kordelle Stephenson 406-748-5364
Purchase Order #: **Ariba #21057984** **Contract #622268-04**	ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other _____

Special Report Formats – ELI must be notified prior to sample submittal for the following:

NELAC ☐ A2LA ☐ Level IV ☐

Other _____

EDD/EDT ☐ Format _____

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments:
Please email copy of sample results to Jenny Vanek Hydrometrics ivanek@hydrometrics.com and to Kordelle Stephenson Talen Montana kordelle.stephenson@talenenergy.com

Receipt Temp _____ ° C

Cooler ID(s) _____

Custody Seal Intact Y N

Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air, Water Soils/Solids, Vegetation, Bioassay Other)	EC, pH	HCO3,Bromide, CO3,Ca, Chloride, Fluoride, Magnesium, K	SAR, Sodium Sulfate	Antimony, Ar, Barium, Beryllium, Boron, Cadmium, Chromium	Cobalt, Lead, Manganese, Mercury, Selenium, Thallium, Lithium	Molybdenum	Radium 226 and Radium 228			SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	LAB ID
TLN-1805- 185	5/1/18	1325	1 Soil	X	X	X	X	X	X	X			X	X		1805240-122
TLN-1805- 186		1330	1 Soil	X	X	X	X	X	X	X			X	X		-123
TLN-1805- 187		1345	1 Soil	X	X	X	X	X	X	X			X	X		-124
TLN-1805- 188		1350	1 Soil	X	X	X	X	X	X	X			X	X		-125
TLN-1805- 189		1355	1 Soil	X	X	X	X	X	X	X			X	X		-126
TLN-1805- 190		1400	1 Soil	X	X	X	X	X	X	X			X	X		-127
TLN-1805- 191		1405	1 Soil	X	X	X	X	X	X	X			X	X		-128
TLN-1805- 192		1410	1 Soil	X	X	X	X	X	X	X			X	X		-129
TLN-1805- 193		1415	1 Soil	X	X	X	X	X	X	X			X	X		-130
TLN-1805- 194		1420	1 Soil	X	X	X	X	X	X	X			X	X		-131
TLN-1805- 195	↓	1423	1 Soil	X	X	X	X	X	X	X			X	X		-132

LABORATORY USE ONLY

Custody Record MUST be Signed				
Relinquished by: [signature]	Date/Time: 5/1/18 1110	Shipped by:	Received by:	Date/Time:
Relinquished by:	Date/Time:	Shipped by:	Received by: [signature]	Date/Time: 5/1/18 11:10
Sample Disposal:	Return to Client ☐	Lab Disposal ☐	LABORATORY USE ONLY Sample Type _____ # of fractions _____	

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Chain of Custody and Analytical Request Record

PLEASE PRINT; provide as much information as possible. Refer to corresponding notes on reverse side.

Company Name: Hydrometrics, Inc.	Project Name, PWS#, Permit #, Etc. Talen Montana, LLC – Soil Sampling at Historic Spills (12073.18 Task 400)	
Report Mail Address: **Kordelle Stephenson** **PO Box 38** **Colstrip, MT 59323**	Contact Name: Rich Labbe or Al Hilty Voice: 656-1172 Fax: 656-8912 Email: ahilty@hydrometrics.com	Sampler Name if other than Contact: John Bergin 690-8304 Garry Hoffman 671-8177
Invoice Address: **TALEN MONTANA, LLC;** ATTN: A.P. GENTW13 P.O. Box 25223 Lehigh Valley, PA 18002-5223	Invoice Contact & Phone #: Kordelle Stephenson 406-748-5364	Purchase Order #: **Ariba #21057984** **Contract #622268-04** ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐ Other _____

Special Report Formats – ELI must be notified prior to sample submittal for the following:

NELAC ☐ A2LA ☐ Level IV ☐

Other _____

EDD/EDT ☐ Format _____

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments:
Please email copy of sample results to Jenny Vanek Hydrometrics jvanek@hydrometrics.com and to Kordelle Stephenson Talen Montana kordelle.stephenson@talenenergy.com

Receipt Temp _____ ° C

Cooler ID(s) _____

Custody Seal Intact Y N

Signature Match Y N

SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	MATRIX (Number of Containers; Sample Type: A W S V B O; Air, Water Soils/Solids, Vegetation, Bioassay Other)	EC, pH	HCO3,Bromide, CO3,Ca, Chloride, Fluoride, Magnesium, K	SAR, Sodium Sulfate	Antimony, Ar, Barium, Beryllium, Boron, Cadmium, Chromium	Cobalt, Lead, Manganese, Mercury, Selenium, Thallium, Lithium	Molybdenum	Radium 226 and Radium 228			SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	LAB ID (LABORATORY USE ONLY)
TLN-1805- 196	5/10/18	1426	1 Soil	X	X	X	X	X	X	X			X	X		1805I240-133
TLN-1805- 197		1430	1 Soil	X	X	X	X	X	X	X			X	X		-134
TLN-1805- 198		1435	1 Soil	X	X	X	X	X	X	X			X	X		-135
TLN-1805- 199		1440	1 Soil	X	X	X	X	X	X	X			X	X		-136
TLN-1805- 200		1440	1 Soil	X	X	X	X	X	X	X			X	X		-137
TLN-1805- 201		1445	1 Soil	X	X	X	X	X	X	X			X	X		-138
TLN-1805- 202		1450	1 Soil	X	X	X	X	X	X	X			X	X		-139
TLN-1805- 203		1455	1 Soil	X	X	X	X	X	X	X			X	X		-140
TLN-1805- 204		1500	1 Soil	X	X	X	X	X	X	X			X	X		-141
TLN-1805- 205		1510	1 Soil	X	X	X	X	X	X	X			X	X		-142
TLN-1805- 806		1515	1 Soil	X	X	X	X	X	X	X			X	X		-143

Custody Record MUST be Signed	Relinquished by: [signature]	Date/Time: 5/11/18 0911	Shipped by:
	Relinquished by:	Date/Time:	Shipped by:
	Sample Disposal: Return to Client ☐	Lab Disposal ☐	

Received by: _____ Date/Time: _____

Received by: Sarah Kirsch Date/Time: 5-11-18 0911

LABORATORY USE ONLY

Sample Type _____ # of fractions _____

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Chain of Custody and Analytical Request Record

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Company Name: Hydrometrics, Inc.	Project Name, PWS#, Permit #, Etc.: Talen Montana, LLC – Soil Sampling at Historic Spills (12073.18 Task 400)	
Report Mail Address: **Kordelle Stephenson** **PO Box 38** **Colstrip, MT 59323**	Contact Name: Rich Labbe or Al Hilty Voice: 656-1172 Fax: 656-8912 Email: ahilty@hydrometrics.com	Sampler Name if other than Contact: John Bergin 690-8304 Garry Hoffman 671-8177
Invoice Address: **TALEN MONTANA, LLC;** ATTN: A.P. GENTW13 P.O. Box 25223 Lehigh Valley, PA 18002-5223	Invoice Contact & Phone #: Kordelle Stephenson 406-748-5364	Purchase Order #: **Ariba #21057984** **Contract #622268-04** ELI Quote #:

Report Required For: POTW/WWTP ☐ DW ☐
Other ____
Special Report Formats – ELI must be notified prior to sample submittal for the following:
NELAC ☐ A2LA ☐ Level IV ☐
Other ____
EDD/EDT ☐ Format ____

Notify ELI prior to RUSH sample submittal for additional charges and scheduling

Comments:
Please email copy of sample results to Jenny Vanek Hydrometrics jvanek@hydrometrics.com and to Kordelle Stephenson Talen Montana kordelle.stephenson@talenenergy.com

Receipt Temp ____ °C
Cooler ID(s) ____
Custody Seal Y N
Intact Y N
Signature Y N
Match

SAMPLE IDENTIFICATION (Name, Location, Interval, etc)	Collection Date	Collection Time	Number of Containers / Sample Type: A W S V B O / Air, Water, Soils/Solids, Vegetation, Bioassay, Other / MATRIX	ANALYSIS REQUESTED: EC, pH	HCO3, Bromide, CO3, Ca, Chloride, Fluoride, Magnesium, K	SAR, Sodium Sulfate	Antimony, As, Barium, Beryllium, Boron, Cadmium, Chromium	Cobalt, Lead, Manganese, Mercury, Selenium, Thallium, Lithium	Molybdenum	Radium 226 and Radium 228			SEE ATTACHED	Normal Turnaround (TAT)	RUSH Turnaround (TAT)	LAB ID
TLN-1805- 207	5/10/18	1520	1 Soil	X	X	X	X	X	X	X			X	X		1805240-144
TLN-1805- 208		1525	1 Soil	X	X	X	X	X	X	X			X	X		-145
TLN-1805- 209		1530	1 Soil	X	X	X	X	X	X	X			X	X		-146
TLN-1805- 210		1535	1 Soil	X	X	X	X	X	X	X			X	X		-147
TLN-1805- 211		1540	1 Soil	X	X	X	X	X	X	X			X	X		-148
TLN-1805- 212		1545	1 Soil	X	X	X	X	X	X	X			X	X		-149
TLN-1805- 213		1550	1 Soil	X	X	X	X	X	X	X			X	X		-150
TLN-1805- ~~214~~ 214		1555	1 Soil	X	X	X	X	X	X	X			X	X		-151
TLN-1805- 215		1600	1 Soil	X	X	X	X	X	X	X			X	X		-152
TLN-1805- ~~216~~ 216	5/10/18	14:47	1 Soil	X	X	X	X	X	X	X			X	X		-153
TLN-1805-		5/11/18	1 Soil	X	X	X	X	X	X	X			X	X		

LABORATORY USE ONLY

Custody Record MUST be Signed				
Relinquished by:	Date/Time: 5/11/18 1110	Shipped by:	Received by:	Date/Time:
Relinquished by:	Date/Time:	Shipped by:	Received by: Sarah Kirsch	Date/Time: 5/11/18 11:10
Sample Disposal: Return to Client ☐ Lab Disposal ☐			LABORATORY USE ONLY Sample Type ____ # of fractions ____	

In certain circumstances, samples submitted to Energy Laboratories, Inc. may be subcontracted to other certified laboratories in order to complete the analysis requested. This serves as notice of this possibility. All sub-contract data will be clearly notated on your analytical report.

TABLE 1. Soil Sampling Parameter List

Analyte	Analytical Method	Reporting Limit	Units	Holding Time
PHYSICAL PARAMETERS				
EC (lab), (saturated paste)	ASAM 10-3	0.01	mmhos/cm	NA
pH (lab), (saturated paste)	ASAM 10-3.2	0.01	S.U.	NA
COMMON IONS				
Bicarbonate as HCO3, (saturated paste)	ASAM 10-3	2	mg/L	14 Days
Bromide	E300.0	0.5	mg/kg	28 Days
Carbonate as CO3, (saturated paste)	ASAM 10-3	2	mg/L	14 Days
Calcium, (saturated paste)	E6010.20	0.01	meq/L	6 Month
Chloride	E300.0	1	mg/kg	28 Days
Fluoride	E300.0	0.1	mg/kg	28 Days
Magnesium, (saturated paste)	E6010.20	0.01	meq/L	6 Month
Potassium, (saturated paste)	E6010.20	0.01	meq/L	6 Month
SAR	Calculation	0.01	NA	6 Month
Sodium, (saturated paste)	E6010.20	0.01	meq/L	6 Month
Sulfate	E300.0	1	mg/kg	28 Days
TRACE METALS				
Antimony	E6010.20	1	mg/Kg	6 Month
Arsenic	E6010.20	1	mg/Kg	6 Month
Barium	E6010.20	1	mg/Kg	6 Month
Beryllium	E6010.20	1	mg/Kg	6 Month
Boron	E6010.20	1	mg/Kg	6 Month
Cadmium	E6010.20	1	mg/Kg	6 Month
Chromium	E6010.20	1	mg/Kg	6 Month
Cobalt	E6010.20	1	mg/Kg	6 Month
Lead	E6010.20	1	mg/Kg	6 Month
Manganese	E6010.20	1	mg/Kg	6 Month

TABLE 1. Soil Sampling Parameter List

Analyte	Analytical Method	Reporting Limit	Units	Holding Time
Mercury	SW7471B	1	mg/Kg	6 Month
Selenium	E6010.20	1	mg/Kg	6 Month
Thallium	E6010.20	1	mg/Kg	6 Month
Lithium	E6010.20	1	mg/Kg	6 Month
Molybdenum	E6010.20	1	mg/Kg	6 Month
RADIONUCLIDES				
Radium 226	E903.0	-1000 - 0	pCi/g-dry	180 days
Radium 228	RA-05	-1000 - 0	pCi/g-dry	180 days

APPENDIX J

Responses to DEQ Comments on the 3&4 EHP CCRA

Responses to DEQ Comments on the 3&4 EHP Cleanup Criteria and Risk Assessment Work Plan dated 4/4/2018
DEQ Comments dated 4/26/2018

1) Page 1, last paragraph, last sentence: The "Regulatory Background" section discusses the closure of remaining cells and construction of new cells. Please discuss the fact that cells currently receiving CCR are required to be closed by July 1, 2022 and replaced with cells constructed for dry stack storage.

The following paragraph has been included in the 3&4 EHP CCR in Section 1.2.2 to discuss the cells currently receiving CCR.

The Colstrip Wastewater AOC Settlement Agreement requires the conversion to a "non-liquid" disposal system for CCR material generated by Colstrip Units 3&4 scrubbers which is deposited in the effluent holding ponds for Units 3&4 (3&4 EHP) no later than July 1, 2022. The CCR Rule requires the start of closure within 30 days of final receipt of CCR with final closure of a CCR unit within 5 years of starting closure activities unless an extension is granted.

2) Page 6, 1st set of bullets ("Surface Water"): Please include "EPA MCLs" as a screening level.

"USEPA MCLs" have been added to the Surface Water Screening Values, which are presented in Section 6.3 within Table 6-3.

3) Page 8, Table Footnotes, Footnote 1: Please include discussion of possible difference in exposure frequencies for the two industrial receptors (i.e., ranchers and CSES workers).

"Ranchers" were added to the Receptor column in the table, which is Table 4-1 in Section 4.4. Exposure frequencies for the two industrial receptors (i.e., ranchers and CSES workers) were not developed because no COCs were retained in soil or surface water. In other words, soil and surface water exposure pathways were incomplete for both receptors.

Responses to DEQ Comments on the 3&4 EHP Cleanup Criteria and Risk Assessment dated 11/15/2018
DEQ Comments dated 1/25/2019

DEQ Comments on Units 3&4 Cleanup Criteria & Risk Assessment Report

1. Page x, Executive Summary 3rd paragraph, 2nd sentence: Please clarify which stage of the Eco Risk is being referred to when discussing "preliminary COPCs" (i.e., initial SLERA, SLERA refinement, etc.). If "preliminary COPCs" refers to the initial SLERA, cadmium should be added to this list based on Specific Comment #10 below.

   Accepted. Text has been added to clarify that the preliminary COPCs were identified in the initial SLERA. Cadmium has been added to the sentence consistent with the initial SLERA findings.

2. Page xi, Executive Summary, last paragraph, last sentence: The discussion regarding radium that took place during the meeting between DEQ and Talen on October 15, 2018, resulted in radium not being designated as a COC due to the lack of radium in the paste and pond samples collected by Talen in July 2018. However, due to the small sample population of radium in groundwater, and the exceedances of DEQ-7 in some CCR wells, DEQ and Talen agreed to retain radium as a COPC and to continue sampling for radium under the AOC as well as under the CCR Rule. Please add text that specifies radium will be sampled under the AOC in addition to CCR Rule requirements, and that radium will be retained as a COPC until an appropriate number of samples (including background samples) have been analyzed.

   Accepted. The text has been revised to indicate that radium will remain a COPC while additional groundwater data are collected and that radium will continue to be monitored under the CCR Rule and evaluated as part of the ongoing AOC.

3. Page 13, Section 2.3.3: The third paragraph states that Cow Creek and South Fork Cow Creek are classified as E-1 waters. The waters in this area are classified as C-3 (ARM 17.30.611(1)(c)). Re-classifying C-3 water to an E-1 classification would require a Use Attainability Analysis pursuant to ARM 17.30.615(2) and 40 CFR 131.10. Cow Creek and South Fork Cow Creek may be treated as ephemeral if it is demonstrated that they satisfy the definition of an ephemeral stream as defined in 17.30.602(10). Furthermore, ephemeral streams must meet all the requirements laid out in ARM 17.30.637(4). Please provide a clear demonstration of ephemeral condition for Cow Creek and South Fork Cow Creek for DEQ review or treat them as C-3 waters (ARM 17.30.629).

   Accepted. We concur that as tributaries to the Yellowstone River located downstream of the City of Billings, that Cow Creek and South Fork Cow Creek classify as C-3 waters by default. A change in classification will not be pursued at this time.

The Cow Creek and South Fork Cow Creek drainages are ephemeral. The text in Section 2.3.3 will be revised to provide a clear demonstration of the ephemeral condition for Cow Creek and South Fork Cow Creek. Specifically, the following text, photographs and graphs will be added to Section 2.3.3

Per ARM 17.30.602 (10), "Ephemeral stream" means a stream or part of a stream which flows only in direct response to precipitation in the immediate watershed or in response to the melting of a cover of snow and ice and whose channel bottom is always above the local water table. The information provided herein will demonstrate that Cow Creek and South Fork Cow Creek (1) only flow in response to precipitation or snow and ice melt and (2) the channel bottom of these two streams is always above the local water table; thereby, Cow Creek and South Fork Cow Creek meet the definition of an ephemeral stream.

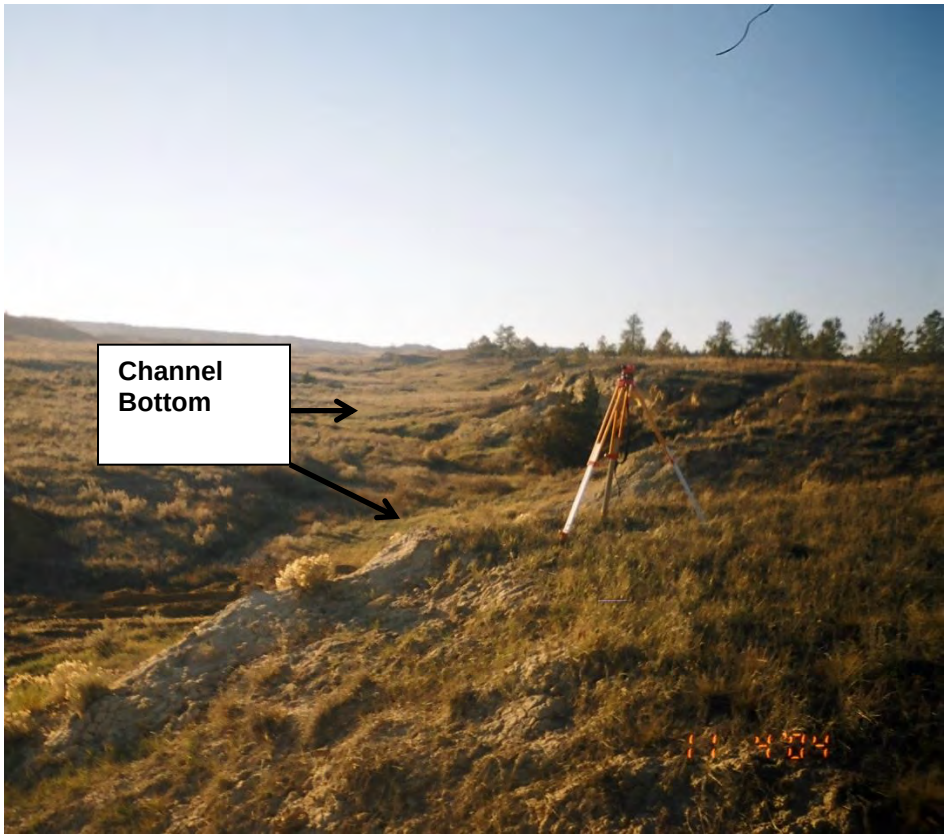
(1) Stream Flow Occurs Solely in Response to Precipitation or Snowmelt

Both Talen and Hydrometrics employees routinely travel through Cow Creek and South Fork Cow Creek throughout the year. Flow is only observed in the drainages following precipitation events or during snowmelt runoff periods when the ground is frozen or the snowmelt exceeds the infiltration capacity of the local soil. Following these events, water may be present for extended period of times in natural depressions or manmade “reservoirs”. However, the channels and depressions dry up during summer, fall and winter, except in the case when high intensity rainfall may cause additional runoff.

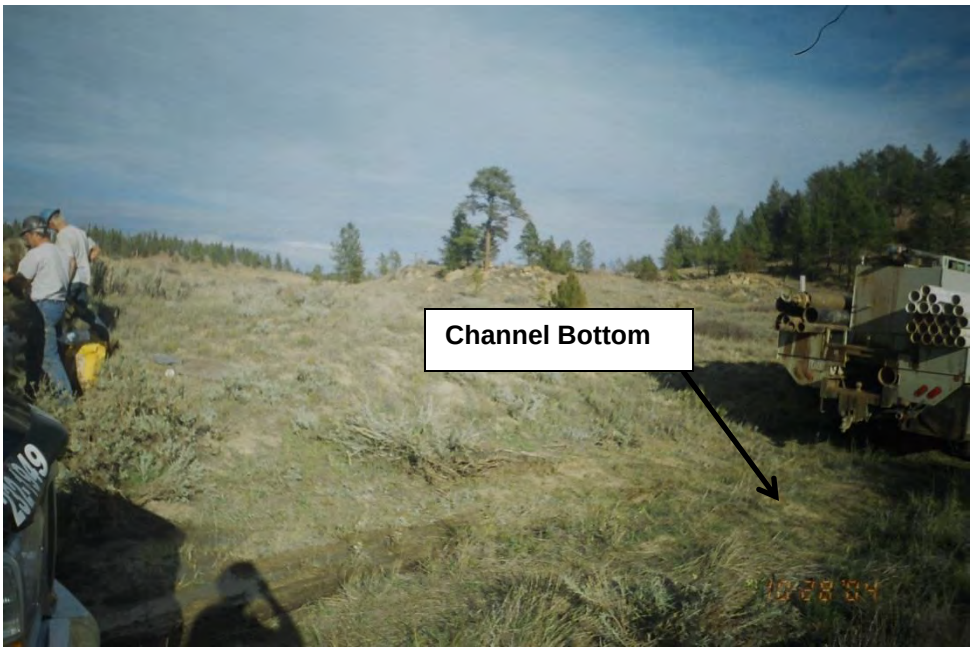
South Fork Cow Creek - The following photographs were taken in South Fork Cow Creek during the fall of various years. Two main points demonstrate the ephemeral nature of the drainage. First, there is not any flow. This is a typical condition in South Fork Cow Creek except during snowmelt runoff periods, particularly when the ground is frozen, and runoff following intense or prolonged precipitation events. Second, the bottom of the channel is vegetated indicating that perennial flow does not occur.



Photograph 2-1: South Fork Cow Creek – Late Fall – view downstream from near well 672A. Note vegetated channel and dry conditions



Photograph 2-2: South Fork Cow Creek – Late Fall – view upstream from near well 672A. Note vegetated channel and dry conditions



Photograph 2-3: South Fork Cow Creek – at well 666A. Note fully vegetated channel and lack of flow. Water present in photo is from injection water used during drilling.

Cow Creek - The following series of photos are from Cow Creek. Similar to South Fork Cow Creek, the photos illustrate the ephemeral nature of the drainage due to a lack of surface water flow and well vegetated drainage bottom.



Photograph 2-4: Google Earth image of Cow Creek at Stock Well PSW-9. Note vegetation in drainage bottom illustrating lack of surface water flow and lack of visible water.



Photograph 2-5: Cow Creek Drainage (dry) looking east /southeast from Well PSW-9.



Figure 2-6 – Cow Creek near the confluence of the 3&4 Main Dam tributary drainage.

(2) Relationship Between Channel Bottom and Local Water Table

Cow Creek - Wells 557A, 558A, and 559A were completed in Cow Creek alluvium at the Colstrip SES site boundary, downgradient/downstream of the Units 3&4 Effluent Holding Ponds (3&4 EHP), in 1982 (see Figure 3). Groundwater levels have been monitored at these wells since their completion. A hydrograph for well 557A illustrates typical groundwater fluctuations and the depth to water below the channel at this location. Water levels in the sentinel alluvial wells are shown in relationship to the Cow Creek channel bottom elevation in the following hydrograph (Figure 2-1). Groundwater level elevations have remained below the channel bottom elevation throughout the entire period of record. Based on these water level elevation data, the local groundwater table is between approximately 13 and 22 feet below the channel bottom.

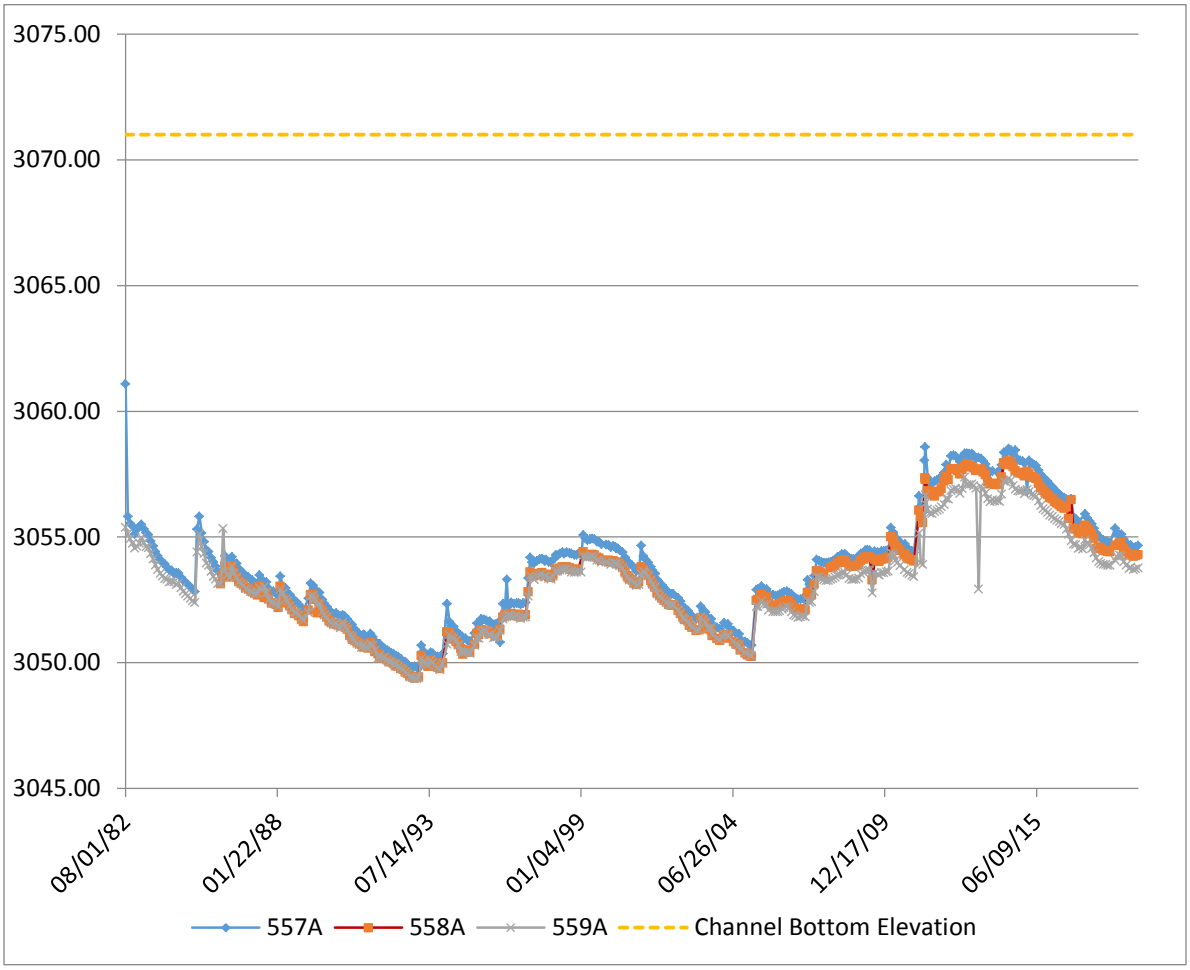


Figure 2-1 Hydrograph of Wells 557A, 558A, 559A in Cow Creek Alluvium from 1982 to 2018

Well 626A is located at the confluence of the tributary drainage that holds the Units 3&4 EHP and Cow Creek. The following hydrograph illustrates groundwater levels in relation to the channel bottom adjacent to the well (Figure 2-2). As can be seen, groundwater has risen to about 3 feet of the channel bottom, but has never been observed intersecting the ground surface. Groundwater clearly does not issue to the surface at either of this location.

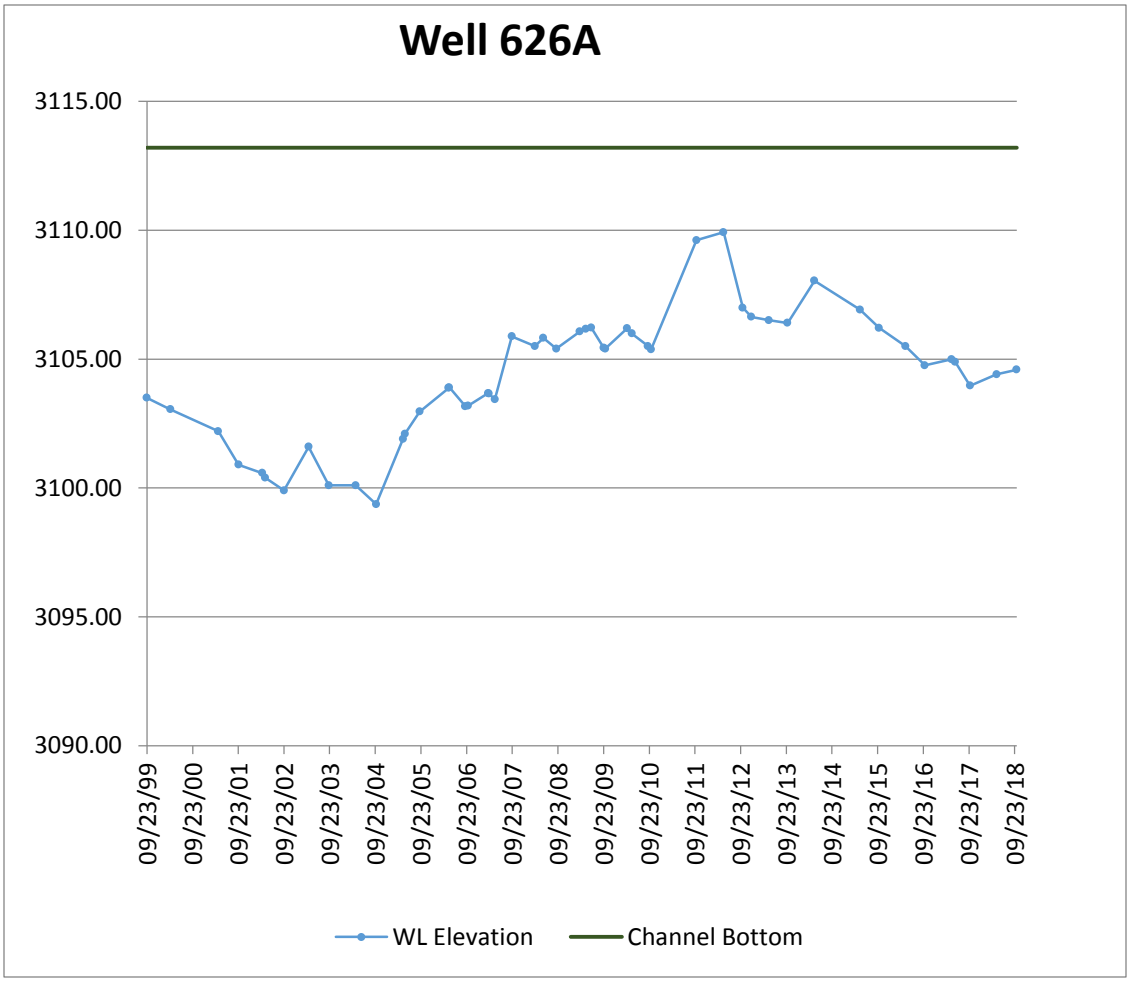


Figure 2-2 Hydrograph of Well 626A in Cow Creek from 1999 to 2018

South Fork Cow Creek - Well 568A is completed southeast and downgradient/downstream of the 3&4 EHP in alluvium of South Fork Cow Creek (see Figure 2-3). This well was installed and has been monitored for water levels since 1982. Similar to groundwater level elevations observed in the Cow Creek drainage, water levels recorded throughout the period of record (1982 to 2019) at 568A and 569A have always occurred at elevations that are well below the South Fork Cow Creek channel bottom elevation. A hydrograph for well 568A is shown in the following hydrograph (Figure 2-3). Based on 36 years of observation, the depth to the water table beneath the channel bottom ranges from about 5 to 14 feet below ground surface. Note that water levels recorded between 2004 and 2019 are relatively stable compared to those measured prior to that time, which is likely the effect of groundwater capture that is being conducted in the alluvium in the area.

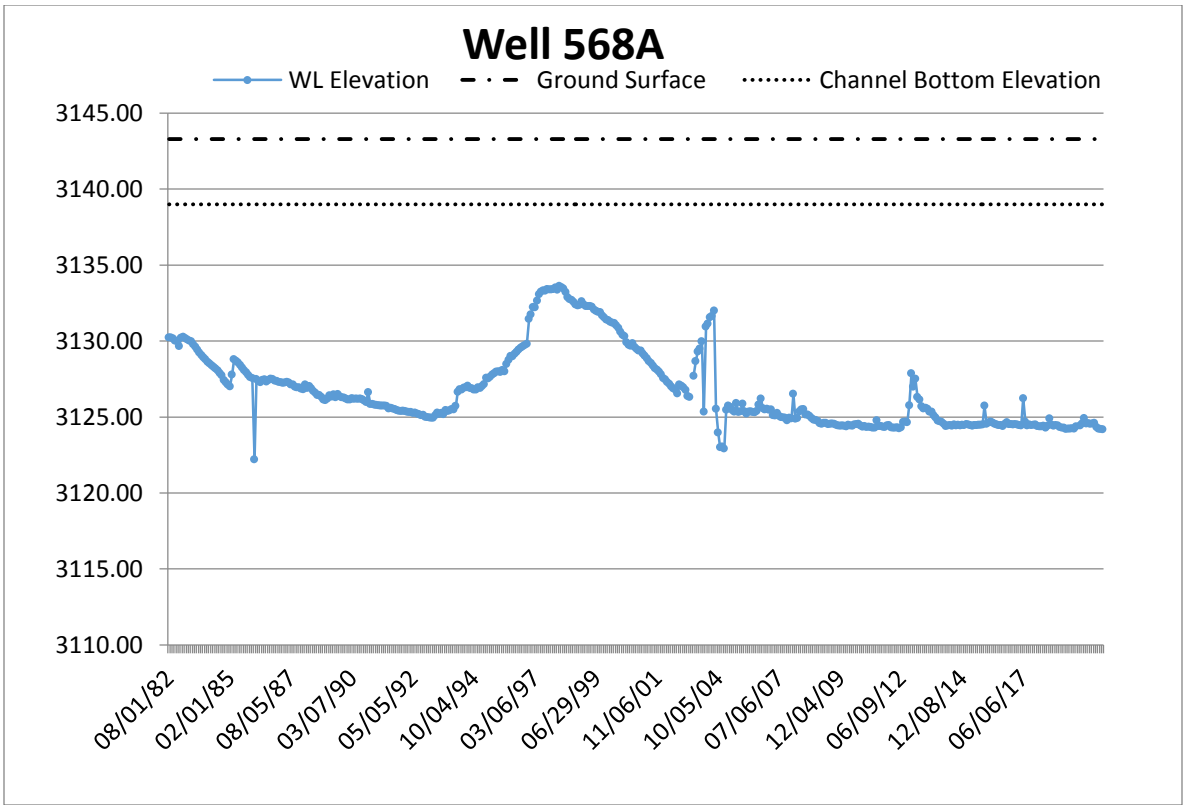


Figure 2-3 Hydrograph of Well 556A in South Fork Cow Creek Alluvium from 1982 to 2019

4. Page 40, Section 7.0: Sections 7, 8 and 9 indicate that no soil COCs were retained, so further analysis was unnecessary. However, the Plant Site and Units 1&2 CCRAs performed these analyses based on identification of COPCs, not COCs. Since COPCs were identified in both soil and surface water at the 3&4 EHP (described in Table 6-3), these analyses should be performed in this report for both soil and surface water, or an explanation should be given as to why these sections differ from the other two CCRAs.

   Accepted. Generally speaking, human health risk calculations for COPCs in soil (sediment) were performed for the Plant Site and the Units 1&2 area because the 95 UCL concentrations exceeded screening levels (in addition to the highest concentrations in the datasets). At the 3&4 EHP, the 95 UCL concentrations for the COPCs did not exceed screening levels and, therefore, human health risk calculations were unnecessary. A more detailed description for each area is provided in the paragraphs below.

   For the Plant Site, one sediment and one soil human health COPC were initially identified, manganese and lead, respectively, because the highest concentrations in the datasets exceeded screening levels. The 95 UCL concentration of manganese in sediment also exceeded screening levels and, therefore, risk calculations were performed for potential exposures to manganese concentrations in sediment. The risk calculations indicated manganese did not pose a human health risk and manganese was not retained as a COC. Lead was not retained as a human health COC in soil because only one soil sample (of 88)

had a concentration exceeding screening levels and a re-analysis concentration of that sample did not.

For the Units 1&2 Area, one sediment and one soil human health COPC were initially identified, manganese and radium, respectively, because the highest concentrations in the datasets exceeded screening levels. The 95 UCL concentration of manganese in sediment also exceeded screening levels and, therefore, risk calculations were performed for potential exposures to manganese concentrations in sediment. The risk calculations indicated manganese did not pose a human health risk and manganese was not retained as a COC. Radium was not retained as a human health COC in soil because soil concentrations appeared consistent with background concentrations and were below USEPA Remediation Goals.

At the 3&4 EHP, six soil human health COPCs (arsenic, barium, cobalt, lithium, manganese, and radium) were initially identified because the highest concentrations in the datasets exceeded screening levels. The 95 UCL concentrations of arsenic, barium, cobalt, lithium, and manganese did not exceed exceeding screening levels (as presented in Section 10.4 of the report). Therefore, risk calculations were unnecessary for those five COPCs and they were not retained as COCs. Radium was not retained as a human health COC in soil because soil concentrations appeared consistent with background concentrations and were below USEPA Remediation Goals (also presented in Section 10.4).

For surface water, DEQ guidance indicates that human health risks should be evaluated qualitatively through comparison to DEQ-7 Standards, rather than quantitatively through the forward calculation of human health risks. For the Plant Site, one surface water COPC was identified, manganese, that was qualitatively evaluated following DEQ guidance and was not retained as a COC (see Section 10.1 of the Plant Site CCRA). For the 1&2 Area, no surface water COPCs were identified. For the 3&4 EHP, one surface water COPC was identified, boron, which was qualitatively evaluated following DEQ guidance and not retained as a COC (presented in Section 10.1)

The following text has been added to the report for clarification:

- *Section 6.3 Identifying Human Health COPCs, Table 6-3 Summary of Screening Values and Human Health COPCs footnote:*
  "For arsenic, barium, cobalt, lithium, and manganese, 95 UCL concentrations in soil were estimated. Because the 95 UCLs (i.e., Exposure Point Concentrations) were below screening levels for these five soil COPCs, human health risk calculations were unnecessary and they were not retained as COCs. Radium soil concentrations were below USEPA Remediation Goals and appeared consistent with background. Please see Section 10.4 for a detailed discussion."

- *Section 7.1 Exposure Points and Exposure Point Concentrations*
  "Six human health COPCs were initially identified in soil (arsenic, barium, cobalt, lithium, manganese, and radium); but, were not retained as COCs during further evaluation. For arsenic, barium, cobalt, lithium, and manganese, 95 UCL concentrations in soil were estimated. Because the 95 UCL concentrations (i.e., EPCs) were below screening levels for these five soil COPCs, human health risk calculations were unnecessary and they were not retained as COCs. Radium soil concentrations were below USEPA Remediation Goals and appeared consistent with background. Please see Section 10.4 for a detailed discussion, as well as Appendix B, Tables B-2.3 to B-2.8 and Appendix D."

5. Page 44, Section 10.1, 2nd paragraph, last sentence: Section 6.1.3 states that "although not directly applicable because East Fork Armells Creek does not flow through the 3&4 EHP area, the surface water reference/background data [upstream surface water background data used to calculate the BSLs] were included for comparison." However, Section 10.1 does not discuss the use of this data. Please clarify how this data was used.

   Accepted. Although not directly applicable, the East Fork Armells Creek BSLs were used as background comparison values because of the lack of other background surface water data. Text has been added to Section 2.3.3 Surface Water, 6.1.3 Reference/Background Samples and Section 10.1 Comparison of Surface Water COPC Concentrations to DEQ-7 Standards to clarify that the East Fork Armells Creek BSLs were used as a background comparison in the screening process to identify preliminary COPCs. For example, the following text was added to Section 10.1.

   "However, East Fork Armells Creek surface water BSLs (Neptune, 2017) were available that were used in the Plant Site and SOEP/STEP CCRAs (Canty, 2018a, 2018b). Although not directly applicable because East Fork Armells Creek does not flow through the 3&4 EHP area and is a perennial stream, these surface water BSLs were used for comparison purposes in the data screening to identify potential COPCs because of the lack of background surface water data for the 3&4 EHP area (see also Table B-2.1 in Appendix B)." Water quality in ephemeral drainages, such as Cow Creek and South Fork Cow Creek, would be expected to have more variable water quality than perennial streams. As such, the use of East Fork Armells Creek BSLs was a conservative approach."

6. Page 57, Section 10.4.6, last paragraph: Please provide the radium soil data used in determining whether radium should be retained as a COC in this section; specifically, please compare the data to the background values provided in Table 10-12.

   Accepted. Radium data for soil samples collected during the May 2018 investigation of the historic seep/spill release areas have been added to Table 10-12.

7. Page 62, Section 10.5, last paragraph: Please see Specific Comment #1.

   Accepted. The text has been revised to indicate that radium will remain a COPC while additional groundwater data are collected and that radium will continue to be monitored under the AOC.

8. Page 70, Section 12.4.4, 1st bullet: Since pond operations did not begin until 1983 (as described at the bottom of page 69), it would not be expected that photographic data would be available from 1982. Please clarify.

   The question is unclear because the timing for site photos are not dependent on pond operations but were viewed on Google Earth. Photos are available before and after pond operations began. As mentioned in the text, a 1982 photograph of the 3&4 EHP that could be used to establish water levels within the pond could not be located. As such, a photograph from 1983 was used to illustrate the level of water behind the starter dam and in the original clearwell. That aerial photograph was overlain with topographic contours from a USGS topographic map. From this, the elevations of water in the EHP could be estimated. The estimated elevations of water in the EHP were below those measured in the monitoring wells when they were installed. Hence, water from the EHP could not have flowed to the wells and caused impacts at that time.

9. Page 71, Section 13.3, last sentence: Please see Specific Comment #1.

   Accepted. The text has been revised to indicate that radium will remain a COPC while additional groundwater data are collected and that radium will continue to be monitored under the AOC.

10. Appendix B, Table B-2.2, 1st row, last column: Please change "BB" to "BSL". According to this table, boron in the stock wells (concentration of 2.04 mg/L) is above the background concentration of 0.88 mg/L, but below the RSL of 4 mg/L.

    Accepted. The suggested change has been made to Appendix B, Table B-2.2.

11. Appendix C, Page 3, Executive Summary, 1st full paragraph, 4th sentence: The list of COPCs identified in the preliminary SLERA does not include cadmium, which was listed as a COPC in the preliminary SLERA on page 17 (Main Dam soil area). Please clarify.

    Accepted. Cadmium has been added to the list of preliminary COPCs identified in the SLERA for the Main Dam area, consistent with the evaluation presented on Page 17.

12. Appendix C, Page 14, Table C-8: Please include available antimony data in this table; if it is not available, please clarify this in the table.

    Accepted. The antimony LOAEL TRV for mammals (0.59 mg/kg-d) has been added to Table C-8. No avian LOAEL TRV is available for antimony, so "NA" has been added to the Avian LOAEL TRV column.

13. Appendix C, Page 21, Table C-11, Radium 228: Please change "No" to "Yes", based on the Hazard Quotient value that is greater than 1.

    Accepted. "No" has been changed to "Yes", consistent with the preliminary screening conclusions.

14. Appendix C, Page 29, Table C-18: This table conflicts with the last paragraph on page 28, which states that selenium should not be evaluated further as a COPC in the SLERA refinement. Please clarify.

    Accepted. The laboratory has provided an updated report with lower reporting limits for selenium in DP3 and DP5. As a result, the frequency of detect has risen to 26% in each of these areas. The selenium ecological risk assessment has been updated based on the new data reporting. Selenium was carried through the ecological screening refinement in DP3 and DP5. Selenium was eliminated as a COPC in DP3 based on comparison of the 95 UCL to ecological screening levels in the expanded screening step of screening refinement. Selenium in DP5 was carried through the BERA where it was found not to present unacceptable risks to plants and insectivorous mammals in DP5 soil. The SLERA, screening refinement, and BERA have been updated accordingly.

15. Appendix C, Page 29, last paragraph: The "Surface Water" section on page 16 indicates that chloride will be retained for further analysis in the screening refinement; however, chloride is not discussed in this section. Please add chloride to the screening refinement.

    Accepted. Chloride was removed from the sentence on Page 16 that identified preliminary COPCs due to the fact that chloride concentrations in surface water did not exceed chloride screening levels in any area. Therefore, chloride was not carried forward to screening refinement.

16. Appendix C, Page 30, 2nd paragraph, 1st sentence: Please add arsenic to this list (constituents carried forward to the BERA), as stated in the last paragraph on page 29.

    Accepted. Arsenic has been added to the list on Page 30, consistent with the statement on Page 29 and the evaluation presented in the BERA on Page 40.

17. Appendix C, Page 39, Section C-4.2.2, 5th paragraph, last sentence: The concentrations of barium in this sentence are being compared to the range of soil background values that were used to calculate the Montana BTV, instead of comparing to only the BTV. Because the BTV was calculated specifically for use as a statewide background value, comparison to the range of values from that study is not valid. Please correct this section accordingly.

    Accepted. References to the range of background concentrations used to calculate the Montana BTV for barium have been removed from this section.

18. Appendix D, Page 3, Section D-1.1, 2nd paragraph, 2nd sentence: In the executive summary of the main text, cobalt was also identified as a human health COPC. Please add cobalt to this list.

    Accepted. The text has been revised to say:
    "For soil, arsenic, barium, cobalt, lithium, manganese, radium-226, and radium-228 were identified as preliminary COPCs, with radium identified in all exposure units and in both depth intervals defined by the exposure scenarios (0-24'' and 0-7')."

19. Appendix D, Page 3, Section D-1.1, 3rd paragraph, 1st sentence: This sentence indicates that no COPCs were identified for surface water in the Eco Risk; however, boron, selenium, sulfate and chloride were identified as COPCs in the Eco Risk. Please edit this sentence.

    Accepted. The text has been revised to say:
    "The human health risk assessment (HHRA) identifies only boron as a preliminary COPC for surface water. The ecological risk assessment identified boron, selenium, and sulfate as preliminary COPCs in the SLERA. The HHRA identified a single EU to cover all surface water within the Units 3 & 4 EHP AOC Area (see Figure 5 in the main CCRA document), while the ERA evaluated surface water both as a single EU and discrete surface water bodies. 95% UCLs were calculated only for the single EU scenario due to sample size limitations with the discrete water body data sets."

    In addition to the text revisions:
    Selenium and sulfate were added to Table D-2.1 with a 95% UCL for each included in the section. Due to the low frequency of detection for selenium (4 uncensored observations out of 41 total observations in surface water), a 95% UCL for selenium is highly sensitive to the method to account for censored observations. A 95% UCL was calculated for selenium using half the detection limit, but it will be assisted with a range of 95% UCLs that were estimated from other methods that account for spatial dependence and censorship as well as the range of RLs.

    Note: Chloride has been removed as a preliminary COPC in the SLERA.

20. Appendix D, Page 3, Section D-1.1, 3rd paragraph, 2nd sentence: These constituents do not match those listed in the main text Executive Summary or the Ecological Risk (Appendix C) Executive Summary. Please check these constituents against the other sections. Also, please clarify which stage of the Eco Risk is being referred to when discussing "preliminary COPCs" (i.e., SLERA, SLERA refinement, etc.).

    Accepted. The text has been revised to:
    "The SLERA identified antimony, arsenic, barium, boron, cadmium, manganese, selenium, and radium-228 as preliminary COPCs in at least one soil area. Antimony and cadmium were eliminated as ecological COPCs in SLERA refinement based on low frequency of detection (< 5% of samples). 95% UCLs were calculated for arsenic, barium, boron, manganese, selenium, and radium-228 for use in SLERA refinement and the baseline ERA in the soil areas where they were identified as preliminary COPCs. Due to the low frequency of detection for selenium (8 uncensored observations out of 32 total observations in the DP-3 area and 4

uncensored observation out of 18 total observations in the DP-5 area), a 95% UCL for selenium is highly sensitive to the method to account for censored observations. A 95% UCL was calculated for selenium using half the detection limit, but it will be assisted with a range of 95% UCLs that were estimated from other methods that account for spatial dependence and censorship as well as the range of RLs."

21. Appendix D, Page 17, Table D-3.2: Please indicate what the bolded concentrations in this table represent.

    Accepted. The table caption has been updated to say:

    "The maximum concentrations of the field duplicate pair are displayed in bold."

22. Appendix D, Page 19, Section D-3.2.5, last sentence: Page 59, Table 10-13 indicates that if the radium concentrations were less than zero (negative value), then zero was used as a proxy value when calculating the radium 226+228 average (in groundwater). However, average radium concentrations in soil were calculated using the negative value. Please explain why the negative values were treated differently in the soil analysis versus the groundwater analysis, and cite a reference that discusses how these negative values should be treated in soil and groundwater.

    Accepted. Negative values typically indicate that the radiation count from the instrument was less than the long-term average background radiation typically reported by the instrument (TROYER and others, 1991; cited in Caldwell and others, 2014). There exist different methods for dealing with negative concentrations before carrying out calculations of statistical summaries over samples (Caldwell and others, 2014; Szabo and others, 2012), including the use of the reported negative values (NCRP, 1985). In general, one should investigate and describe sensitivity of 95% UCLs to the approach used for dealing with the negative reported concentrations. For these data, sensitivity was assessed by calculating the UCLs using both the negative values and substituting zero. Note that while substituting a negative concentration with zero before calculating a UCL will increase the average, it will decrease the standard deviation, meaning the UCL can increase or decrease as a result of the decision. The results for these data (both ground water and soil) were not sensitive to the approach, but it was decided to use the method of substituting negative values with a value of zero for both media. In addition, the method of substituting negative values with a value of zero is consistent with the approaches used at the Plant Site and the Units 1&2 SOEP/STEP area.

    References added:

    Caldwell, R.R., Nimick, D.A., and DeVaney, R.M., 2014, *Occurrence and hydrogeochemistry of radiochemical constituents in groundwater of Jefferson County and surrounding areas, southwestern Montana, 2007 through 2010*: U.S. Geological Survey Investigations Report 2013–5235, 58 p., plus appendixes, http://dx.doi.org/10.3133/sir20135235

    National Council on Radiation Protection and Measurements. A handbook of radioactivity measurements procedures. Bethesda, MD: National Council on Radiation Protection and Measurements; NCRP Report No. 58, 2nd ed.; 1985.

Szabo, Z., dePaul, V.T., Fischer, J.M., Kraemer, T.F., and Jacobsen, Eric, 2012, *Occurrence and geochemistry of radium in water from principal drinking-water aquifers of the United States:* Applied Geochemistry, v. 27, p. 729– 752.

Troyer, G.L., Jones, R.A., and Jensen, Louis, 1991, *The utility of reporting negative counting values*: Radioactivity and Radiochemistry, v. 2, no. 1, p. 48–56.

23. Appendix D, Pages 43-45, Figures D-2.2 through D-2.5: Please clarify why dissolved concentrations are presented here; surface water data should be total concentrations per DEQ-7 guidance. Additionally, Table E-1 in Appendix E presents surface water data with total concentrations (with the exception of Ca and Mg), which differs from the data presented in the Figures. Please clarify.

    In accordance with Talen's Groundwater Monitoring Plan (Talen Montana, LLC Colstrip Steam Electric Station Water Resources Monitoring Plan, Revision 6 July 1, 2015), surface water samples are analyzed for dissolved metals. As such, a very limited number of total samples were available in the surface water dataset. Specifically, 5 samples for total recoverable concentrations of boron were available and 3 of those samples were non-detect. The two samples with detectable total concentrations of boron were both collected from Cow Creek (0.6 and 1.1 mg/L). Approximately 40 dissolved concentrations of boron were available in the surface water dataset from several locations at the 3&4 EHP. Hence, the dissolved concentration data were determined to be more representative of the surface water at the 3&4 EHP than the limited total concentration data and were used for the statistical analysis (boron 95 UCL = 2.8 mg/L). Table E-1 in Appendix E was incorrectly labelled as total concentrations. Please note that when this issue was explored to address DEQ's comment, a limited number of additional surface water data were located. As such, the statistics have been updated in the revised CCRA. Text has been added to Appendix D and the report (Section 10.1) to clarify why dissolved surface water concentrations were used. Lastly, Table E-1 in Appendix has been corrected.

24. Appendix F: There are several exceedances of the DEQ-7/MCL thallium standard presented in this chart. Please include a discussion regarding these exceedances in the 3&4 EHP area, including why thallium was not flagged as a COPC (i.e., did background data had comparable concentrations?).

    Appendix F presents the groundwater data collected from the wells installed under the Federal Coal Combustion Residuals (CCR) Rule and is included as reference to data presented in report Table 3 (Screening for the Identification of Groundwater Constituents of Interest). Under the CCR Rule, the data in Appendix F were screened against USEPA MCLs (or Tapwater RSLs if MCLs were not available). As such, the exceedances shown in Appendix F are concentrations greater than USEPA MCLs or RSLs, not DEQ-7 Standards. The data in Appendix F, which are almost entirely Total Recoverable thallium concentrations (in accordance with the CCR Rule), are not directly comparable to the DEQ-7 standard, which is a dissolved concentration. Thallium groundwater exceedances shown in Appendix F are total recoverable concentrations exceeding the MCL. A limited number of dissolved thallium concentrations were available and did not exceed the DEQ-7 standard.

The CCR well data were used to assist in the identification of groundwater COPCs/COIs as described in Section 3.0 Identification of Constituents of Interest. Table 3 presents the comparison of 3&4 EHP pond data to the CCR well data (although not directly comparable) and to the BSLs (which were directly comparable because they are dissolved concentrations). As shown in Table 3, thallium was not selected as a COPC because the concentrations in the ponds were greater than the MCL standard and equal to the BSLs; while the concentrations in the CCR wells were less than the DEQ-7 Standard and equal to the BSLs. Please note that a correction has been made to Table 3 to indicate the maximum pond water concentration (a total concentration) was greater than the MCL, rather than the DEQ-7. A correction has also been made based on further analysis of the development of the BSLs that the CCR Well data are equal to the BSLs. Footnotes (6) and (7) have also been added to Table 3 for clarification regarding comparison to a total concentration in the pond water, as well as directing the reader to a new text section (Section 10.6).

Additional text was added for clarification in Section 4.1 Sources of Facility Chemicals and Affected Environmental Media indicating the use of total concentrations results in a conservative bias. In addition, the table note in Appendix F describing comparison to the USEPA MCLs has been revised for clarity. Furthermore, a new Section (10.6 Evaluation of Thallium Concentrations in Groundwater) has been added to the report as shown below. Lastly, after discussions with DEQ, thallium will not be identified as a COI/COC; however, it will remain a COPC. Thallium will continue to be monitored and evaluated in groundwater as part of the Federal CCR Rule compliance monitoring and continue to be evaluated under the AOC.

10.6 EVALUATION OF THALLIUM CONCENTRATIONS IN GROUNDWATER

Thallium was not flagged as a groundwater COPC during the screening process for COIs (see Sections 1.3 and 3.0 and Table 3). However, because a limited number of groundwater samples collected from wells located around the process pond perimeter and used as part of the Federal CCR Rule compliance monitoring had total thallium concentrations greater than the MCL, thallium concentrations in groundwater were further evaluated as presented within this section.

Groundwater samples collected under the Federal CCR Rule compliance monitoring were largely analyzed for total thallium concentrations in accordance with that Rule. However, note that a limited number of samples were analyzed for dissolved thallium concentrations, which did not exceed the DEQ-7 Standard for thallium.

As shown in Table 3 in the "Rationale for Selection or Deletion" column, thallium data were evaluated as follows:

- The available pond water data (a total concentration) was greater than the MCL. Dissolved concentrations in the pond water data were not available for comparison to the DEQ-7 Standard.
- The available pond water data point (0.0048 mg/L [total thallium]) was determined to be approximately equal to the BSLs, which ranged from 0.0003 to 0.05 mg/L (dissolved concentrations; Neptune, 2017). Dissolved concentrations in the pond water data were

not available for comparison to the BSLs, which resulted in a conservative bias in determining the representativeness of background.

- The dissolved thallium concentrations available in the CCR Well data set were less than the DEQ-7 Standard.
- The dissolved thallium concentrations available in the CCR Well data set, which ranged from 0.0005 to 0.0018 mg/L were roughly equal to the BSLs, which ranged from 0.0003 to 0.05 mg/L. Note that the dissolved thallium concentrations in the CCR Well data set were less than the pond water total thallium concentration.
- The comparison of the pond water and CCR well data indicated thallium was not migrating from the 3&4 EHP to groundwater.

Thallium BSLs

A review of the data used to develop the thallium BSLs was necessary to appropriately compare 3&4 EHP pond water and CCR Well data to background data. Thallium BSLs were developed by hydrostratigraphic unit (Neptune, 2017). A summary of the data used to develop the thallium BSLs is presented in Table 10-15 below. The following should be noted:

- Thallium BSLs were based on dissolved concentrations.
- Thallium was not present in the background data at detectable concentrations; however, the laboratory detection limits were wide-ranging.
- The laboratory detection limits ranged approximately four orders of magnitude from 0.0003 mg/L to 1.0 mg/L.
- Statistical approaches were used to establish thallium BSLs based on the laboratory detection limits, but generally were established near the lower end of the detection limit ranges.

Table 10-15 Summary of Data* Used to Develop the Thallium BSLs and Comparison to 3&4 EHP Data

Hydrostratigraphic Unit	Alluvium	Spoils	Clinker	Coal-Related	SubMcKay
Number of Wells	11	12	0	12	6
Number of Samples	30	23	0	38	42
Detection Frequency (%)	0	0	NA	0	0
Range of Detection Limits (dissolved)	0.0003 – 0.5	0.001-0.05	NA	0.0002 – 0.005	0.0003 – 1.0
BSL (mg/L) (dissolved)	0.0005	0.05	NA	0.0003	0.0003
3&4 EHP Pond Water (total)	0.0048				
CCR Well Data (dissolved)	0.0005* – 0.0018				
MCL (mg/L) (total)	0.002				
DEQ-7 (mg/L) – (dissolved)	0.002				

Notes:
BSL Baseline Screening Level
Data* Final Report on Updated Background Screening Levels (Neptune, 2017)
DEQ-7 Montana Department of Environmental Quality Groundwater Standard
MCL Maximum Contaminant Limit
mg/L milligrams per liter
NA Not Available/Not Applicable
0.0005* Note that the laboratory detection limit in the CCR Well data of 0.0005 mg/L is greater than the lowest detection limit in the data used to develop the BSL, as well as lower than the Coal- Related and SubMcKay BSLs.

The pond water data and the CCR Well data were both determined to be equal to the thallium BSLs for the following two main reasons:

- Neither the pond water, nor the CCR well data, exceeded the upper end of the thallium BSL range of 0.05 mg/L.
- The thallium BSLs were based on laboratory detection limits that ranged widely, rather than on actual detectable background concentrations.

Summary of Findings for Thallium under the Federal CCR Rule

Groundwater data are collected and evaluated at the 3&4 EHP in accordance with the Federal CCR Rule and those data were used to supplement the selection of groundwater COPCs/COIs under the AOC (see Section 1.3). Statistical procedures were used to evaluate the groundwater data collected under the Federal CCR Rule. All statistical procedures used in evaluating groundwater monitoring data collected at the Colstrip SES CCR units were conducted in a manner consistent with the USEPA's Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities Unified Guidance (USEPA, 2009b) and the Electric Power Research Institute's (EPRI) Groundwater Monitoring Guidance for the Coal Combustion Residuals Rule (EPRI, 2015).

Statistical methods conducted in 2018 included those used to establish background concentrations of Appendix IV constituents [§257.93(d)]; establish a groundwater protection standard for each detected Appendix IV constituent [§257.95(h)]; and determine whether a statistically significant level (SSL) occurred, as evidenced by concentrations of Appendix IV constituents in excess of groundwater protection standards (GWPS) at downgradient wells [§257.95(g)]. Confidence intervals around the mean are the method of statistical choice when compliance point data are to be compared to a fixed standard (e.g., a MCL or GWPS), as confidence intervals contain the true average of the underlying population and account for variability in sample data (USEPA 2009b). A 95% (α = 5% significance) lower confidence limit (LCL) on the mean was calculated for each well/constituent pair for normally distributed Appendix IV constituents with ample detection frequency for statistical evaluation. Non-parametric statistics, typically a confidence interval on the median, were used to establish levels of Appendix IV constituents that were not normally distributed and that could not be normalized, (potentially due to high fractions of non-detectable concentrations). A desired confidence level of 95% (α = 5% significance) was targeted; but actual confidence intervals for non-parametric LCLs were calculated based on sample size and rank. As noted in Unified Guidance (USEPA 2009b), it is possible or even likely for non-parametric confidence limits (upper or lower) to be equal to the reporting limit (RL) used for non-detects.

Thallium was detected in one sample collected from one of the McKay background wells (WM-127) but went undetected in all samples collected from the other two McKay background wells (601M and 1182M-CCR). Similarly, thallium was detected in a single sample at one sub-McKay background well (1020D) but not the other (1138D). None of the thallium concentrations at the CCR Rule background wells were above the MCL of 0.002 mg/L at the 3&4 EHP; thus, the GWPS was established as the MCL for statistical comparison to compliance well data.

Statistical comparisons of thallium confidence limits to the GWPS were made on an individual well basis. The detection frequency of thallium ranged from 0% (all non-detects) to 50% at well 622D-P. Non-detects were reported for every sample (0% detects) in 13 of the 32 compliance wells. Another 15 of the 32 3&4 EHP compliance wells only had one detectable concentration of thallium (6 – 7% detection frequency). Given the extremely low detection frequencies at individual wells, nearly all of the 95% non-parametric confidence intervals (LCLs and UCLs) were equivalent to the reporting limit, which was typically 0.0005 mg/L. The exception was well 622D-P, where the detection frequency (50%) allowed for the mean and standard deviation of the data-set to be estimated using the Kaplan Meier censored estimation technique; and a 95% parametric LCL was calculated to be 0.00062 mg/L. Thus, the highest LCL calculated for any of the compliance wells was still much less than the GWPS and no SSLs were determined for thallium. As such, no remedial action is required for thallium in groundwater under the CCR Rule (although thallium will continue to be monitored under the CCR Rule compliance monitoring).

Summary

In summary, thallium was not retained as a groundwater COI; however, it will remain a COPC while additional thallium groundwater data are collected. The further evaluation of thallium groundwater concentrations is summarized below:

- Thallium was not found to be migrating from pond water to groundwater because the pond water was greater than the MCL (and conservatively also greater than the DEQ-7 Standard), but the CCR Well groundwater data (dissolved concentrations) were less than the DEQ-7 Standard.
- The pond water and CCR Well groundwater data were both determined to be representative of background concentration ranges (i.e., BSLs).
- Thallium had a very low detection frequency in the CCR Well groundwater samples (6 – 7%).
- Thallium was not found to have a statistically significant level indicating no remedial action is required under the CCR Rule (although thallium will continue to be monitored under the CCR Rule compliance monitoring).

In conclusion, because a limited number of groundwater samples collected from wells located around the process pond perimeter and used as part of the Federal CCR Rule compliance monitoring had total thallium concentrations greater than the MCL, as a conservative measure thallium will remain a COPC while additional groundwater data are collected. Thallium will continue to be monitored and evaluated in groundwater. In addition, thallium will be monitored in groundwater as part of the Federal CCR Rule compliance monitoring and continue to be evaluated under the AOC.

25. Appendix H, Page 14: Please fix the typo in the first row of the spreadsheet under the "K_d" column.

    The NJDEP SPLP spreadsheet is locked and therefore the column could not be expanded to accommodate the value. In the lower right-hand side of the page, the value has been copied with an explanation.

Responses to DEQ Comments on the 3&4 EHP Cleanup Criteria and Risk Assessment Comment Responses dated 5/24/2019
DEQ Comments dated 6/7/2019

1. General Comment: Please provide a clear explanation that "censored data" means non-detect data.

   Accepted. Section 5.3 Statistical Data Analysis was added to the report to provide a brief discussion of and introduction to the comprehensive statistical analysis presented in Appendix D. An explanation of "censored data" is provided within this new section.

2. Response to Comments, Page 2, first paragraph before "(1) Stream Flow Occurs…": Please add language stating that Cow Creek and South Fork Cow Creek meet the definition of an ephemeral stream along the reaches that are within the 3&4 Pond area.

   Accepted. The suggested language has been added to Section 2.3.3 Surface Water.

3. Response to Comments, Page 14, Comments 19 and 20: As per DEQ FAQs on non-detects, DEQ recommends the use of ProUCL suggestions for handling non-detect or censored data and does not suggest halving the detection limit for undetected compounds. Please revise as necessary.

   Partially Accepted. Section D-1.3.4 Tradeoffs When Choosing Among Methods has been added to Appendix D to discuss the handling of non-detect (or censored) data and ProUCL guidance. Ultimately, the statisticians at Neptune and Company, Inc. (Neptune) disagree with some of the recommendations and approaches currently used by ProUCL. Please note that the ProUCL guidance indicates "It should be pointed out that a typical simulation study cannot cover all data sets … the user/project team may select the most appropriate UCL based upon the site CSM [Conceptual Site Model], expert site knowledge, toxicity of the analyte, and exposure risks associated with that analyte. ***The project team should make the final decision regarding using or not using the suggestions/recommendations made by ProUCL. If deemed necessary, the project team may want to consult a statistician.****" In other words, ProUCL was generally developed for use by non-statisticians. ProUCL guidance recognizes that for various data sets, statisticians should be consulted. The statistical analysis (Appendix D) to support the CCRA was prepared by a team of statisticians, including PhD statisticians, at Neptune using statistical software (R), which is an advanced software with capabilities beyond those available within ProUCL.*

   Lastly, please note that Neptune was recently awarded a contract with the USEPA to revise and correct various recommendations and approaches used in ProUCL. As such, Neptune is presently the USEPA's administrator of the ProUCL software. Updates and corrections to ProUCL are expected to occur within the next few years.

Responses to DEQ Comments on the 3&4 EHP Cleanup Criteria and Risk Assessment Comment Responses dated 6/26/2019
DEQ Comments dated 7/30/2019

Leaching to Groundwater/SPLP Comments:

1. The NJDEP SPLP Spreadsheets provided in Appendix H should use DEQ-7 standards (where available) rather than New Jersey Health-based GWQC. If a DEQ-7 standard is not available, the EPA MCL/SMCL or the Tapwater RSL should be used. Specifically, the following standards should be changed:
    a. Arsenic DEQ-7: 10 µg/L
    b. Barium DEQ-7: 1,000 µg/L
    c. Cobalt DEQ-7: None, use Tapwater RSL of 6 µg/L
    d. Manganese DEQ-7: None, use EPA SMCL of 50 µg/L

    Please change the text in Section 10.2 as necessary to reflect changes in pass/fail results.

    Accepted. The SPLP spreadsheets in Appendix H have been updated to use the standards listed in DEQ's above comment. The text in Section 10.2 has been revised to reflect the spreadsheet changes.

Specific Ecological Risk Assessment Comments:

1. Page 6: It is not clear why the yellow billed cuckoo, sage grouse and bald/golden eagles were excluded from the ecological risk assessment. Please further discuss the exclusion of these species of concern from the risk assessment.

    The following text has been added to the discussion on Pages 6 and 7:
    "The Yellow-billed Cuckoo inhabits prairie riparian forests and may utilize streamside cottonwoods during migration. For breeding purposes, the western subspecies of yellow-billed cuckoo requires patches of at least 10 hectares (25 acres) of dense, riparian forest with a canopy cover of at least 50 percent in both the understory and overstory (Montana Natural Heritage Program and Montana Fish, Wildlife, and Parks, 2019). Such habitat is not present in the area of the 3&4 EHP to support breeding yellow-billed cuckoos. According to the Montana Field Guide developed by the Montana Natural Heritage Program and Montana Fish, Wildlife, and Parks (http://FieldGuide.mt.gov/speciesDetail.aspx?elcode=ABNRB02020), there are only 18 records of yellow-billed cuckoo in Montana (all during the months of June and July), and no direct evidence of breeding in the state. Given the lack of suitable habitat for yellow-billed cuckoo within the 3&4 EHP area, the yellow-billed cuckoo is not considered a receptor of concern for this risk evaluation."

    "The greater sage grouse inhabits sagebrush habitats throughout central and eastern Montana, including much of Rosebud County. The United States Fish and Wildlife Service (USFWS) published a finding in October 2015 on a petition to list the greater sage grouse as endangered or threatened across its range, including Montana. The 2015 finding concluded that listing of the greater sage grouse was not warranted. Greater sage grouse is considered an S2 species of concern in Montana, meaning populations are at risk because of very limited and/or potentially declining population numbers, range and/or habitat. Due to the USFWS finding that greater sage grouse listing as a T&E

species was not warranted, greater sage grouse was not selected as a special status receptor in this risk assessment. Protection of greater sage grouse populations at the site is covered through the surrogate species selected to represent avian omnivores in the risk assessment."

"Individual golden eagles range widely, and nesting golden eagles require 55 - 105 square miles per nesting pair. Due to their large foraging area requirements, exposure of eagles to any individual area within 3&4 EHP is expected to be small. Because the chemicals of potential concern at the site do not biomagnify in the food chain, exposure of eagles and other wide-ranging top-level carnivores to the COPCs is expected to be less than to lower trophic-level birds with home ranges more aligned with the size of the areas of potential releases. Therefore, bald eagles and golden eagles were not selected as receptors of concern for this risk assessment."

2. Page 11, Table C-4 BERA: Aquatic plants and invertebrates are not mobile or of limited mobility. Please explain why all surface water areas were included instead of doing the analysis on an area-by-area basis (i.e., protection focused at the site-wide population level?) or update the table to clarify where data availability allowed, aquatic plants and invertebrates were looked at on an area-by-area basis. If there is a dearth of data, selenium, boron, and sulfate may need to be added to the routine, yearly surface water sampling events.

   Three constituents (boron, selenium, and sulfate) had maximum concentrations in any area exceeding screening levels. 95% UCL concentrations were calculated for these three constituents across all areas to increase the robustness of the data set. 95% UCL concentrations of boron and selenium calculated across all data exceeded the screening level and so these constituents were carried forward to the BERA. In the BERA, discussion is provided as to the specific areas where exceedances sample results exceeded aquatic life criteria.

3. Page 11, Table C-4 BERA: The comparison of surface water concentrations of boron, sulfate, and selenium to aquatic plant and invertebrate surface water screening values could not be found in the text. In addition, amphibians should be included in this discussion.

   A discussion of the potential effects of boron and selenium to non-fish aquatic life has been added to Section 4.2.1. A discussion of the effects of sulfate on aquatic life has been added to Section C-4.3 (Uncertainties) since sulfate was not carried through to the BERA.

4. Page 28, C-4.1.2 Ecological Screening Refinement Results: This section should describe what surface water screening levels were used to ensure the surface water is free from substances that "create concentrations or combinations of materials which are toxic or harmful to human, animal, plant or aquatic life" [ARM 17.30.637 (1) (d)].

   The following text has been added to Section C-4.1.2. "The ecological screening levels for surface water and soil used in this step of the refinement are the same as used in the preliminary screening. For surface water, DEQ-7 values for protection of aquatic life were

used where available, even though according to Administrative Rules of Montana (ARM) 17.30.637, ephemeral streams are not subject to the specific water quality criteria identified in In Montana Circular DEQ-7 for the protection of aquatic life. Ephemeral streams are subject to the ARM requirement that the water must be free from substances that "create concentrations or combinations of materials which are toxic or harmful to human, animal, plant, or aquatic life." [ARM 17.30.637(1)(d)]. Any alternatives to the DEQ-7 values are presented as part of the BERA."

5. Page 31, C-4.1.2 Ecological Screening Refinement Results, first paragraph: The text states sulfate will be discussed in the uncertainty discussion. This discussion on sulfate cannot be located. In the uncertainty discussion, please note background sulfate surface water concentrations.

   The following text has been added to the uncertainty discussion: "Limited aquatic life information are available to assess the potential for sulfate toxicity to aquatic life in waters where fish are not expected to be present. The British Columbia Ministry for the Environment published aquatic life criteria of 429 mg/L for sulfate (BCME, 2013) in water with hardness of 250 mg/L, but the recommended guidelines were based on protection of early life-stage rainbow trout, which were the most sensitive organism tested. Results also showed that sulfate toxicity was hardness dependent, and guidelines were only published for hardness values up to 250 mg/L, with the recommendation that site-specific water should be tested for hardness values greater than 250. Hardness in the majority of site water samples was over 400 mg/L, and ranged as high as 4,000 mg/L. A variety of fish, invertebrate, plant, and amphibian studies were evaluated by BCME for incorporation into aquatic life criteria development. Sulfate EC_{10} concentrations (the concentration at which 10% of the test organisms exhibit effect) for non-fish test organisms ranged from 253 mg/L for the waterflea Ceriodaphnia dubia to 2,548 mg/L for the algae Pseudokirchneriella subcapitata at the maximum tested hardness of 250 mg/L. The authors suggest that increased toxicity with water hardnesses above 160 mg/L for C. dubia may be due to osmotic stress presented by total ionic strength of the water, and not solely due to sulfate toxicity. Maximum sulfate concentrations exceed the range of EC_{10} concentrations presented in BCME (2013), however there is uncertainty how those concentrations apply to 3&4 EHP waters where water hardness greatly exceeds the maximum hardness evaluated in development of the BCME sulfate criterion. Use of the livestock drinking water standard may overestimate or underestimate risk to non-fish aquatic life."

6. Page 41, C-4.2.1 Surface Water, Aquatic Life, second paragraph: For the CCME number, please clarify which species drove the final 1500 ug/L protective level. If it was fish, fish can be removed, and invertebrates, amphibians, and plants should be examined to determine if site concentrations would pose a threat to receptors present at the site.

   The following text has been added to Section 4.2.1 on page 42: "The CCME value of 1,500 µg/L represents the 5th percentile effects level derived from the 28 studies mentioned above, of which six were based on fish toxicity endpoints. As discussed, fish are not appropriate receptors for the site due to the ephemeral nature of site surface water. If the six fish studies are removed and the 5th percentile effects level is calculated based only on the invertebrate, amphibian, and plant studies, the 5th percentile toxicity threshold is estimated at 2,100 µg/L."

7. Page 41, C-4.2.1 Surface Water, Aquatic Life, fourth paragraph. Please provide context for comparison to the maximum upstream boron concentration of 7,000 µg/L (i.e., is this a background concentration due to mine operations?). A two-sample hypothesis test can be performed on background sample population and site population to determine if background concentrations of boron are significantly different than boron concentrations in the 3 & 4 EHP area in the Cow Creek and S. Fork Cow Creek drainages. If they are significantly different, the compound should be retained as a COPC and comparison to the maximum background concentration is not appropriate since the ephemeral creeks in the 3&4 area are not influenced by upgradient mining.

   The paragraph has been revised to remove the reference to the maximum boron concentration in the upstream area of the East Fork Armells Creek drainage. Surface water background comparisons were not used to eliminate chemicals from consideration as COPCs in the 3&4 EHP areas, and the paragraph has been revised to state such.

Table and Text Updates:

1. Page 17, C-4.1.1. Preliminary Screening of COPCs, Surface Water, first sentence: Please check the accuracy of this reference. It appears that the surface water data is presented in Table C-9, not C-10.

   Accepted. Callout has been changed to Table C-9.

2. Page 21, Table C-9, Preliminary Screening of Surface Water: Please add Boron to this table.

   The referenced table on Page 21 is a continuation of the table on Page 20. Boron in West Seep Diversion is listed on Page 20. The table has been reformatted so that all of West Seep Diversion is on Page 21, and the heading has been revised to make it clear that the table is continued from the previous page.

3. Page 30, C-4.1.2 Ecological Screening Refinement Results, first paragraph, second sentence: Please update the table reference from Table C-18 to Table C-19.

   Accepted. Reference has been changed to Table C-19.

4. Page 40, C-4.2 Baseline Ecological Risk Characterization, first sentence: Please add selenium to the list of COPCs carried forward for evaluation in the 3&4 EHP area soils as shown in tables C-24 &C-27.

   Accepted. Selenium has been added to the list of COPCs carried forward for evaluation in soil.

5. Page 41, C-4.2.1 Surface Water, Aquatic Life, first paragraph, second sentence: Please change manganese to selenium.

   Accepted. Manganese has been changed to selenium.

6. Page 50, Table C-40, Food Chain Model Dose Calculations for Masked Shrew as Surrogate for Insectivorous Mammals: Please explain why the selenium 95 UCL water concentration of 65 µg/L (the maximum concentration at Cow Creek 3, which is not near DP3) was used instead of the site-wide 95 UCL of 7.3.

   The water concentration has been changed to the site-wide 95 UCL of 7.3 ug/L. It was also noted that the dose calculation for masked shrew had incorrectly transposed the water ingestion rate of 0.0005 L/d and the incidental soil ingestion rate of 0.000084 kg/d. This error has been corrected and doses and HQ values updated accordingly. The slight change in calculated dose and HQ values for selenium in DP5 soil do not change the risk conclusions for selenium in soil.

7. Tables C-38 – C-40: Please note what food chain model was used and insert a reference to the model.

   The following text has been added to Section C-4-2.2, Terrestrial Wildlife: "Average daily doses to wildlife receptors were calculated using Equation 3 presented in Section C-4."

8. Page 41, C-4.2.1 Surface Water, Aquatic Life, third paragraph, second sentence: This sentence states a 95 UCL EPC was not calculated for selenium due to its low frequency of detection, but Table C-19 shows a 95 UCL of 7.3 ug/L and C-4 states for the BERA surface water will be assessed using the 95 UCL (all locations). Please clarify throughout the document how surface water was analyzed.

   The text has been modified to read: "The 95 UCL for selenium in surface water of 7.3 µg/L should be used with caution because of the large number of non-detects in the data set. Selenium was only detected in four out of forty-one surface water samples. In addition, reporting limits for selenium non-detects in surface water (5 ug/L) were equal to the surface water screening criteria. The 95 UCL was calculated using one-half the LOD as a substitution for non-detected values. Of the four detects samples, only the maximum concentration observed in CC3 (65 µg/L) exceeded the selenium surface water LOAEL value of 20 µg/L."