Record of Decision

Mission Wye Facility

Livingston, Montana

Prepared by:
Montana Department of Environmental Quality
Waste Management and Remediation Division
Helena, Montana
March 20, 2020

Part 1

Declaration of the ROD

Declaration of Record of Decision

FACILITY NAME AND LOCATION

The Mission Wye (MWYE) Facility is a high priority State Superfund facility listed on the Montana Comprehensive Environmental Cleanup and Responsibility Act (CECRA) Priority List. The MWYE Facility is located outside of Livingston and within Park County, Montana.

STATEMENT OF BASIS AND PURPOSE

This decision document presents the Montana Department of Environmental Quality's (DEQ's) selected final remedial action for the MWYE Facility and was developed in accordance with CECRA.

The remedial action set forth in the Record of Decision (ROD) is based on the identified administrative record, which consists of the documents DEQ cited, relied upon, or considered in selecting the remedy for the MWYE Facility. The administrative record is identified in Part 2, Section 14. The complete administrative record is available for public review at the office of DEQ's Waste Management and Remediation Division, located at 1225 Cedar Street in Helena, Montana.

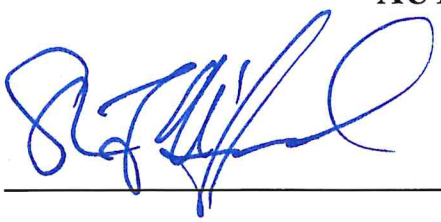
ASSESSMENT OF THE FACILITY

DEQ is authorized to take remedial action whenever there has been a release or a threatened release of a hazardous or deleterious substance into the environment that poses or may pose an imminent and substantial endangerment to the public health, safety, or welfare, or the environment. Section 75-10-711, Montana Code Annotated (MCA). CECRA defines a hazardous or deleterious substance in § 75-10-701(8), MCA. The primary contaminants remaining at the MWYE Facility are tetrachloroethylene (PCE) and trichloroethylene (TCE). These contaminants are described in Part 2 of the ROD. DEQ has determined that these contaminants are hazardous or deleterious substances under CECRA. Based on the administrative record, DEQ has determined that contaminants have been spilled, leaked, discharged, leached, dumped, or disposed into the environment, which constitutes a release or threatened release under § 75-10-701(19), MCA.

The potential for an "imminent and substantial endangerment to public health, safety, and welfare, or the environment" is present when contaminant concentrations in the environment exist or have the potential to exist above risk-based screening levels (Administrative Rules of Montana (ARM) 17.55.102) and an imminent and substantial endangerment does exist if contaminant concentrations exceed site-specific cleanup levels (SSCLs). DEQ has determined that hazardous or deleterious substances at the MWYE Facility exceed risk-based screening levels and SSCLs. See Table 5, and Part 2, Section 8.0 of the ROD. Therefore, DEQ has determined that a release or a threatened release of hazardous or deleterious substances from the MWYE Facility poses an imminent and substantial endangerment to the public health, safety, or welfare, or the environment and further remedial action is necessary. In selecting the remedial action, DEQ evaluated the criteria found in § 75-10-721, MCA, as explained more fully in the Statutory Determinations section below.

account the total short- and long-term costs of the actions, including the cost of operation and maintenance activities for the entire period during which the activities will be required. DEQ has considered the public comment received during the public comment period on the Proposed Plan and responded to these comments in Part 3 of the ROD.

AUTHORIZING SIGNATURE



3/20/2020

Shaun McGrath
Director
Montana Department of Environmental Quality

Date

Part 2

Decision Summary

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Acronyms

ACM	Asbestos Containing Material
ALS	Asphalt-like Substance
ARM	Administrative Rules of Montana
bgs	Below Ground Surface
BNSF	BNSF Railroad Company
CCR	Construction Completion Report
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CECRA	Comprehensive Environmental Cleanup and Responsibility Act
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
DAF	Dilution Attenuation Factor
DEQ	Montana Department of Environmental Quality
DEQ-7	Circular DEQ-7 Montana Numeric Water Quality Standards
EPA	U.S. Environmental Protection Agency
ERCLs	Environmental Requirements, Criteria, or Limitations
FS	Feasibility Study
GIS	Geographic Information System
IAM	Interim Action Memorandum
IAMA	Interim Action Memorandum Addendum
IC	Institutional Control
IRA	Interim Remedial Action
MCA	Montana Code Annotated
MCL	Maximum Contaminant Level
µg/cm	micrograms per centimeter
$\mu g/m^3$	microgram per cubic meter
mph	miles per hour
MNA	Monitored Natural Attenuation
MRL	Montana Rail Link, Inc.
MWYE	Mission Wye Facility
NCRS	U.S. Natural Resources Conservation Service
NOV	Notice of Violation
NPL	National Priorities List
O&M	Operation and Maintenance
PAH	Polycyclic Aromatic Hydrocarbon
PCE	Tetrachloroethene
RA	Risk Assessment
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
RSL	Regional Screening Levels
SC	Specific Conductivity
SCEM	Site Conceptual Exposure Model
SOW	Scope of Work

SSCL	Site-specific Cleanup Level
SVE	Soil Vapor Extraction
TCE	Trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbons
VI	Vapor Intrusion
VMP	Vapor Monitoring Point
VOC	Volatile Organic Compound

1.0 FACILITY NAME, LOCATION, DESCRIPTION

The Mission Wye (MWYE) Facility is a high priority Comprehensive Environmental Cleanup and Responsibility Act (CECRA – State Superfund) Facility located approximately five miles east of Livingston, Montana, in Park County. The Montana Department of Environmental Quality (DEQ) is overseeing remediation of the Facility under CECRA, §§ 75-10-701, et seq. Montana Code Annotated (MCA). (References to DEQ throughout this document include DEQ's predecessor agency, the Montana Department of Health and Environmental Sciences.) This Record of Decision (ROD) identifies DEQ's selected remedy for the MWYE Facility.

The MWYE Facility is approximately seven acres located in the Southeast ¼, Northwest ¼, of Section 35, Township 1 South, Range 10 East (Figure 1) northwest of the intersection of Interstate 90 and US Highway 89. Generally, the surficial boundaries are the "wye" of the former east and west bound railroad tracks that converged to a single track going north/south and the southern boundary is the active east and west bound railroad.

2.0 FACILITY HISTORY

2.1 Ownership and Operational History

Currently, Montana Rail Link, Inc. (MRL) and BNSF Railway Company (BNSF) own the real property that comprises the area that makes up the historical industrial landfill as discussed below in this Section. BNSF owns the real property along the active railroad line and MRL owns the real property to the north of the rail lines that makes up the "wye." Figure 2 presents the property boundaries and ownership. The original line now owned by BNSF was part of the Northern Pacific Railway Company, which merged, along with three other railroads, on March 2, 1970, to form Burlington Northern Railroad. On September 22, 1995, Burlington Northern Inc and Santa Fe Pacific Corp merged to become Burlington Northern Santa Fe Railway. In 2005, the company's name was changed to BNSF Railway Company (BNSF, 2020). References to BNSF throughout his document include BNSF's predecessors. MRL currently leases BNSF property for use by MRL's trains.

BNSF operated the MWYE Facility as an industrial landfill from approximately 1955 to 1979, which received waste from the Burlington Northern Livingston Shop Complex (Livingston Shop Complex), which is also a CECRA facility. The waste generated from the Livingston Shop Complex included debris from repair operations (AECOM, 2012).

The Livingston Shop Complex also had a reclamation plant on-site where useable oil was recovered and the waste generated from the plant was taken to MWYE. BNSF opened the reclamation plant in the mid-1950s and disposed approximately one truck load of clay waste per week to the landfill until it stopped using the landfill for disposal around 1977 (RETEC, 1991). The oil in the reclamation plant consisted primarily of crank case oil from the train engines and oil waste generated from shop complex maintenance. The pH of the clay source material was low due to the use of sulfuric acid in the reclamation process. This process separated the oil into two components: a light end phase referred to as "skunk oil" and a clay-like acid residue referred to as "acid clay waste." The skunk oil was put in tank cars to sell, and the acid clay waste was brought to the MWYE Facility for disposal (RETEC, 1991).

BNSF did not complete disposal records while it was operating the landfill. However, personal communication with BNSF staff occurred while gathering information for the Remedial Investigation (RI) (RETEC, 1991). These communications describe that one cell at a time was dug out and when each cell was filled approximately two to three feet from the top with clay source material, it was covered with soil excavated to form the next cell (RETEC, 1991). This practice resulted in four cells being dug containing the wastes generated from the Livingston Shop Complex and the reclamation plant. Asphalt-like substances (ALS) were identified in two areas referred to as the "North Parking Lot" and "Seep Area" (AECOM, 2012). The North Parking Lot area had a nine-inch thick layer of ALS on the surface of the soil and the Seep Area contains interbedded ALS seeps and soil cover material (AECOM, 2012).

2.2 Regulatory History

In 1981, BNSF filed a Notification of Hazardous Waste Facility form with the U. S. Environmental Protection Agency (EPA). Between 1984 and 1986, EPA evaluated the Facility to determine if placement on the National Priorities List (NPL) was appropriate. In 1987, the EPA determined that the Facility did not meet the criteria for NPL listing and declared no further action was warranted under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (DEQ, 1995a). The Department of Environmental Quality (DEQ) placed the Facility on the CECRA Priority List in January 1989.

On December 27, 1988, DEQ filed an action against BNSF in federal court for response costs, remedial action, declarative and injunctive relief, penalties, and natural resource damage claims for the Burlington Northern Livingston Shop Complex and the MWYE Facility. On April 27, 1990, DEQ and BNSF entered into a Modified Partial Consent Decree, Order, and Judgement (Modified Consent Decree) (DEQ, 1990a) and BNSF was deemed liable for all remedial costs of investigation, removal, and remedial action pursuant to the Modified Consent Decree. The Modified Consent Decree also addressed the approach to implement remedial actions at both facilities but did not resolve the issues of natural resource damages or the final remedies.

In 1995, the Montana legislature revised the remedy selection criteria in CECRA and included language specifying that the amendments did not apply to civil actions commenced prior to May 1, 1995, or to claims based on those actions, a legislative provision known as the savings clause. Civil actions were filed by DEQ for the MWYE Facility prior to that date. The way in which the savings clause was considered at the MWYE Facility is found in Sections 9.0 and 11.0.

In 1995, using information that BNSF provided in the RI and previous EPA investigations, DEQ prepared an Interim Action Memorandum (IAM) to direct interim actions at the MWYE Facility. The focus of the IAM was to address the clay source material and contaminated soil (DEQ, 1995a). After soliciting and considering public comment, DEQ selected thermal desorption and a vented pile system as the interim remedial action (IRA) (DEQ, 1995a). As required by the Modified Consent Decree, BNSF prepared work plans to proceed with implementing the IRA.

On July 23, 1997, DEQ issued a warning to BNSF during an inspection after the thermal desorption IRA ended, but ALS material was still being processed. It was identified that used oil containers were on-site at MWYE containing oil that needed to be further processing before being transported to Safety Kleen for disposal (DEQ, 1997). The oil was then sent to the Livingston Transfer station and was held there until it was ready to be disposed of at Safety

Kleen (DEQ, 1997). The warning was issued because the Livingston tankage and rail car area at the transfer station, where drums were stored, met the definition of "used oil transfer facility" under then-existing Administrative Rules of Montana (ARM) 17.54.309(5) (this rule was repealed and replaced in 2001). This meant that any used oil that is stored for more than 35 days had to be tested to determine if it was a hazardous waste prior to shipment. As a result of this warning, BNSF was required to analyze current and future used oil generated to determine if it was a hazardous waste prior to any off-site shipment in the future, as well as analyze oil that is currently stored at the Livingston transfer facility (DEQ, 1997). An additional provision of the warning letter required BNSF to provide details regarding notification to DEQ of any used oil activities.

Following this warning letter, on September 1, 1998, DEQ issued BNSF a notice of violation (NOV) under the Montana Hazardous Waste Act for failure to comply with land disposal requirements to provide notice and certification of de-characterized wastes shipped to the Subtitle D landfill in Great Falls, Montana (DEQ, 1998). The requirements identified in the NOV included the EPA hazardous waste number of the waste, the waste constituents to be monitored, the manifest number associated with the shipment of waste, and applicable waste analytical data. These were not provided as required, both by regulation and the warning letter, prompting the NOV. The violation led to DEQ issuing an order that required BNSF to provide High Plains Landfill a one-time notification and certification for disposing of hazardous wastes, provide documentation to DEQ that the notification and certification was provided, and pay a $1,200 penalty (DEQ, 1998).

In 2000, DEQ prepared an IAM Addendum (IAMA) to re-evaluate the IRAs because thermal desorption was proving to be an impractical alternative. The IAMA focused on remediating the rest of the contamination, including clay source material, ALS, spent carbon, contaminated soil, Seep Area, filter cakes, and debris (DEQ, 2000). DEQ solicited public comment on the IAMA and selected a number of interim remedies to address the remaining contamination, including excavation, soil vapor extraction (SVE), and disposal to a landfill or incineration.

In the following years, BNSF and DEQ negotiated potential revisions to the Modified Consent Decree but were unable to reach an agreement. On November 1, 2005, DEQ sent BNSF a letter that outlined the approach for final cleanup of the MWYE Facility. This letter required BNSF to prepare a Construction Completion Report (CCR) to summarize the IRAs completed and evaluate the results from the work to determine whether screening levels were met (DEQ, 1990). The screening levels used were the EPA regional screening levels (RSLs), DEQ Tier 1 risk-based corrective action screening levels for petroleum releases, and Montana Numeric Water Quality Standards (DEQ-7 standards) (DEQ, 2019a). The letter provided that, if exceedances occurred, then BNSF could propose site-specific cleanup levels (SSCLs) and amend the 1993 Risk Assessment (RA). In addition, BNSF was required to prepare a Feasibility Study (FS). When the Modified Consent Decree was later revised, this letter became Exhibit IV to the amendment (DEQ, 2007a).

2.3 Investigation History

There have been numerous investigations and IRAs that have taken place at the MWYE Facility. This section briefly describes the focus of each investigation and IRA.

In 1984, EPA performed a CERCLA preliminary assessment to evaluate the nature of contamination, potential pathways and receptors, and whether to include the MWYE Facility on the NPL (DEQ, 1995a). In 1986, EPA performed another investigation focused on determining the thickness of the aquifer and sampling groundwater for contamination. The presence of polychlorinated biphenyls and dioxin were also investigated (CH2M Hill and Ecology and the Environment, 1986). Based upon the results of the investigations, EPA determined that the MWYE Facility did not meet the criteria to be placed on the NPL. Subsequently, the MWYE Facility was placed on the CECRA Priority List in 1989 and DEQ became the lead agency.

From 1991 through 1992, BNSF performed a two-phased RI to determine the extent and magnitude of the contamination at the MWYE Facility. The work performed included installing wells and sampling the source areas, soil, and groundwater at the MWYE Facility. In addition, BNSF conducted sampling of sediment and surface water from low lying areas near the source area and Vallis Ditch (a former irrigation ditch), which transported non-potable irrigation water to field to the east of Highway 89 (RETEC, 1991). The samples were tested for volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), total metals, and toxicity characteristic leaching procedure (TCLP); TCLP is a method used by laboratories to determine whether the material is a Resource Conservation and Recovery Act (RCRA) characteristic waste. If the material is a RCRA waste, then it must be handled, treated, and disposed of in a specific manner. In addition, BNSF began monitoring groundwater routinely on a semi-annual basis while RI work was taking place (RETEC, 1991 and RETEC, 1992)

In 1993, DEQ approved the RA, which included an evaluation of the baseline of existing data and potential human health risks at the time, as well as a discussion of current and future land use. An ecological risk assessment was also conducted and it concluded the ecological risks are low (RETEC, 1993).

In June and July of 1995, BNSF prepared an IRA work plan, and DEQ solicited public comment on the document. After considering public comment, DEQ selected thermal desorption and the vented pile system as the main IRA technologies for the MWYE Facility and issued its IAM (DEQ, 1995a and RETEC, 1996). For clarification purposes, BNSF identified the vented pile system as an SVE system at the time. However, this ROD identifies it as a vented pile system to distinguish it from the SVE system that BNSF later installed in 2015. The thermal desorption ran until June 1997 when compliance and safety issues were identified, as discussed in Section 2.2. Operation of the vented pile system continued until December 1997.

In 2000, DEQ issued the IAMA to select different IRAs due to problems implementing thermal desorption and the vented pile system. These IRAs included the excavation and offsite disposal of ALS and impacted soils, and cleaning and backfilling rocks at the MWYE Facility. The area was then regraded and reseeded with wheatgrass.

The IRA work was summarized in the CCR and, despite the extensive work performed, exceedances of screening levels remained (AECOM, 2012). The exceedances prompted BNSF to amend the RA to include updates to site conditions and revisions to the SSCLs. DEQ solicited public comment on the amendment, and the RA Amendment was approved in 2014 (AECOM, 2014a and Bozeman Chronicle, 2014).

A separate investigation related to the RA Amendment included an evaluation of vapor intrusion (VI) risks. The evaluation concluded there is a potential for VI. Presently, the VI pathway is incomplete because no construction is planned and no permanent buildings are in place (AECOM 2014b).

Between 2014 and present, BNSF prepared the FS report to evaluate cleanup options at the MWYE Facility. The FS report includes a review of potential cleanup alternatives for the MWYE Facility (AECOM, 2020a). A description of the alternatives is provided in Section 9.0 of this ROD. In reviewing the FS, DEQ identified that an evaluation of the exposure pathway for the construction and utility worker in a trench was not included in the RA Amendment. This pathway includes the inhalation of vapors accumulating to unsafe levels in a trench or excavation; this evaluation identified that an unacceptable risk existed to the construction worker in an excavation (DEQ, 2018). Despite, no unacceptable risk to the utility worker, DEQ developed SSCLs for the utility worker and a construction worker and they are presented in Table 5 of this ROD (DEQ, 2018).

2.4 Interim Remedial Actions and Pilot Tests

The findings of the RI led to BNSF conducting a series of IRAs that started in 1995, as outlined in the IAM and IAMA. The work associated with the IAM and IAMA was focused on removing the clay source material and contaminated soil to reduce impacts to groundwater. An estimated 36,925 tons of contaminated material (clay source, ALS, soil etc.) were neutralized, excavated, or processed during the IRAs (AECOM, 2012).

2.4.1 Thermal Desorption and Removal of Perched Water

The IRAs selected in the IAM were thermal desorption, vented pile system, and excavations. Thermal desorption is a technology that utilizes heat to remove contamination by volatilization and a vented pile system aerates to remove contaminated soil by volatilization.

Water was perched on top of the North and South Cells and needed to be removed before the soil could be treated by thermal desorption. Perched water in the North and South Cells was removed, pumped through a filter, treated by an air stripper to remove contaminants and sprayed on a one-acre plot on BNSF's property. BNSF discontinued using thermal desorption in June 1997 because of difficulties in maintaining the unit's operation, overall low production rates, compliance issues, and safety and equipment problems (AECOM, 2012).

BNSF constructed a thermal desorption unit on the western side of the Facility to treat the contaminated soil. The thermal desorption operated until violations and safety issues became known and DEQ required it to be shut down.

2.4.2 Vented Pile and Off-Site Disposal

Upon termination of thermal desorption, a vented pile system was used to treat the remaining contaminated soil prior to offsite disposal. The vented pile system was constructed on the north-eastern side of the railroad wye (Figure 3). Contaminated soil was placed in four piles and covered with a non-porous liner (RETEC, 1997). Perforated pipes were placed within the piles and connected to a manifold and vacuum blower. The vacuum blower circulated air and was connected to two carbon canisters to remove contaminants that volatilized out of the soil. BNSF

collected samples from the vented soil and analyzed for TCLP VOCs and metals. When soils passed TCLP levels, BNSF shipped them to a Subtitle D Landfill in Great Falls, Montana, for disposal. DEQ discovered a violation under the Montana Hazardous Waste Act and issued BNSF an NOV in May 1998 (DEQ, 1998). This action lead to DEQ re-evaluating the IRAs included in the IAM and to require new ones in the IAMA.

2.4.3 Additional Waste Streams

The IAMA focused on additional waste streams, which included rocks, debris, spent carbon, and ALS wastes. The IRAs included a combination of excavation, sampling, and treatment of waste before off-site disposal (DEQ, 2000). In brief, the following briefly describes how each waste stream was treated.

Rocks were pressure washed, visually inspected for stains, and visually clean rocks were stock piled in 200-ton piles. A sample was collected from each pile to determine if the interim remediation goals were met. If the goals were met, the rocks were used as backfill (AECOM, 2012).

Debris found in the North, Center, South, and East Cells was sampled and analyzed for TCLP VOCs and metals. The results from the analyses indicated that all the debris samples passed TCLP VOC levels, but one sample failed for TCLP metals. Lime was added to treat the debris until it passed TCLP for metals. The debris was then disposed of at a Subtitle D Landfill in Great Falls (AECOM, 2012).

Spent carbon was generated from operating the thermal desorption unit, running the vented pile system, and treating water. The carbon was tested for TCLP (metals and VOCs), total VOCs, and pH for disposal options. The thermal desorption and vented pile samples did not pass TCLP for VOCs, and elevated levels of VOCs were detected. Therefore, the spent carbon used for the vented pile was incinerated in Aragonite, Utah, at a RCRA-permitted facility. The spent carbon used for water treatment did pass TCLP and it was shipped to the landfill in Great Falls.

The ALS waste was treated and excavated separately. It was mixed and neutralized with kiln dust and water. The ALS was processed through a soil stabilizer because it consisted of larger, solid material. Samples were analyzed for total VOCs, TCLP (VOCs and metals), metals, oil, grease, and halogens. The results indicated the ALS waste did not meet the interim remediation goals and was deemed RCRA hazardous waste. Therefore, the ALS waste was hauled off-site to Aragonite, Utah, to be incinerated at a RCRA-permitted facility. BNSF collected confirmation samples at the base of the excavations in the Seep Area and North Parking lot area and the samples met the interim remediation goals for VOCs but showed elevated levels of total petroleum hydrocarbons (TPH). Further excavation was done until the interim remediation goals for TPH were met (AECOM, 2012). BNSF completed the IAM and IAMA activities by 2000.

2.4.4 Confirmation Sampling

DEQ required BNSF to perform additional soil sampling following the completion of the IRAs described above because DEQ identified that BNSF had not completed confirmation sampling of all of the excavations (DEQ, 2004a). Due to these areas being previously backfilled with clean material, BNSF collected samples biasedly to target soil that appeared visually contaminated (i.e. stained). The samples were selected for analysis based on visual inspections, where biased

samples were collected to contain minimal clean fill material (ENSR, 2008). The samples were analyzed for VOCs, extractable petroleum hydrocarbons, and VPH. If clean material could not be differentiated from original contaminated soil, then samples were collected at depths between seven and 24 inches below ground surface (bgs). The results indicated exceedances of leaching to groundwater SSCLs, particularly between the South and East Cells (Figure 4). Residential SSCLs were exceeded in two samples collected and those samples were targeted as part of the 2015 soil tilling pilot study discussed below in this section.

2.4.5 Fire Brick Removal

In 2012, DEQ required BNSF to have the MWYE Facility inspected for asbestos because asbestos containing material (ACM) was used to fill areas under nearby railroad tracks, and asbestos was present at the Livingston Shop Complex, which was where waste found at the MWYE Facility originated (DEQ, 2012). DEQ conducted a visual inspection of the MWYE Facility, including the formerly used railroad beds, to determine if ACM was present (DEQ, 2013a). Firebrick was uncovered on the formerly used railroad bed and samples of the firebricks and underlying soils were collected and analyzed for asbestos (DEQ, 2013b). Results indicated the bricks and soils did not meet the DEQ Asbestos Program's definition of ACM because the results were either non-detect for asbestos fibers or contained less than one percent asbestos. BNSF originally proposed to not perform abatement to the fire bricks because they did not fit the definition of ACM (AECOM, 2013b). However, DEQ proposed either further analyses with more sensitive methodology to determine the presence of asbestos or disposal of the firebricks to ensure protectiveness (DEQ, 2013b). Subsequently, BNSF disposed of it as a non-hazardous substance at a Subtitle D Landfill in Great Falls.

2.4.6 Soil Tilling Pilot Test

In August 2015, BNSF voluntarily initiated a soil tilling pilot test to collect data needed for the FS Report (AECOM, 2015). Soil tilling is done to expedite the chemical break down of contaminants in surface soils. By tilling the soil, the contaminants are degraded by the climate (e.g. wind and sun) and biological activity. BNSF focused on two areas based on the 2007 confirmation sampling event. These locations were tilled at depths of two feet in approximately 10 feet wide by 10 feet long grids (Figure 13 and Table 1). Samples were collected prior to tilling and two days after tilling; results indicated tetrachloroethene (PCE) and trichloroethene (TCE) concentrations were below leaching to groundwater and residential SSCLs (DEQ, 2016).

2.4.7 SVE System Pilot Test

The SVE pilot test was also initiated (along with the soil tilling) to collect data needed for the FS Report (AECOM, 2015). The system start-up took place in October 2015 and ran continuously until September 2016. An SVE system removes soil vapor in the subsurface through a vacuum and passes it through filter medium to remove the contamination. The SVE system started out with a potassium permanganate impregnated zeolite. The clean vapor is expelled through an exhaust pipe and release to the ambient air. Baseline samples were collected from vapor monitoring points (VMPs) to understand the initial amount of contamination before the SVE system began running. Soil vapor collected from sample location VMP-1D contained the highest concentrations of PCE (12,000 micrograms per cubic meter ($\mu g/m^3$)) and TCE (3,800 $\mu g/m^3$). Performance monitoring at the combined effluent sample location occurred every other week

from October 2015 through December 2015, then it took place monthly from January 2016 through July 2016. Samples were collected quarterly from individual SVE extraction wells in September 2015 through June 2016. In August 2016, BNSF proposed to end the SVE pilot test because a sufficient amount of data had been collected to satisfy the objectives of the pilot test but proposed to continue operations under different monitoring requirements (AECOM, 2016 and BNSF, 2016). DEQ provided conditional approval to end the pilot test, but a modified monitoring schedule continued to operate the system (AECOM, 2016). In November 2016, the potassium permanganate impregnated zeolite filter was replaced with two granulated activated carbon filters. After the conditional approval, samples were collected quarterly at locations from within the system: pre-treatment, combined effluent, and exhaust. This continued until September 2017 when BNSF shut down the SVE system because effluent concentrations had decreased and groundwater concentrations were below SSCLs (BNSF, 2017).

DEQ considered the IRAs and pilot tests when selecting the final remedy.

3.0 COMMUNITY PARTICIPATION

DEQ complied with the public participation requirements found in § 75-10-713, MCA, by holding a public meeting and hearing on June 19, 2019, on the Proposed Plan which identified the preferred final cleanup for the MWYE Facility. On multiple occasions prior to the public meeting, DEQ provided additional opportunities for public involvement not required by CECRA. The following is a discussion of instances where there was an opportunity for public involvement.

In October 1990, Dr. Leslie Hutchinson of the Agency for Toxic Substances and Disease Registry presented his proposed pancreatic cancer study for Park County. This study was conducted because the number of pancreatic cancer cases in Park County has been higher than the rest of the state. The study included compiling information about individuals that either died or were diagnosed with pancreatic cancer. A public meeting was held for Dr. Hutchinson to provide his final study results (ATSDR, 1990 and 1991).

In June 1990, DEQ solicited public comment and held a public meeting to discuss the RI work plan. Also in June 1990, DEQ solicited public comment on an air monitoring work plan (DEQ, 1990b).

In August 1992, DEQ solicited public comment and held a public meeting to discuss the RI findings (DEQ, 1992).

In June 1995, DEQ held a public meeting to provide background on the Facility and discuss the IAM cleanup approach. DEQ also accepted public comment on the IAM (DEQ, 1995b).

In August 1996, DEQ held a public meeting to discuss the IAM cleanup plans (DEQ, 1996).

In December 1999, DEQ held a public meeting to discuss the problems with implementing thermal desorption and the alternative IRAs discussed in the IAMA. DEQ also accepted public comment on the IAMA during this time (DEQ, 1999).

In September 2004, DEQ held a public meeting to discuss the progress at the Livingston Shop Complex and MWYE Facility (DEQ, 2004b).

In February 2007, DEQ held a public comment period to amend the Modified Consent Decree (DEQ, 2007b).

In September 2014, DEQ solicited public comment on the RA Amendment. A press release and legal advertisement were published to announce the comment period and fact sheets were sent to individuals on the mailing list (DEQ, 2014).

The Modified Consent Decree provides that public comment will be solicited on the Proposed Plan and FS. The public comment period for the MWYE Facility Proposed Plan and FS took place from June 6 through July 6, 2019. The documents were made accessible by posting electronic copies on DEQ's public comment webpage and having hard copies of the documents available at the Livingston-Park County Library. On June 6, 2019, a legal notice was published in the Livingston Enterprise to announce the public comment period and it provided information about the public meeting and hearing, which took place on June 19, 2019. A press release was also distributed to media outlets. DEQ notified stakeholders and local governments of the public comment period, public meeting, and hearing, and how to access the documents. DEQ also provided a fact sheet summarizing the preferred final cleanup for the MWYE Facility (DEQ, 2019b).

Notice of the issuance of this ROD will be published in accordance with § 75-10-713, MCA, and a copy of the ROD will be available at the Livingston-Park County Public Library, at DEQ Waste Management and Remediation Division's office in Helena, and on DEQ's website. The ROD is accompanied by a discussion of any notable changes to the preferred remedy presented in the Proposed Plan along with reasons for the changes. Also included in Part 3 of the ROD is a Responsiveness Summary, which provides a response to each of the comments received during the comment period on the Proposed Plan, including those transcribed during the public hearing (DEQ, 2019c and 2019d).

The administrative record that contains the documents DEQ cited, relied upon, or considered in selecting the final remedy for the MWYE Facility (see Section 14.0) is available for review by contacting DEQ at:

Montana Department of Environmental Quality

Waste Management and Remediation Division
1225 Cedar Street
Helena, MT 59601 Business Hours: Monday – Friday, 8:00 am – 5:00 pm
(406) 444-6444
In addition, a copy of the ROD is available at:

Livingston-Park County Public Library

228 W Callender St.
Livingston, MT Business Hours: Monday – Friday, 9:00 am – 1:00 pm
(406) 222-0862

4.0 SCOPE AND ROLE OF REMEDIAL ACTION

Although the MWYE Facility is generally located at the railroad wye where the former landfill operated, the MWYE Facility boundary is based on the extent of contamination. The MWYE Facility boundaries include the inactive rail line to the west, the active rail line to the south that runs parallel with I-90, Vallis Ditch to the north and a narrow strip that extends to the east near Fox Run road; no known contamination extends outside of these general boundaries (Figure 5).

In general, the purpose of the RI, RA, and FS were to collect data necessary to adequately characterize contamination and develop and evaluate effective remedial alternatives to address human health and environmental risks at the MWYE Facility. The primary objectives of the RI, RA, and FS for the MWYE Facility include the following:

- Adequately characterize the nature and extent of releases or threatened releases of hazardous or deleterious substances, both before and after the IRAs;
- Allow an assessment of health and ecological risks and development of SSCLs; and
- Allow the effective development and evaluation of alternative remedies to be included in the FS.

Based on findings from the previous investigations, RA and FS, DEQ finds that the data obtained is adequate to evaluate and select an appropriate remedy for the MWYE Facility. Any remaining data gaps will be evaluated during implementation of the remedy. This ROD contains SSCLs for all known contaminants of concern (COCs) and addresses contaminated media related to the former landfill operations.

The ROD documents the final remedy for the MWYE Facility; it addresses the principal threats to public health, safety, and welfare and the environment posed by contaminated media; and selects a remedy that will comply with federal and state environmental requirements, criteria, and limitations (ERCLs) that are applicable or well-suited to the remedial action and Facility conditions. The ROD also identifies the IRAs that have occurred to date and identifies how those IRAs are integrated into the final remedy.

DEQ will require that a remedial action work plan will be prepared shortly after the ROD is issued, and remedy implementation will begin in approximately one year. Institutional controls (ICs) will also be implemented during that time.

5.0 SITE CONCEPTUAL EXPOSURE MODEL

The Site Conceptual Exposure Model (SCEM) is the framework for understanding the receptors and exposure pathways included in the RA and the way contaminants move in the environment at the MWYE Facility. The primary contaminant sources are the unlined waste disposal cells. Sludge and filter media containing petroleum, solvents, and metals were disposed at the MWYE Facility (AECOM, 2012). Precipitation primarily moved contamination from the waste disposal cells into surrounding and nearby soils. Some contamination moved through the underlying soil and into the shallow alluvial groundwater; depth to groundwater ranges from approximately 2.3 to 15.5 feet below ground surface (bgs) at the MWYE Facility (AECOM, 2019b).

Contamination from the soil continues to leach to groundwater and contamination in the soil and groundwater can volatilize and form vapors that move upward into excavations and structures. These primary sources and migration pathways result in potential exposure to humans through contact with contaminated soil, breathing contaminated vapors, and exposure to contaminated groundwater. The SCEM is provided in Figure 6.

5.1 Facility Characteristics

5.1.1 Geographical setting

The MWYE Facility is generally flat and at an elevation of approximately 4,501 feet above sea level. The MWYE Facility is located near the Yellowstone River to the north, Highway 89 to the east, Interstate-90 to the south, and approximately 5 miles west of Livingston, Montana. The surrounding area consists of fields/meadows, two gravel pits, and residential areas approximately two miles to the east and five miles to the west of the MWYE Facility. An active rail line is directly south of the MWYE Facility and the rail line runs east to west.

5.1.2 Climate

The climate in Livingston is representative of the climate observed at the MWYE Facility. A weather station was installed at the Livingston Airport by the National Oceanic and Atmospheric Administration in July 1948. In the 1990's, the weather station became automated with very little manned oversight. Due to this change, the precipitation measured during the winter months may be underestimated (NOAA, 2017).

The Livingston area receives rain and snow as precipitation. The average annual precipitation within a 30-year period is 14.8 inches, with May typically being the wettest month of the year. The area receives snow most often between December and April and the ground is most likely to freeze during January and February. Temperatures in Livingston stay relatively cool; average temperatures over a 30-year period ranged from 27°F to 36°F during the winter months (December through February) and 55°F to 70°F during the summer months (July through September). The Facility is in an area with minimal tree cover. As a result, it is subjected to high winds and sun exposure. The average wind gusts are 16 miles per hour (mph), but winds have reached a maximum 76 mph. Prevailing winds are typically from the southwest (Wunderground.com, 2018).

5.1.3 Geology

The quaternary system of the Yellowstone River Basin consists of fluvial, glacial, landslide, and volcanic deposits; valley-fill consists of unconsolidated gravel, sand, silt, and clay (Zelt et al., 1999). Deposits of valley-fill occur adjacent to larger streams. The subsurface underneath the MWYE Facility is comprised of approximately 40 feet of coarse-grained, fluvial deposits, unconsolidated cobbles and gravels with a silt/sand matrix, and some sand (RETEC, 1991 and AECOM, 2020a).

5.1.4 Surface Water

The MWYE Facility is relatively flat. The Yellowstone River generally flows from west to east and flows are typically highest in May and June, and lowest from November through February. The United States Geologic Survey (USGS) has a streamflow station located near Carter's

Bridge in Livingston, MT (45.596951, -110.566138) that has been measuring discharge of the Yellowstone River for over 90 years (USGS, 2017). Within those years, the average daily discharge was 1,390 cubic feet per second. ARM 17.30.611 classifies the mainstem of the Yellowstone River as B-1 and ARM 17.30.623 requires that B-1 surface water be maintained suitable for drinking, culinary, and food processing (after conventional treatment); bathing, swimming, and recreation; growth and propagation of salmonid fishes and associated aquatic life, waterfowl, and furbearers; and agricultural and industrial water supply.

There are also two gravel pits located near the MWYE Facility that contain surface water (Figure 1 and Figure 5). ARM 17.30.615 classifies the waters of the gravel pit ponds as E-4, and ARM 17.30.655 requires that E-4 surface water be maintained suitable for aquatic life, agricultural purposes, secondary contact recreation, and wildlife.

Vallis Ditch once contained surface water flowed from west to east and was supplied with non-potable irrigation water. The ditch passed through to the north of where the former tracks of the wye at MWYE converged and transported the water to ranches/field to the east (RETEC, 1991). However, during a site visit in 1990, it was observed that much of the ditch had been filled in and regraded; further discussions with the foreman of the Heart K Land and Cattle indicated no surface water has been transported, including in the portion that lies at the northern end of the MWYE Facility, for nearly 10 years (RETEC, 1991).

5.1.5 Groundwater

The aquifer underlying the MWYE Facility has been identified as the Yellowstone aquifer (AECOM, 2020a). The depth to groundwater is approximately 2.3 to 15.5 feet bgs at the MWYE Facility (AECOM, 2019b). The saturated thickness of the aquifer varies from approximately 20 feet during periods of low flow (April/May) to 30 feet during periods of high flow (July/August). The hydraulic conductivity is estimated to be 170 to 380 feet per day and the average hydraulic gradient of the aquifer is 0.003 feet/feet (AECOM, 2020a). Groundwater generally flows from east to north east (AECOM, 2020a).

BNSF inventoried wells within a half mile radius of the MWYE Facility. Eighteen wells were located within a half mile and well usage includes: domestic, irrigation, stock water, and one public water supply well owned by BNSF (AECOM, 2019a). There is no indication that BNSF is currently using the public water supply well and it is likely that the use of this well was incorrectly logged in Montana's Groundwater Well Information Center records since the well log indicates it is a remediation well (AECOM, 2020b).

Groundwater classification is defined in ARM 17.30.1006. The lowest specific conductivity (SC) for the groundwater at the MWYE Facility corresponding to the highest quality is appropriate for classification of the groundwater. The background well, MW-1, was used to determine the groundwater classification because groundwater from the well is not impacted by contamination at the MWYE Facility. From 2015 through 2017, the average SC at MW-1 was 526 micro siemens per centimeter (µs/cm). Thus, the groundwater is Class I, meaning its quality must be maintained as suitable for 1) public and private water supplies, 2) culinary and food processing, 3) irrigation, 4) drinking for livestock and wildlife, and 5) commercial and industrial purposes.

5.2 MWYE Facility Contamination

DEQ evaluated data collected for the RI and subsequent to the RI to: (1) identify sources of contamination; (2) determine the extent of contamination in soil, groundwater, surface water and sediment, and soil vapor; (3) determine risks to human health and the environment; and (4) develop and evaluate cleanup options. During the RI and post-RI investigations, groundwater samples, surface soil samples, subsurface soil samples, surface water and sediment samples, and soil vapor samples were collected. The findings of the investigations are summarized below.

5.2.1 Soil

The RI revealed VOCs, including PCE and TCE, as well as toluene, ethylbenzene, and xylenes were found in the soil (RETEC, 1991 and 1992). Metals and PAHs were detected in the samples of the clay source material. The North, Center, and South cells contained a layer of water perched on the clay material; the water contained elevated levels of VOCs and metals (RETEC, 1992). During the IRAs that took place between 1995 and 2000, the perched water and soils from the cells were treated and/or shipped for off-site disposal (see Section 2.4 of this ROD for more information).

Samples were collected from the bottoms of the North Cell, East Cell, South Cell, Center Cell, Seep Area, and North Parking lot area to confirm excavation was complete and could be backfilled with clean material (Figure 3). Some of the locations did not meet the SSCLs for leaching to groundwater for VOCs.

The results of 2007 confirmation sampling demonstrate the IRAs were effective in cleaning up most of the contamination. The focus of the confirmation sampling was to characterize the contamination between MW-4 and MW-3 because of localized groundwater contamination in that area. BNSF collected surface soil samples throughout the MWYE Facility and subsurface soil sampling in the vicinity of MW-4 and MW-3. The residential SSCLs were exceeded in a single, discrete surface soil sample (SS-88d) that was sampled because the soil was visibly stained. There was also a composite sample collected from the same location, and it did not exceed the residential SSCLs. The leaching to groundwater SSCLs in surface and subsurface samples were exceeded in several sample locations, and they are generally located around the South and East Cells (Figure 4). No additional cleanup efforts occurred at these locations following the confirmation results with the exception to SS-88d and SBS-7D, which were selected as the locations for the soil tilling pilot test (see Section 2.4 of this ROD for more information).

BNSF conducted the soil tilling pilot test in 2015. The pilot test focused on two areas with higher contaminant concentrations in surface soil based on the 2007 confirmation sampling results. BNSF collected samples prior to tilling (pre-tilling) and two days after tilling (post-tilling) at two locations from 10 foot by 10 foot grids that were two feet deep. None of the soil sample concentrations exceeded the residential or leaching to groundwater SSCLs for either PCE or TCE (Table 1).

There are potentially a few localized areas outside of the MW-3 area where surface and subsurface soil contamination still exceeds the leaching to groundwater SSCLs. However,

contaminant concentrations in groundwater downgradient of those areas have decreased to below SSCLs. This empirical data demonstrates the remaining contamination outside of the MW-3 area is no longer leaching at levels that would cause exceedances of groundwater SSCLs (AECOM, 2020a).

5.2.2 Soil Vapor

PCE and TCE can volatilize from contaminated soil and groundwater and occupy the soil pore spaces as vapor. Due to the readiness of these chemicals (and other volatiles) to volatilize, they migrate from the pore spaces in the subsurface and into indoor air of indoor air, or future nearby or overlying structures (DEQ, 2011). Removing sources of contamination can reduce the magnitude of contaminated soil vapor. There are also technologies available that are effective in removing soil vapor contamination, such as SVE systems. As discussed in Section 2.4, an SVE system operated at the MWYE Facility from 2015 through September 2017.

Prior to starting the SVE system pilot test in September 2015, BNSF collected baseline samples to assess the levels of PCE and TCE contamination in soil vapor in August 2015 (AECOM, 2020a). The soil vapor concentrations detected in the samples ranged from 650 $\mu g/m^3$ to 12,000 $\mu g/m^3$ for PCE, and 64 $\mu g/m^3$ to 3,800 $\mu g/m^3$ for TCE (AECOM, 2020a). The area with the highest concentrations is at VMP-1D. When BNSF turned on the SVE system, soil vapor concentrations were collected at the eight individual SVE wells and several of the exceedances in the SVE wells samples were located in areas where historical subsurface soil samples exceeded leaching SSCLs (Figure 7) (AECOM, 2020a). The complete set of soil vapor results can be found in Table D-4 and D-5 of the FS (AECOM, 2020a)

BNSF monitored combined effluent (pre-treatment), mid-treatment, and post-treatment SVE system vapors on a quarterly basis for six months. The results of soil vapor at the combined effluent (pre-treatment) location demonstrate an overall steady decline in soil vapor concentrations (Figure 8). BNSF shut down the SVE system in September 2017 (BNSF, 2017). The last time samples were collected was in June 2017, and the pretreatment concentrations were 630 $\mu g/m^3$ for PCE and 94 $\mu g/m^3$ for TCE (AECOM, 2020a). These concentrations exceed the residential indoor air SSCLs for PCE (47 $\mu g/m^3$) and TCE (2.15 $\mu g/m^3$), respectively. The June 2017 results also exceed the construction worker SSCLs for PCE (353 $\mu g/m^3$) and TCE (17 $\mu g/m^3$).

5.2.3 Sediment and Surface Water

In 1984 and 1986, EPA collected surface water and sediment samples from Vallis Ditch. The surface water in the ditch contained only trace levels of phenol and pyrene. The 1984 downstream sediment samples contained PAHs and barium. The 1986 downstream sediment samples contained arsenic, tin, several PAHs, and two phthalate compounds. However, the data were qualified and the presence or absence of these compounds was not confirmed (RETEC, 1991).

In March 1991, BNSF collected sediment samples at nine locations: four from Vallis Ditch (SED1 to SED4), and five others (which were called sediment but appear to be soil) in the old haul road and topographic low spots in the source area of the MWYE Facility. VOCs were not detected in any of the samples. Upstream sediment samples from Vallis Ditch contained concentrations of PAHs greater than or equal to the PAH sediment concentrations in Vallis Ditch

as it crosses the MWYE Facility. PAHs were not detected downstream of the MWYE Facility (i.e., downgradient of Vallis Ditch). Metals were not detected above background concentrations (RETEC, 1991).

5.2.4 Groundwater

BNSF has collected groundwater samples from nine monitoring wells (MW-1, MW-3, MW-4, MW-5, MW-9, MW-12, MW-14, MW-18, MW-19) since 1992. During this timeframe, samples were collected to capture the extent of contamination coinciding with low and high groundwater levels. In 2001, DEQ allowed BNSF to reduce the monitoring frequency to annually, when groundwater levels and contaminant concentrations are high, typically in July.

The highest PCE and TCE concentrations in groundwater were detected before IRAs occurred in 1995 (Table 2 and Table 3). After IRAs took place and most of the source to groundwater contamination was treated or removed, groundwater quality began to improve.

The majority of exceedances of the SSCLs have occurred in samples collected from MW-3, MW-4, MW-5, MW-9, and MW-14 (Figure 9 and Figure 10). Historically, high PCE and TCE concentrations occur during high groundwater levels. Groundwater concentrations steadily decreased over time since the IRAs and pilot tests, but only recently started to meet SSCLs; since 2013, SSCL have been met with the exception of MW-3. Samples collected from MW-3 consistently contain concentrations of PCE above the SSCLs and it is the localized extent of the groundwater plume (Figure 11). The most recent exceedances in samples collected from MW-3 were in July 2019 (PCE) and July 2013 (TCE).

6.0 CURRENT AND REASONABLY ANTICIPATED FUTURE LAND AND RESOURCES USE

6.1 Land uses

The MWYE Facility is located in Park County, approximately five miles east of Livingston, Montana. The current land use within and adjacent to the MWYE Facility is a mixture of commercial/industrial, including an active rail line and two gravel pits, and agricultural use. Residential use occurs within two miles of the MWYE Facility (including those on Fox Run Road). The MWYE Facility is in an area that has potential for future growth given the presence of primary transportation avenues, including the active rail line, interstate highway, and primary state highway. The area may also experience recreational growth as development of a trail system along formerly used railroad beds is explored, and recreational use of the nearby Yellowstone River continues.

Reasonably anticipated land use was evaluated to ensure that the remedy selected is appropriate for the long-term intended use of the Facility and development trends in the surrounding area. Section 75-10-721, MCA, as it existed in 1993, did not include a consideration of reasonably anticipated future uses of a facility in remedy selection and consideration of future facility use in remedy selection is not required due to the savings clause (see Section 2.2). However, consideration of the current and future uses of a facility has typically been used in the risk assessment process to identify unacceptable risk and SSCLs. Consistent with that practice, current and anticipated future land use of the Facility was considered in the RA Amendment

when risk was evaluated for each receptor. In order to apply those RA Amendment considerations at the Facility, DEQ evaluated § 75-10-701(18), MCA, as guidance in evaluating the reasonably anticipated future use of this Facility. Those factors include: 1) local land and resource use regulations, ordinances, restrictions, and covenants; 2) historical and anticipated uses of the MWYE Facility; 3) patterns of development in the immediate area; 4) relevant indications of anticipated land use from the owners of the MWYE Facility and local planning officials. DEQ evaluated these four requirements as follows:

1) Local Land Use and Resource Use Regulations, Ordinances, Restrictions, or Covenants:

   DEQ reviewed the zoning regulations for the MWYE Facility. The area is unzoned and no restrictions, regulations, ordinances or covenants are currently in place (DEQ, 2017). The area on the east side of Highway 89 is part of the East Yellowstone zoning district and the area is zoned for residential and agricultural development (Park County, 1997).

2) Historical and Anticipated Uses of the MWYE Facility:

   Historically, the MWYE Facility was used as a BNSF landfill for railroad operations waste. It also served as a "wye" to connect north-south and east-west rail lines. However, some of those rail lines are no longer active and the line that makes up the eastern side of the wye has been removed. Currently, an active rail line and power line run east-west, making up the southern boundary of the MWYE Facility. The owners of the property making up the MWYE Facility (BNSF and MRL) have indicated there is no planned change in use at the MWYE Facility (AECOM, 2020a and MRL, 2017).

3) Patterns of Development in the Immediate Area

   The population of Livingston is 7,401 and the MWYE Facility is located five miles east of the town center. The area near the MWYE Facility has not undergone significant development, but Livingston's population is growing (U.S. Census Bureau, 2019). Despite a growing population, the current development to support the growth is not expanding near the MWYE Facility. There is a small residential area located about two miles to the east of the MWYE Facility, but it has not grown substantially over the years. Two gravel pits are adjacent to the MWYE Facility: one gravel pit acquired a permit in 2017 and it is located to the north of the MWYE Facility; the other is no longer in operation and is located on the eastern side of Highway 89. Park County has also been selected as part of the nationwide Great American Rail-Trail Corridor. There is currently a four-mile trail route that runs south of Livingston, and a planned trail route would continue south to the entrance of Yellowstone National Park (Rails to Trails Conservancy, 2019). Current trail route plans are being developed for the western side of Livingston, and there are no current planned routes for the eastern side of Livingston, where the MWYE Facility is located. However, Park County Environmental Council, a community advocacy group, indicated that because there are no plans in the current version of the Great American Rail-Trail, one possibility is to utilize the old Shields Valley railbed, connecting to the Gallatin Valley from Clyde Park or Wilsall. This route would potentially bring a trail adjacent to or through the MWYE Facility (PCEC, 2019).

The property owners of the MWYE Facility have indicated they do not intend to develop the Facility in the future.

4) Indications of Anticipated Land Use from the Property Owners and Local Planning Officials

DEQ sent letters or spoke to the property owners within the MWYE Facility, asking how they plan to utilize their properties in the future. There are two owners of property within the Facility: BNSF and MRL. MRL indicated that, aside from overhead utility work that may occur in the future, it has no plans to develop its land within the MWYE Facility and that if in the future it decided to develop the property, MRL would develop its plans around any restrictions DEQ set on the property (MRL, 2017). BNSF identified no future development is planned on its property (AECOM, 2020a). As referenced above, the Park County Director of Planning indicated there are no plans to change the zoning in this area.

6.2 Groundwater Use

Livingston provides a public water supply to residents from six wells throughout the city (Livingston Water Public Works Department, 2018a). Groundwater is used for human consumption in the residential areas located two miles downgradient of the MWYE Facility. Eighteen wells are located within a half mile radius of the MWYE Facility and well usage includes: domestic, irrigation, stock water, and one public water supply well owned by BNSF (AECOM, 2019a). Groundwater at the MWYE Facility is not currently used for human consumption. However, SC readings of groundwater at the MWYE Facility indicate it is Class I groundwater and is suitable for human consumption. In addition, ARM 17.30.1006(1) requires that Class I groundwater must be maintained for 1) public and private water supplies, 2) culinary and food processing, 3) irrigation, 4) drinking for livestock and wildlife, and 5) commercial and industrial purposes. As part of the final remedy, ICs will prohibit the future use of groundwater and installation of new wells where groundwater exceeds the SSCLs as shown on Figures 11 and 12.

6.3 Surface Water Use

There are no year-round surface water bodies at the MWYE Facility. Vallis Ditch periodically contained surface water. It flowed from west to east and was supplied with non-potable irrigation water and the water was transported to ranches to the east (Figure 1) (RETEC, 1991). The ditch passed through to the north of where the former tracks of the wye at MWYE converged. However, during a site visit in 1990, it was observed that much of the ditch had been filled in and regraded; further discussions with the foreman of the Heart K Land and Cattle indicated no surface water has been transported, including in the portion that lies at the northern end of the MWYE Facility, for nearly 10 years (RETEC, 1991). Other periodic surface water may exist at the MWYE Facility as rain water that has not evaporated into the atmosphere or infiltrated into the soil; this surface water may periodically be used by wildlife, but it is not expected to contain contamination because the surface soil contamination exceeding SSCLs was addressed through IRAs.

7.0 SUMMARY OF HUMAN HEALTH AND ECOLOGICAL RISKS

BNSF prepared a RA in 1993, which included an identification of contaminants of potential concern (COPCs), an exposure assessment, a toxicity assessment, and calculation of SSCLs for the impacted media at the MWYE Facility. In 2014, BNSF prepared an amendment to the RA that included an evaluation of the post IRA data, and changes to the exposure assumptions and EPA's chemical and toxicity information (AECOM, 2014). The RA Amendment updated the RA and is the document discussed herein.

In 2017, DEQ identified the need to evaluate the inhalation pathway for vapors that could potentially accumulate in a trench or excavation as this potential pathway was not included in the RA or RA amendment. DEQ's evaluation identified an unacceptable potential risk to construction workers who may be involved in excavation activities in the area where soil vapor exceeds SSCLs (DEQ, 2018).

The remedial actions selected in this ROD are necessary to protect public health, safety, and welfare and the environment from actual or threatened releases of hazardous or deleterious substances into the environment and to abate the imminent and substantial endangerment those releases pose.

7.1 Human Health Risks

Current and potential future land uses were evaluated by BNSF in the RA Amendment and SSCLs protective of those uses were calculated. For the purposes of the RA Amendment, populations that were evaluated for potential exposure to contamination at the MWYE Facility include potential future residents, current and potential future commercial/industrial workers, current and future construction and excavation workers, and current and future visitors/trespassers (AECOM, 2014a and AECOM, 2020a). A SCEM is provided in Figure 6. The exposure pathways of incidental ingestion, dermal contact, inhalation of volatiles and particulates from soil, inhalation of indoor air containing contaminants volatilized from groundwater or soil, and inhalation of volatiles accumulating in excavations were quantitatively evaluated. Exposure to contaminated groundwater was not evaluated quantitatively since SSCLs must meet DEQ-7 standards that include values protective of human health. Additional details regarding the above pathways can be found in Section 4.0 of the RA Amendment and Section 2.2.2 of the FS (AECOM, 2014a and AECOM, 2020a).

In the RA Amendment and FS, BNSF estimated potential cancer risk and potential non-cancer effects for general exposure, ingestion, dermal contact, and inhalation. COPCs were identified by their detection frequency and exceedance of screening levels. COPCs were then separated based on their effect (i.e., cancer causing or non-cancer effects). Target hazard quotients were determined for non-carcinogenic effects based on target organs or critical effects to ensure that the total hazard index did not exceed 1.0 for any organ or effect. Target cancer risks were determined to ensure that the total excess lifetime cancer risk did not exceed a one in 100,000 (1 x 10-5) individual excess lifetime cancer risk. "Excess lifetime cancer risk" is additional risk that someone might have of getting cancer if that person is exposed to cancer causing compounds. DEQ considers an additional or excess 1 in 100,000 chance (or 0.001%, or 0.00001, or 1 x 10-5) allowable. The most recent toxicity information available was used to calculate risk levels in the RA Amendment and FS (AECOM, 2014a and 2020a). Based on the most recent

confirmation sample results and SSCLs, the following exposure pathways present an unacceptable risk to human health and the environment: soil vapor or indoor air, contaminated groundwater, and leaching to groundwater (Table 4).

7.2 Determination of COCs

COPCs that exceed SSCLs are COCs for the MWYE Facility. PCE and TCE are the COCs remaining at the MWYE Facility in subsurface soil, groundwater, and soil vapor. Table 5 identifies the COCs in soil, groundwater, and soil vapor and their SSCLs. A brief discussion of health effects from exposure to the contaminants that remain at the MWYE Facility follows.

7.2.1 Health Effects and Hazards

PCE is a manufactured chemical that is widely used for dry cleaning of fabrics and metal-degreasing. It is also used to make other chemicals and is used in some consumer products. Exposure to PCE may harm the nervous system, liver, kidneys, and reproductive system, and may be harmful to unborn children. EPA considers PCE a likely human carcinogen. Human deaths have occurred from inhaling high concentrations of PCE vapors. Symptoms of PCE exposure at higher concentrations include dizziness, drowsiness, headache, incoordination, and at higher levels, unconsciousness. Symptoms of PCE exposure at lower concentrations include changes in mood, memory, attention, reaction time, or vision. Studies in humans suggest that exposure to PCE may result in a higher risk of getting bladder cancer, multiple myeloma, or non-Hodgkin's lymphoma. In animals, PCE has caused cancers of the liver, kidney, and blood system. It is not clear whether these effects might also occur in humans, because humans and animals differ in how their bodies handle PCE. Animals studies indicate pregnancy related problems after exposure to PCE; however, there is insufficient information to determine if PCE can cause birth defects in humans (ATSDR, 2019a).

TCE is a manufactured chemical but may also be present as a breakdown or daughter product of PCE under certain conditions. TCE is used primarily for metal-degreasing, but may also be an ingredient in adhesives, lubricants, paints, varnishes, paint strippers, pesticides, and some spot removers. TCE was once used as a medical anesthetic. Exposure to TCE may harm the nervous system, kidneys, liver, immune system, male reproductive system, and unborn children. EPA considers TCE a known human carcinogen. Human deaths have occurred from inhaling high concentrations of TCE vapors. Symptoms of TCE exposure at higher concentrations include central nervous system depression, unconsciousness, and damage to some of the nerves in the face. Symptoms of TCE exposure at lower concentrations include headaches, dizziness, and sleepiness. Exposure to TCE may result in a higher risk of getting kidney cancer, and there is some evidence that it causes liver cancer and malignant lymphoma. Some human studies indicate that trichloroethylene may cause developmental effects to unborn children such as spontaneous abortion, congenital heart defects, central nervous system defects, and small birth weight. However, these people were exposed to other chemicals as well (ATSDR, 2019b).

7.3 Calculation of Cleanup Levels

The following sections provide a discussion of COCs for each media and a discussion of the calculation of SSCLs, and the applicable regulatory cleanup levels. SSCLs were developed for the COCs (PCE and TCE) and they are summarized in Table 5. These cleanup levels establish acceptable levels that are protective of human health associated with exposure to soil, soil vapor,

and groundwater, and are protective of the environment by minimizing the migration of contaminants into the groundwater from soil. For human health, DEQ allows cleanup levels to be calculated based on cumulative risk levels less than or equal to a total excess cancer risk of 1x10-5 for carcinogens or a total hazard index less than or equal to 1.0 for non-carcinogens. In instances where potential carcinogenic and non-carcinogenic risks were evident, SSCLs were based on the lower, more conservative value. For the environment, soil cleanup levels must be adequately protective to ensure leaching to groundwater does not exceed DEQ-7 standards.

7.3.1 Soil

7.3.1.1 Direct Contact

Direct contact to soil accounts for exposure though touching (dermal contact), inhaling, or ingesting contaminated soil particles. These exposure pathways are applied across several receptors: commercial/industrial worker, construction/excavation worker, visitor/trespasser, and adult and child residents. All of these receptors are expected to interact with surface soil only except the construction/excavation worker, who may be exposed to surface and subsurface soil. Therefore, surface soil results were applied in the development of the SSCLs for the commercial/industrial worker, visitor/trespasser, and adult and child resident receptors and two SSCLs developed for surface and subsurface soil exposure to the construction/excavation worker. Each receptor has different inputs that are more realistic to how they may potentially interact with the environment at the Facility. The inputs were based on a combination of site-specific and EPA parameters to calculate the SSCLs for each receptor. The specific inputs are provided in Appendix C of the RA Amendment (AECOM, 2014a). Both cancer and non-cancer risks were determined and if either were considered unacceptable, SSCL were developed based on the type of risk (cancer or non-cancer).

7.3.1.2 Leaching to Groundwater

Leaching to groundwater was calculated by applying a site-specific dilution attenuation factor (DAF) of 56.5, which was calculated by utilizing several default input and site-specific parameters (AECOM, 2014a). The DAF takes into account that decreases in soil concentrations that will naturally occur as a contaminant leaches to groundwater. The DAF was then multiplied by the EPA maximum contaminant level (MCL)-based soil screening level in the RSLs. The resulting leaching to groundwater SSCLs were compared to soil concentrations to determine leaching to groundwater exceedances. The leaching to groundwater SSCLs were exceeded in several surface soil sample locations, and they are generally located around the South and East Cells (Figure 4). No additional cleanup efforts occurred at these locations following the IRAs with the exception of SS-88d and SBS-7D, which were part of the soil tilling pilot test (Table 1). However, contaminant concentrations in groundwater downgradient of those areas where surface soil exceeds the leaching to groundwater SSCLs have steadily declined and now meet the SSCLs for PCE and TCE, except for MW-3. Therefore, although some surface soil may still exceed the leaching to groundwater SSCLs, contamination in the soil has already leached and is no longer causing exceedances of groundwater SSCLs outside of MW-3. Based upon recent groundwater sample results, there is localized contaminated subsurface soil that is leaching to groundwater and causing exceedances of SSCLs in MW-3. However, the exact location of the remaining subsurface soil contamination that is causing the exceedances in MW-3 is not known.

7.3.2 Soil Vapor

Soil vapor SSCLs were calculated for indoor air and accumulation in excavations and trenches. Indoor air SSCLs were calculated for the commercial/industrial worker and residential development. The COCs were evaluated for indoor air risks, in the event that permanent buildings are constructed at the Facility; however, there currently are no permanent buildings at the Facility. The evaluation concluded that the COCs could migrate and contaminate indoor air and SSCL were developed with a combination of EPA default and site-specific inputs. The full evaluation is provided in the Soil Vapor Monitoring and Vapor Intrusion Evaluation Report (AECOM, 2014b). DEQ identified that vapor accumulating in excavations and trenches were not accounted for in the RA Amendment. DEQ separately evaluated potential risk to construction workers in excavations and utility workers in a trench. Unacceptable risk existed for the construction worker because it was assumed this receptor would be exposed during a longer duration than the utility worker; however, because it was assumed the utility worker would not have a long exposure duration to the vapors, there was no unacceptable risk associated with the receptor. The site-specific input for the receptors was based on an exposure point concentration (960 $\mu g/m^3$ for PCE and for 97 $\mu g/m^3$), which is the highest combined effluent concentration collected from the SVE system in 2017 (DEQ, 2018). These concentrations represent the overall, average vapor concentrations in the area at the time of collection where soil vapor exists.

7.3.3 Groundwater

The Montana Board of Environmental Review (BER) has adopted rules establishing water quality standards for protection of human health pursuant to § 75-5-301, MCA. DEQ-7 standards are the applicable regulatory cleanup levels for groundwater. As noted previously, the groundwater at the MWYE Facility is Class I and the DEQ-7 standards apply. Because the groundwater is also a potential source of drinking water, the EPA MCLs also apply; the EPA MCLs concentrations are the same as the DEQ-7 standard for PCE and TCE. The groundwater SSCLs for PCE and TCE are provided in Table 5.

7.3.4 Evaluation of Uncertainties

This section evaluates uncertainties associated with the RA Amendment (AECOM, 2014a), which are discussed below. Investigations have been conducted for soil, soil vapor, groundwater, surface water and sediment at the MWYE Facility and COPC concentrations and distributions are adequately characterized. While unlikely, it is possible that unidentified data gaps exist, and COPCs may be screened out and therefore, not evaluated as COCs as a result.

In general, the available scientific literature is insufficient to provide a thorough understanding of potential toxic properties of chemicals to which humans are exposed. Therefore, it is necessary to infer these properties by extrapolation from data obtained under other conditions of exposure, usually from experimental laboratory animals. This introduces two types of uncertainties into the risk evaluation: (1) the uncertainty of extrapolating from one species to another; and (2) the uncertainty related to extrapolating from the high exposure doses usually employed in experimental animal studies to lower doses usually estimated for human environmental exposures.

The development approach EPA applies to cancer slope factors and non-cancer reference doses likely results in an overestimate of the actual risk to humans and conservative in nature. For

example, a hazard quotient or hazard index greater than 1.0 does not necessarily mean that an adverse effect will occur.

Aside from uncertainties related to extrapolating scientific data and information, there are site-specific uncertainties that may exist too. The RA Amendment identified that no data has been collected between surface soil location SS-88d and MW-10 and, thus, the leaching to groundwater impacts may be unknown (Figure 13) (AECOM, 2014a). While soil and groundwater impacts have been evaluated in North Parking Lot and Seep Area, particularly between the sample locations ALSAB-2 and SAB-2, no soil vapor data has been collected and it is unknown if elevated levels exist there (AECOM, 2020a).

There are some scenarios that lack data because the specific scenario does not exist. It has been previously discussed that there is potential risk of indoor air at the MWYE Facility, but there are no permanent structures and associated data to demonstrate, with certainty, that the indoor air risk does exist. The indoor air evaluation also does not include attenuation factors and assumes the vapor concentrations may remain constant for the exposure duration (AECOM, 2014b). The same assumptions exist for the soil vapor risks associated with vapor accumulating in a trench. The evaluation does not include attenuation factors such as mixing and dispersion and assumes 100% of the soil vapor within an excavation would 100% comes from the subsurface (AECOM, 2018). These risk evaluations are performed conservatively to avoid missing potential unacceptable risks.

7.4 Summary of COCs exceeding SSCLs

In summary and listed by media, the COCs exceeding commercial/industrial SSCLs, with the location areas in parentheses, at the BWOR Facility are:

1) **Surface soil:** None; see Section 5.2.1;
2) **Subsurface soil:** PCE and TCE;
3) **Groundwater** – PCE;
4) **Surface water** – None; see Section 5.2.3;
5) **Ambient Air** – None; and
6) **Soil vapor** – PCE and TCE.

Please refer to Figure 4, Figure 7, Figure 11, and Figure 13 for the locations where contaminated media is present and/or where COCs exceed SSCLs.

7.5 Ecological Risks

In 2014, BNSF conducted an updated qualitative screening level ecological assessment, identifying the current or potential future risk of harm to indicator terrestrial and aquatic species through the evaluation of exposures to the COPCs at the MWYE Facility. The evaluation included a habitat assessment, ecological survey for state or federal rare, threatened, or endangered species, and a contaminant exposure assessment (AECOM, 2013a)

Based on current conditions, there is little potential for significant exposure to ecological receptors that may access the property, as overall use by wildlife is expected to be low. Migration of soil impacts out of the source area via erosion or overland transport and/or via groundwater migration is minimal based on existing data and is considered insignificant from an

ecological risk perspective. BNSF obtained and evaluated an updated list of threatened and endangered species and state sensitive species within a four-mile radius of the MWYE Facility from the Montana Natural Heritage Program. The two rare, threatened, or endangered species identified as potentially inhabiting portions of the Facility were the bald eagle (*Haliaeetus leucocephalus*) and western toad (*anaxyrus boreas*). These two species could potentially inhabit portions of the land within the Facility due to its proximity to the Yellowstone River, but the two species are more likely to forage and nest closer to the Yellowstone River (AECOM, 2013a). In addition, ecological screening levels were compared to current COC concentrations and the updated qualitative ecological risk evaluation was included in the RA work plan (AECOM, 2013a).

The habitat assessment indicated surface water in the surrounding area was predominantly ephemeral and could not support most ecological populations; the evaluation was based on a half mile radius, which excludes the Yellowstone River. DEQ reviewed the Montana Natural Heritage Wetland and Riparian Map Viewer to identify any nearby wetlands (Montana Natural Heritage Program (MNHP), 2020) Although the surrounding area does not appear to have a permanent wetland leading to navigable waters, wetland vegetation, such as cottonwoods, were observed in a depression that is downgradient from the MWYE Facility. The primary soil type, as mapped using the U.S. Natural Resources Conservation Service (NRCS) Web Soil Survey, is Beaverell-Beavan Complex with 0 to 2 percent slopes (NRCS, 2019) This is also the mapped soil type for the area where cottonwoods occur and it is not listed as a hydric (wetland) soil as per the NRCS State Hydric Soils List for Montana. The Facility is not located in any designated sage grouse habitat area (DNRC, 2017). Based on this information, SSCLs protective of human health are expected to be protective of any ecological receptor's limited exposure.

8.0 REMEDIAL ACTION OBJECTIVES

DEQ established remedial action objectives (RAOs) for each contaminated medium. RAOs are general descriptions of what the remediation must accomplish in order to protect public health, safety, and welfare and the environment against unacceptable risk identified in the RA Amendment, along with the FS, consistent with reasonably anticipated land use and beneficial use of groundwater. The RA Amendment and FS identified unacceptable risks to receptor populations for inhalation of vapors in excavations and potential future buildings, and leaching to groundwater (AECOM 2014a and AECOM, 2020a). The groundwater SSCLs for PCE and TCE are the DEQ-7 standards. SSCLs were not developed for ecological receptors because no unacceptable risk was identified. Using the RAOs, DEQ identified and screened remedial alternatives that will achieve protection of public health, safety, and welfare and the environment consistent with reasonably anticipated future land use and beneficial use of groundwater. The RAOs are established as follows:

<u>RAOs for soil</u>

- Prevent migration of COCs that would potentially leach from soil to groundwater, causing exceedances of the SSCLs for groundwater;
- Prevent exposure of humans to COCs in soil at concentrations above SSCLs; and
- Meet soil SSCLs for COCs.

RAOs for indoor air and soil vapor:

- Where there is potential for vapors in groundwater or soil to accumulate beneath the surface, limit exposure to contaminants that may volatize to indoor air or in excavations.
- Prevent inhalation of COCs in indoor air above SSCLs if occupied structures are present in the future.

RAOs for groundwater:

- Meet groundwater SSCLs for COCs in groundwater;
- Reduce potential future migration of the impacted groundwater plume;
- Prevent exposure of humans to COCs in groundwater at concentrations above SSCLs; and
- Comply with ERCLs for COCs in groundwater.

9.0 DESCRIPTION OF FS ALTERNATIVES

9.1 Components

The FS describes the alternatives evaluated to cleanup groundwater, surface and subsurface soil, and soil vapor at the Facility. These alternatives are summarized and evaluated in the following sections using the remedy selection criteria provided in § 75-10-721, MCA, as it existed in 1993. That version is used because the 1995 legislation that revised the statute included a savings clause making the amendments inapplicable to civil actions initiated prior to the date of the legislation, which is the case for the Facility (Section 25(1), Ch. 584, L. 1995). However, section 5.1.11 of the Scope of Work (SOW) associated with the Modified Consent Decree outlines the criteria for screening the alternatives (DEQ, 2004a). Several of the guidance documents referenced in the SOW, particularly the EPA's Feasibility Study: Development and Screening of Remedial Action Alternatives from 1989, are consistent with statutory language found under CERCLA, which requires seven criteria to be screened against the alternatives (DEQ, 1990). DEQ followed this same approach of including 'implementability' and 'short-term effectiveness' in the evaluation of alternatives in the Livingston Shop Complex ROD, which is covered under the same Modified Consent Decree as this Facility. A summary of the analysis of alternatives is provided in Table 6.

Threshold Criteria

1. Protectiveness - Alternatives must attain a degree of cleanup of the hazardous or deleterious substance and control of a threatened release or further release of that substance that assures present and future protection of public health, safety, and welfare, and the environment.

2. Compliance with ERCLs - This criterion evaluates whether each alternative will meet applicable or well-suited state and federal ERCLs.

Balancing Criteria

3. Permanent solutions - Evaluates whether the remedy provides long-term effectiveness and permanently and significantly reduces the threat posed by the hazardous and deleterious substances.

4. Treatment or resource recovery technologies reduce toxicity, mobility, and volume - Alternatives must be evaluated for the use of treatment technologies or resource recovery technologies that reduce toxicity, mobility, and volume. These are preferred over simple disposal options.

5. Short-term effectiveness - This criterion addresses the period of time needed to complete the alternative and any adverse impact on the community, workers, or the environment during the construction and implementation period.

6. Cost effectiveness - This criterion considers the total short- and long-term costs of the actions, including operations and maintenance activities for the entire period during which the activities will be required and the SSCLs have been met. Cost effectiveness evaluates the direct capital, indirect capital, and operations and maintenance costs.

7. Implementability - Alternatives are evaluated on technical and administrative feasibility, including the availability of materials and services needed to carry out a particular option.

The first two criteria, protectiveness and compliance with ERCLs, are threshold criteria that must be met for an alternative to be considered a potential remedy and be screened through for comparison using the balancing criteria. The final ERCLs are provided in Appendix A of this ROD. If a remedy is expected to meet the first two criteria, DEQ then evaluates the next five criteria, balancing each against the alternatives to evaluate which alternative, or combination of alternatives, provides the most appropriate remedy. In addition to these criteria, DEQ considered the acceptability of the preferred alternative to the affected community, as indicated by community members and local government, during the public comment period on the Proposed Plan.

The cost estimate for each alternative evaluated in the FS was based on present value estimates of capital and operation and maintenance (O&M) costs for the estimated cleanup timeframe. Costs were developed using professional judgement, and generally included the following types of costs:

- Capital costs, including direct and indirect costs;
- Annual O&M costs, including long-term effectiveness monitoring costs;
- Periodic costs;
- Implementation of ICs; and
- Net present value of capital, discounted at 3%, O&M costs, periodic costs, and implementation of ICs.

A brief description of the cleanup alternatives presented in the FS and evaluated by DEQ in the Proposed Plan are set forth below.

- Alternative 1 – No Further Action
- Alternative 2 – Soil Tilling

- Alternative 3 – SVE system
- Alternative 4 – ICs
- Alternative 5 – Monitored Natural Attenuation (MNA)

In considering the affected media, the alternatives listed above relate to those media as follows:

- Soil – No further action, soil tilling, SVE system
- Groundwater – No further action, ICs, MNA
- Soil vapor – No further action, ICs, SVE system

Typically, more alternatives are evaluated for groundwater remediation in the FS. However, due to contamination being localized to MW-3 in relatively low concentrations, only two alternatives (along with no further action) were carried through in the FS. The SVE system remediates both soil and soil vapor because contamination in soil is a source of soil vapor contamination. The SVE system also indirectly remediates groundwater because it diminishes the amount of contamination in soil that may leach to groundwater.

9.1.1 Alternative 1 – No Further Action

DEQ requires that all other options be compared against the baseline alternative, no further action. No further action is considered under this alternative and contamination would remain at the Facility. No ICs or engineering controls would be put in place and no monitoring would occur.

Alternative 1 is not protective of human health and the environment in the short-term or long-term. MWYE Facility receptors would continue to have the potential for exposure to unacceptable levels of PCE and TCE contamination in soil vapor, indoor air, and groundwater; contamination in soil could continue to leach to groundwater. Alternative 1 does not meet ERCLs because there are still exceedances of the SSCLs for groundwater. Unacceptable risks would remain and would not be mitigated. This alternative would not be effective and reliable in the short-term and long-term because unacceptable levels of contamination would remain and potential exposure to contamination would continue. Alternative 1 is easily implemented and does not use treatment or resource recovery technologies. The net present cost for implementing no further action at the MWYE Facility is $0.

9.1.2 Alternative 2 – Soil Tilling

Under this alternative, soil would be turned over to degrade and volatilize PCE and TCE. Tilling is only effective for surface soil and would not be able to treat subsurface contamination.

This alternative would be protective of human health and the environment in the short- and long-term. Soil tilling would be effective and reliable in addressing remaining sources of contamination in surface soil that could leach to groundwater and/or contribute to VI. However, this alternative would not be effective and reliable for treating subsurface soils due to the limited depth at which the equipment can till soil. This alternative would not be compliant with ERCLs on its own but would be compliant if combined with another alternative. This alternative can be immediately implemented and could be completed within a field season due to the size of the

MWYE Facility; therefore, it is not necessary to add a net present value for cost estimate purposes because it would be implemented immediately. This alternative would cost $36,100.

9.1.3 Alternative 3 – SVE System

Under this alternative, an SVE system would remove soil vapors from the subsurface. An inactive, but operable, SVE system exists at the Facility due to the previous SVE pilot test. During the pilot test, the SVE was effective in removing soil vapor from subsurface soil that could cause contamination of indoor air or air within an excavation. In addition, the SVE system would also be effective in reducing contaminants in soil that are causing exceedances of SSCLs for groundwater.

This alternative is protective of human health and the environment in the short- and long-term but will not meet all the ERCLs on its own; however, it would be in compliance if combined with another alternative. This alternative would be a permanent solution because it is removing contamination from the subsurface soils. The SVE system would utilize resource recovery technologies as it reduces the mobility and volume of contamination, and it is implementable because the system is already installed at the MWYE Facility. This alternative could be completed in two years and the net present value is $167,100.

9.1.4 Alternative 4 – Institutional Controls

Specific reference to ICs was not included in the 1993 version of CECRA. However, consideration of land use and the way in which restrictions can be applied to real property to limit exposure have long been a part of the Superfund process and it is appropriate to consider their use here. ICs are restrictions on the use of real property that mitigate the risk posed to public health, safety, and welfare and the environment and include restrictive covenants, deed restrictions, controlled groundwater areas, and other legal mechanisms. Although ICs do not remediate the contamination, they manage human exposure to contaminants. The effectiveness of ICs depends on the mechanisms used, the durability of the IC, and the inspection and enforcement of the IC. ICs may be layered to improve effectiveness. ICs are considered easy to implement and inexpensive to implement and maintain, although long-term enforcement may increase costs.

Land Use Controls: ICs in the form of restrictive covenants would be used to prohibit building construction and excavation activities. Based on the soil vapor results and the groundwater plume, construction of new buildings in certain areas have the potential for VI and would be prohibited. DEQ evaluated the areas that comprise of the exceedances for soil vapor and groundwater and determined the area for new building restrictions encompasses approximately 1.9 acres (Figure 11 and Figure 13). This area includes approximately 0.35 acres for the groundwater plume plus 1.55 acres based on the soil vapor results (Figure 11 and Figure 13).

Groundwater Use Restrictions: ICs would be used to limit groundwater use at the MWYE Facility until SSCLs are met. The area where groundwater exceeds SSCLs is approximately 0.35 acres in size.

The appropriate IC or combination of ICs for the Facility would mitigate exposure to contaminated vapors during construction activities and in potential future buildings and mitigate

exposure to contaminated groundwater by restricting use. The total net present value for implementing ICs is $76,000, which assumes placement of restrictive covenants on BNSF and MRL property and includes 30 years of annual site inspections and deed reviews every five years. It does not include the cost of enforcement if violations of the ICs are found.

BNSF also has the ability to track property restrictions in its geographic information system (GIS) mapping program (BNSF, 2018). The system has an environmental layer that identifies property use restrictions. Internal BNSF departments including engineering, real estate, and environmental, consult the GIS program as part of BNSF's planning process for construction projects or land use decisions (e.g. acquisitions). The restriction footprint is mapped on the GIS program and available for download and review by BNSF staff (BNSF, 2018). This process helps ensure the durability of ICs on BNSF property.

This alternative is protective of human health in the short- and long-term provided monitoring and enforcement mechanisms are in place. It does not meet ERCLs on its own but would be in compliance if combined with another alternative. This alternative does not offer a permanent solution on its own but can be effective when combined with other alternatives and implemented adequately to ensure compliance. Alternative 4 is effective in the short-term and is implementable because the process to put ICs in place is relatively easy. It may also be effective in the long-term with adequate monitoring; however, the most difficult aspect of ICs is ensuring compliance by the property owner and enforcement in the case of violations. This alternative does not utilize resource recovery technologies.

9.1.5 Alternative 5 – Monitored Natural Attenuation

MNA refers to the natural breakdown of chemicals and this natural process can result in impacted media to meet SSCLs for COCs in groundwater. For MNA to be effective, the COCs must be conducive to this type of remediation and the source of contamination must either be removed to the maximum extent practicable or contained through other alternatives. MNA is also an appropriate remedy when there is evidence that the extent of contamination has reduced in size (EPA, 1999). Although biodegradation is not occurring at the MWYE Facility, volatilization and dilution are playing a role in attenuation processes (AECOM, 2013a). These factors, coupled with source removal during IRAs, have played a role in decreasing contamination.

This alternative is not protective of human health and the environment on its own in the short-term but will be protective in the long-term when the SSCLs for groundwater are met. Therefore, this alternative would need to be combined with other alternatives to be protective of human health and the environment. MNA will reduce the toxicity, mobility, and volume of contamination even though it is not an active technology. ERCLs would not be met for potentially four to six years, but a permanent solution would be achieved once DEQ-7 standards are met and maintained for two consecutive years. This alternative is easily implementable and expected to be completed in four to six years. For cost estimate purposes, it was assumed that the SSCLs for groundwater will be met within four years. The net present cost of MNA is $143,300.

10.0 Shared and Distinguishing Features

10.1.1 ERCLs

None of the alternatives are expected to meet all applicable or well-suited federal or state ERCLs when selected alone. However, various combinations of the alternatives will comply with all ERCLs. Appendix A contains the complete list of ERCLs identified for the MWYE Facility.

10.1.2 Long-Term Reliability of the Remedy

With the exception of Alternative 1 (No Further Action), each of the alternatives rely on ICs to help mitigate risk to human health at the MWYE Facility. ICs are considered moderately reliable because they rely on human actions. All technology options being considered in the alternatives are considered reliable over the long-term but each depends upon proper design, implementation, and maintenance.

10.1.3 9.2.3 Estimated Time for Design and Construction

All components within each alternative could be implemented within one year or less.

10.1.4 Estimated time to reach cleanup levels

Cleanup levels for surface soil have been met; however, cleanup levels for groundwater will take an estimated four to six years to achieve. It is expected that monitoring may be discontinued when two consecutive annual monitoring events confirm SSCLs are met. Once groundwater SSCLs are met, it is anticipated that subsurface soil and soil vapor concentrations will also have decreased to SSCLs.

10.1.5 Estimated Cost

The subsections of Section 9.1 provided the cost estimates of each alternative and a breakdown of the costs can be reviewed in Appendix F in the FS. Capital costs, O&M costs, and a 3% discount is applied to the total cost for the net present value of the alternative.

10.1.6 Use of Presumptive Technologies

A presumptive remedy is a technology that EPA has determined, based upon its experience, generally will be the most appropriate remedy for a specified type of site. EPA establishes presumptive remedies to accelerate site-specific analysis of remedies by focusing FS efforts (EPA, 1993a and EPA, 1993b). Although the MWYE Facility is not a CERCLA site, DEQ considered the presumptive remedy guidance as part of the alternatives analysis. SVE is a presumptive remedy for VOCs in soil (EPA, 1996) and was implemented as a pilot test at the MWYE Facility. However, DEQ's selected remedy does not include a presumptive remedy.

10.2 Expected outcomes

The residual source area at the MWYE Facility poses a current and future risk to human health and the environment through exposure to contaminated soil vapor in excavations or indoor air of future buildings, and by continuing to leach PCE and TCE to groundwater. Remediating the contaminated groundwater will reduce contaminant concentrations of PCE and TCE in subsurface soil and soil vapor. Restrictive covenants will be required to prevent new building

construction and excavation where there is a potential for contaminated soil vapors to pose unacceptable risks.

Although the groundwater is not currently in use at the MWYE Facility, ingestion and direct contact with contaminated groundwater pose future risks to human health. Groundwater use and the installation of wells near or where groundwater exceeds SSCLs will be prohibited through the use of ICs in the form of restrictive covenants until groundwater is remediated to meet the SSCLs.

11.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

The alternatives were evaluated and compared using the remedy selection criteria provided in § 75-10-721, MCA, as it existed in 1993. That version is used because the 1995 legislation that revised the statute included a savings clause making the amendments inapplicable to civil actions initiated prior to the date of the legislation, which is the case for the Facility (Section 25(1), Ch. 584, L. 1995). However, section 5.1.11 of the SOW associated with the Modified Consent Decree outlines the criteria for screening the alternatives (DEQ, 2004a). Several of the guidance documents referenced in the SOW, particularly the EPA's Feasibility Study: Development and Screening of Remedial Action Alternatives from 1989, are consistent with statutory language found under CERCLA, which requires seven criteria to be screened against the alternatives (EPA, 1989 and DEQ, 2004a). DEQ followed this same approach of including 'implementability' and 'short-term effectiveness' in the evaluation of alternatives in the Livingston Shop Complex ROD, which is covered under the same Modified Consent Decree as this Facility. Therefore, the cleanup alternatives are evaluated in a slightly different manner than they would be under the current version of § 75-10-721, MCA. A discussion about whether each alternative can meet the criteria is also provided, and this evaluation, coupled with reasonably and anticipated land use and public comments, aided in the selecting the final remedy.

Overall protection of human health and the environment, and compliance with ERCLs are threshold criteria that must be met for any remedy to be further considered or selected. In the comparative analysis, DEQ also evaluates the remaining criteria to select the best overall alternatives for each media. A list of the alternatives and their corresponding numbers is also provided to aid in this analysis.

Alternative 1 – No Further Action
Alternative 2 – Soil Tilling
Alternative 3 – SVE system
Alternative 4 – ICs
Alternative 5 – MNA

None of these alternatives alone can be used to remediate the entire MWYE Facility. Due to the extent of contamination and the affected media, some of the remedial alternatives listed above are specific to affected media.

11.1 Overall Protection of Human Health and the Environment

The criterion requiring overall protection of human health and the environment addresses whether an alternative provides adequate short-term and long-term protection from unacceptable

risks. Protection may be achieved by eliminating, reducing, or controlling exposure to unacceptable levels of hazardous or deleterious substances present at the MWYE Facility. None of the alternatives alone provides adequate protection of human health and the environment over the short or long-term as the public could be exposed to unacceptable concentrations of and exposures to COCs in subsurface soil, soil vapor, and groundwater, and the onsite residual source would continue to contribute contamination to the groundwater. Alternatives can be combined to ensure protectiveness.

Alternative 1 is not protective of human health or the environment because it would not address unacceptable risks present at the MWYE Facility, particularly potential exposure to contaminated soil vapor, indoor air and/or groundwater. Alternative 2 is not protective in the short-term and long-term by itself because it only addresses surface soil contamination, but it could be combined with other alternatives that would address contaminated subsurface vapor and groundwater. Alternative 3 would be protective in the long-term but would need to be combined with another alternative to be protective in the short-term. Alternative 4 protects human health in the short-term and long-term so long as the ICs are monitored and enforced to ensure compliance. However, this alternative is not protective of the environment because contamination would continue to leach to groundwater. Alternative 5 is protective in the long-term once groundwater standards are met but would not be protective in the short-term and does not address unacceptable risks from soil vapor.

11.2 Compliance with ERCLs

This criterion evaluates whether each alternative will meet applicable or well-suited state and federal ERCLs identified for the MWYE Facility. Two of the alternatives attain ERCLs individually. However, the other alternatives can be combined to achieve ERCLs.

Alternative 1 would not comply with the ERCLs. Alternatives 2 and 4 would not comply with ERCLs on their own. Alternatives 3 and 5 would be expected to comply with ERCLs in approximately four to six years.

11.3 Permanent Solutions

Long-term effectiveness and permanence refer to the ability of an alternative to maintain reliable protection of human health and the environment over time. Three of the alternatives provide permanent solutions on their own.

Alternative 1 would not be a permanent solution because contaminated soil vapor and groundwater would remain at levels that would continue to pose a potential risk. Alternatives 2 and 3 would be permanent because contaminant mass would be removed but would need to be combined with Aternative 4 until SSCLs are met. Alternative 4 would provide a permanent solution if combined with another alternative that addresses remaining contamination provided the ICs were adequately monitored and enforced to ensure compliance. Alternative 5 would ultimately be permanent once SSCLs for groundwater are met, but it is estimated to take approximately four to six years to demonstrate that SSCLs are met.

11.4 Treatment or Resource Recovery Technologies to Reduce Toxicity, Mobility, and Volume

This criterion addresses the degree to which treatment technologies or resource recovery technologies reduce toxicity, mobility, and volume of the contamination. These technologies are generally preferred to simple disposal options.

Alternatives 1 and 4 do not reduce toxicity, mobility, or volume of the contamination. Alternatives 2 and 3 do reduce toxicity, mobility, or volume of the COCs present at the Facility by treating contaminated soils or vapors to SSCLs. Although Alternative 5 is not a treatment or resource recovery technology, it does reduce the toxicity, volume, and mobility of COCs as they naturally attenuate.

11.5 Short-term Effectiveness

Short-term effectiveness addresses the period of time needed to complete the alternative and any adverse impact on the community, workers, or the environment during the construction and implementation period.

Alternatives 1 and 5 do not provide short-term effectiveness because the potential risk from soil vapor and contaminated groundwater would not be addressed. Alternative 2 presents limited risk to workers during operation of heavy equipment used for tilling. Alternative 3 presents limited risk to workers because the system is already installed. Risks associated with Alternatives 2 and 3 could be minimized by following proper safety procedures. Alternative 4 is effective in the short-term as implementation of ICs take little time and would limit potential exposure to contamination. Alternative 5 would need to be combined with another alternative to be effective in the short-term. All alternatives are expected to achieve RAOs in approximately four to six years.

11.6 Implementability

Implementability refers to the technical and administrative feasibility of an alternative including the availability of materials and services needed to carry out a particular option.

Alternatives 1 and 4 are easily implemented. Alternative 2 is implementable and contractors are locally available. Alternative 3 is easily implementable because the SVE system is already installed; however, some minimal maintenance may be needed to restart the system Alternative 5 is implementable because and would use the same type of groundwater monitoring that has been occurring at the MWYE Facility for many years.

11.7 Cost-Effectiveness

All costs are estimates and may vary as a result of unforeseen expenses and inflation. Cost effectiveness evaluates the overall monetary cost compared to the risk reduction the alternative achieves. Alternative 1 has the lowest cost but does not address the risk from contaminated soil vapor and groundwater. Alternative 2 is less costly than Alternative 3 but does not reduce the soil vapor risk. Alternative 3 is the costliest alternative but would address remaining risks from

soil vapor within a shorter timeframe. Alternative 4 is costlier than alternatives 1 and 2, but less costly than Alternatives 3 and 5. Alternative 5 is less costly than Alternative 3.

12.0 SELECTED REMEDY

12.1 Summary of the Rationale for the Selected Remedy

DEQ's selected remedy for the MWYE Facility is a combination of alternatives set forth below:

- ICs (Alternative 4): The selected remedy partially relies on the placement of DEQ-prepared and approved restrictive covenants on the properties that make up the MWYE Facility, including property owned by BNSF and MRL. A restrictive covenant to prohibit use of the groundwater where SSCLs are exceeded is necessary (Figure 11). Excavation and construction of new buildings will be prohibited in those areas of the MWYE Facility that have the potential for VI related to the groundwater plume, subsurface soil, and soil vapor impacts. The parcels may be surveyed to limit the IC to those areas exceeding SSCLs or the IC may be applied to the entire parcel. The DEQ-prepared and approved ICs are provided in Appendix C. Approval for any proposals for excavation or construction must be requested from DEQ in advance and, as part of the approval, DEQ may require implementation of a mitigation or ventilation system in order to limit risk.

- MNA (Alternative 5): The selected remedy for groundwater is MNA. Numerous IRAs effectively removed the majority of the source contributing to groundwater exceedances. Long-term monitoring is necessary to demonstrate the effectiveness of MNA and ensure contaminant concentrations in groundwater continue to decrease and consistently meet SSCLs. The FS estimated the SSCLs will be met within four to six years.
- DEQ will determine the final monitoring requirements after it issues the ROD.

Costs and assumptions used in calculating the total present value of the selected remedy are provided in Appendix B and Section 12.3. These are estimates only and are subject to change during remedial design and implementation. The cost estimates are based on the assumption that the alternatives will meet the estimated cleanup timeframes (as identified in the individual alternative discussions) and these are preliminary estimates only. They are used to ensure that the costs of each alternative are compared and evaluated based upon consistent information. Actual costs and cleanup timeframes may vary and cost estimates will be further refined during remedial design/implementation.

As described in Section 4, IRAs and pilot tests were conducted at the MWYE Facility and they helped reduce the threat to human health and the environment and contributed to the selected remedy because they reduced concentrations of COCs in soil and groundwater. Thermal desorption and the vented piles treated contaminated soil that was subsequently shipped off-site for disposal. These IRAs contributed to the reductions of COCs impacting groundwater and soil vapor. The soil tilling pilot test removed COCs in surface soils. The SVE system pilot test was effective at removing and treating subsurface soil and vapor contamination, which further reduced contaminant concentrations in groundwater. DEQ evaluated thermal desorption and vented piles, against the criteria found in the 1993 version of § 75-10-721, MCA, to determine if

they are consistent with the final remedy. The soil tilling and SVE system were evaluated in Sections 9.1.2 and 9.1.3 as part of the FS alternatives.

Overall Protection of Human Health and the Environment: Thermal desorption and the vented piles treated contaminated soil and disposed of the treated soil off-site. Therefore, these IRAs are protective of human health and the environment because they reduced hazardous and deleterious substances at the MWYE Facility.

Compliance with ERCLs: The IRAs were subject to their own set of ERCLs as set forth in the IAM (DEQ, 1995a). The initial technology of thermal desorption was discontinued in 1997 due to potential compliance issues, specifically concerning safety as well as on-site disposal, and was replaced with the vented piles and off-site disposal. As discussed in Section 2.2, there were RCRA subtitle D landfill compliance issues during the vented pile IRA; however, those were resolved at that time and the IRAs are consistent with solid waste and reclamation ERCLs.

Permanent Solutions: The IRAs permanently reduced contaminant mass in the soil through excavation and treatment. The IRAs improved groundwater quality but did not achieve SSCLs.

Treatment or Resource Recovery Technologies to Reduce Toxicity, Mobility, and Volume: The thermal desorption unit and vented piles occurred over 20 years ago. Both technologies employed a form of treatment that reduced the volume of contaminants in the soil, thereby reducing the volume of contaminated groundwater as demonstrated by the decline in the area where groundwater concentrations exceeded SSCLs.

Short-term Effectiveness: Thermal desorption could not achieve short-term effectiveness due to implementation and safety issues. As a result, vented piles were selected as a subsequent IRA, and the vented piles minimized adverse impacts on the community, workers, and the environment during the construction and implementation period.

Implementability: Implementability issues were encountered with thermal desorption (e.g., operational issues, low production rates, compliance issues, and safety and equipment problems) that resulted in the vented piles being selected as a subsequent IRA. The vented piles were implemented successfully.

Cost-Effectiveness: These IRAs were already implemented and the estimated costs are documented in the IAM and the IAMA.

Based on this analysis, the thermal desorption and vented pile IRAs meet the CECRA criteria and are consistent with the selected remedy. The remaining contamination in the source area will be addressed in the selected remedy, which will reduce risks to human health and the environment through the following:

- The selected remedy will meet both threshold criteria: overall protection of human health and the environment, and compliance with ERCLs. The remedy accomplishes overall protection by prohibiting the use of groundwater and prohibiting excavation and new building construction in areas of subsurface soil and soil vapor contamination until SSCLs are met. It also includes implementation of ICs. ERCLs will be met when MNA has reduced contaminants in groundwater to the SSCLs.

- The selected remedy provides a permanent solution because MNA will continue to decrease contaminant concentrations in groundwater until SSCLs are met, and ICs will prevent human exposure to subsurface soil, soil vapor, and groundwater. The ICs will be adequately monitored and enforced to ensure compliance.

- The selected remedy uses treatment or resource recovery technologies to reduce toxicity, mobility, and volume through the previous IRAs and pilot tests. MNA will continue to decrease the mobility of PCE and TCE in groundwater and will decrease contaminant concentration in soil vapor as the contamination is attenuating.

- The selected remedy provides short-term effectiveness since ICs are easily implemented and will limit potential exposure to contamination while MNA continues to decrease contaminant concentrations in groundwater.

- The selected remedy is implementable. Very little administrative time is involved in executing and recording ICs, and MNA would use the same type of groundwater monitoring that has been occurring at the MWYE Facility for many years.

- The selected remedy costs are presented in Appendix B. Previous IRAs have reduced contaminant concentrations in the source area, which allows MNA to effectively reduce the remaining contamination. The cost also includes implementation and enforcement of ICs.

Based on the available data and using DEQ's expertise, DEQ finds that the selected remedy best meets the selection criteria and provides the appropriate balance considering site-specific conditions and criteria identified in CECRA.

12.2 Detailed Description of the Selected Remedy

DEQ selected a combination of alternatives to address soil, groundwater, and soil vapor. These include MNA for the groundwater plume, ICs to restrict land and groundwater use, and long-term monitoring. MNA will address the groundwater plume and ICs will address groundwater, soil, and soil vapor. Soil vapor will be addressed by cleanup of the groundwater that is a source of contaminated soil vapors. The selected remedy is detailed below.

12.2.1 Groundwater

The selected remedy for groundwater is MNA and ICs; ICs are discussed in Section 12.2.3. Previous IRAs and pilot tests at the MWYE Facility removed a significant amount of the contaminant source. PCE and TCE contamination in groundwater has generally exhibited a decreasing concentration trend (Figure 8, Figure 9, Figure 11, and Figure 12) and is estimated to exceed the SSCLs over an area of approximately 0.35 acres in the central portion of the MWYE Facility (Figure 11). As identified in the cost estimate (Appendix B, Table B-2), the MNA remedy assumed 14 groundwater monitoring wells will be sampled once per year during for nearly four years during high groundwater levels, and it would continue until two consecutive years of monitoring would be needed to confirm that SSCLs are met. The current monitoring well network is expected to adequately characterize the extent of contamination. The precise details of the long-term groundwater monitoring program will be developed during remedy

implementation. Once DEQ determines that SSCLs are consistently met, BNSF will be required to properly abandon the monitoring wells at DEQ's direction.

ICs will provide adequate protectiveness while PCE and TCE naturally degrade in groundwater to meet the SSCLs. Despite geology and hydraulic conductivity supporting high mobility, more recently contamination exceeding SSCLs has remained near MW-3 and it is expected to remain localized. Long-term monitoring will be performed to ensure that concentrations in MW-3 and other wells continue to decrease. Detailed assumptions used for estimating costs for this portion of the selected remedy are provided in Appendix B. The estimated net present cost for this alternative is $143,300.

12.2.2 Subsurface Soil and Soil Vapor

The selected remedy for subsurface soil and soil vapor is to implement ICs. Previous IRAs and pilot tests at the MWYE Facility removed most of the contamination as demonstrated by confirmation samples. Further, the results of the soil tilling pilot study in 2015 demonstrate that surface soils in those two test areas meet SSCLs. Other surface soils exceed SSCLs for leaching to groundwater; however, groundwater data downgradient of those areas indicate that while contaminant concentrations exceeded SSCLs historically, groundwater concentrations have declined and for the past nearly seven years the concentrations have met SSCLs (Section 5.2.4). Based on this empirical data, the surface soil exceedances of the SSCLs for leaching to groundwater no longer pose an unacceptable risk for leaching to groundwater; the surface soil data also indicates that residential SSCLs are met. Therefore, no remedy is needed for surface soil.

Exceedances in MW-3 groundwater correlate to seasonal high groundwater elevations, which suggest residual contamination is present in the smear zone subsurface soils. As groundwater rises in the summer and continues to dissolve contamination in the smear zone, the dissolved contamination will be attenuated through MNA. The subsurface soils and contaminated groundwater cause soil vapor concentrations to exceed SSCLs in a limited area (Figure 13). ICs will be implemented where soil vapor exceedances occur to limit potential future exposure to contaminated soil vapor in excavations and indoor air that could result from VI into future buildings. Exceedances occur on portions of BNSF and MRL properties (Figure 7 and 11). ICs will provide adequate protectiveness while PCE and TCE concentrations in soil vapor decrease to below the SSCLs as a result of groundwater meeting SSCLs. ICs are further discussed in Section 11.2.3. The SVE pilot test infrastructure (wells, vapor points, and piping) must remain in place until SSCLs are met; in the event that MNA does not reduce contaminant concentrations as predicted in the FS, DEQ will determine what actions are necessary and, if they are, address them through a revision to the ROD.

12.2.3 Institutional Controls

The selected remedy partially relies on the placement of a DEQ-prepared and approved restrictive covenant on the BNSF and MRL properties that make up the MWYE Facility to prohibit use of the groundwater where it exceeds the SSCLs (Figure 11). The groundwater plume that exceeds SSCLs is estimated to be an area of approximately 0.35 acres. In conjunction with that restriction, construction of new buildings and excavations will be prohibited in those areas of the MWYE Facility that have the potential for VI related to the groundwater plume and

subsurface soil and where soil vapor impacts remain based on the SVE pilot test (Figure 7). The area for new building and excavation restrictions encompasses approximately 1.9 acres.

Figures 7 and 11 identify the BNSF and MRL properties that will require ICs. Restrictive covenants in substantially the same form as the document found in Appendix C must be executed and recorded on both BNSF's and MRL's properties at the MWYE Facility. The restrictive covenants may be placed on the entire parcels or BNSF may survey those areas with SSCL exceedances to limit the property restrictions. As they pertain to the groundwater portion of the remedy, the ICs will prohibit well installation and the groundwater may only be used for the monitoring activities for the MNA remedy. The ICs prohibit construction activities and excavation without DEQ's express written approval. This prohibition on structures excludes construction of an above-ground trail as part of any future rails-to-trails project if BNSF and/or MRL provided permission for such a project. As part of the approval process for construction or excavation, DEQ may require a ventilation or mitigation system to mitigate unacceptable risks. These restrictions will remain in effect until DEQ determines they are no longer needed to ensure protection of human health and the property owner requests that they be removed as provided for in § 75-10-727, MCA. Detailed assumptions used for estimating costs for ICs are provided in Appendix B, Table B-3. The total estimated cost for this portion of the selected remedy is $76,000.

As discussed previously in Section 9.1.4, BNSF has an internal process to document and track restrictive covenants in a GIS program (BNSF, 2018). BNSF implements an internal procedure where the GIS program is consulted before construction projects and this will provide another mechanism to identify restrictions prior to conducting activities that could result in violations of the ICs at the MWYE Facility. However, the GIS program only tracks BNSF-owned properties. Therefore, BNSF will be required to monitor ICs and report the findings to DEQ. The details of the annual monitoring will be provided in a remedial action work plan to be prepared following the issuance of the ROD.

12.2.4 RAOs and Performance Standards

DEQ has established its RAOs for each contaminated media in Section 8.0. SSCLs for groundwater, soil, and soil vapor are provided in Table 5. Section 7.0 details the development of SSCLs for the MWYE Facility.

12.3 Cost Estimate for the Selected Remedy

Appendix B presents detailed summaries of the costs and assumptions for each component of the selected remedy.

The total present worth value of the selected remedy is $219,300. These cost estimates were based on the information presented in the FS and provided in Appendix B of this ROD. Changes in the cost elements may occur as a result of new information during implementation of the selected remedy. This is a feasibility-level engineering cost estimate expected to be within plus fifty to minus thirty percent of the actual project cost.

12.4 Cost Uncertainties

Remedial implementation will play an important role in determining final costs for the MWYE Facility remedy and will be more reflective of actual costs than the estimated costs presented in this ROD. Uncertainties that may affect the costs of the selected remedy include but are not limited to:

- The time required for MNA and performance monitoring may increase or decrease the costs of the monitoring.
- Increases or decreases in the number of wells to be monitored as part of long-term groundwater monitoring may increase or decrease the costs of monitoring.
- Costs associated with confirmation sampling may increase or decrease the cost if not reflective of what is included in the cost estimates.
- Costs associated with agency oversight of the remedial actions were not included in the cost estimates for the selected remedy. Costs associated with agency oversight may increase the cost of the selected remedy.

12.5 Estimated Outcomes of Selected Remedy

The selected remedy uses a combination of ICs and MNA for subsurface soil, soil vapor, and groundwater to control exposures and protect human health and the environment. Attenuation of the contaminated groundwater in the residual source area will reduce the continuing source of contamination contributing to groundwater and soil vapor concentrations. ICs, along with monitoring, will prevent exposure to contaminated groundwater, subsurface soil, and soil vapor until SSCLs are achieved.

It will likely take less than six months to prepare the remedial action work plan and implement the remedy that includes placement of ICs. Long-term monitoring, including MNA monitoring, will continue until groundwater concentrations are below cleanup levels for two consecutive events and all other SSCLs are met. That is estimated to be four to six years for the purpose of estimating costs.

Land uses are not expected to change as a consequence of the remedial action. Land use is expected to remain commercial/industrial at the MWYE Facility. ICs will prohibit construction or excavation in the areas of groundwater, subsurface soil, and soil vapor contamination. ICs will also prohibit the installation of groundwater wells or use of groundwater where SSCLs are exceeded.

13.0 STATUTORY DETERMINATIONS

Under the 1993 version of § 75-10-721, MCA, DEQ must select a remedy that will attain a degree of cleanup of the hazardous and deleterious substance and control of a threatened release or further release of that substance that assures protection of public health, safety, and welfare and of the environment. In approving remedial actions performed under § 75-10-721, MCA, DEQ must require cleanup consistent with applicable state and federal ERCLs and may consider substantive state and federal ERCLs that are well-suited to site conditions. In addition, DEQ must select a remedy that uses permanent solutions, uses alternative treatment technologies or resource recovery technologies to the maximum extent practicable, is effective in the short-term,

is implementable, and is cost-effective, taking into account the total short- and long-term costs of the actions, including operations and maintenance activities for the entire period during which the activities will be required. Finally, DEQ considers the acceptability of the remedy to the affected community, as indicated by community members and local government. DEQ has considered all public comment received during the public comment period on the Proposed Plan, has responded to these comments in Part 3 of the ROD, and incorporated some of those comments into the ROD where appropriate.

Although not required by statute to do so (due to a 1995 legislative savings clause), the selected remedy also complies with 2020 CECRA remedy requirements. The selected remedy will attain a degree of cleanup of the hazardous or deleterious substance and control of a threatened release or further release of that substance that assures protection of public health, safety, and welfare and of the environment. The selected remedy will meet applicable or relevant state or federal environmental requirements, criteria, or limitations.

The selected remedy, considering present and reasonably anticipated future uses, and giving due considerations to ICs, demonstrates acceptable mitigation of exposure to risks to the public health, safety, and welfare and the environment, is effective and reliable in the short -term and the long-term, is technically practicable and implementable, uses treatment technologies or resource recovery technologies if practicable, giving due consideration to engineering controls, and is cost-effective. In addition, the selected remedy is acceptable to the majority of the affected community, as indicated by comments received from community members and the local government during the public comment period on the Proposed Plan.

The following sections discuss how the selected remedy meets the CECRA statutory requirements.

13.1 Protection of Public Health, Safety, and Welfare and the Environment

CECRA provides that protection of public health, and safety, and welfare and the environment is a threshold criterion in selecting a remedy. DEQ has determined that the selected remedy appropriately protects public health, safety, and welfare, and the environment through the following:

- MNA, in combination with the previous IRAs, will be protective of human health and the environment.
- Placement of restrictive covenants on properties within the MWYE Facility will restrict construction of new buildings and excavations on the properties. ICs in the form of restrictive covenants will also restrict groundwater use until the SSCLs have been met.

13.2 Compliance with ERCLs

The final determination of ERCLs is included in Appendix A of this ROD. The selected remedy will comply with all applicable and well-suited ERCLs. Some significant ERCLs compliance issues are discussed below.

For COCs in groundwater, the contaminant-specific ERCLs for the remedial action are the standards specified in DEQ-7 and the MCLs. Previous IRAs and pilot tests removed a majority

of the contaminant source for groundwater. MNA will lead to compliance with applicable DEQ-7 and MCL standards within a reasonable timeframe.

Once SSCLs are met, groundwater monitoring wells and SVE extraction wells and vapor points will be properly abandoned according to the required regulations.

13.3 Permanent Solutions

The IRAs permanently reduced contaminant mass in the soil through excavation and treatment. The IRAs improved groundwater quality but did not achieve SSCLs. The selected remedy will provide a permanent solution once MNA reduces groundwater contamination to SSCLs.

13.4 Treatment or Resource Recovery Technologies

The selected remedy for subsurface soil, vapor, and groundwater do not use treatment technologies. However, the IRAs and pilot tests at the MWYE Facility did achieve substantial risk reduction through treatment and disposal of contaminated soils.

13.5 Short-term Effectiveness

The selected remedy will require ICs be implemented to limit potential exposure to contamination while MNA continues to decrease contaminant concentrations in groundwater. These ICs provide short-term effectiveness.

13.6 Implementability

The selected remedy is implementable at the MWYE Facility because the selected technology routinely used successfully in the environmental field and the materials necessary are widely available.

13.7 Cost-Effectiveness

The selected remedy is cost-effective, taking into account the total short- and long-term costs of the actions, including long-term monitoring for the entire period during which the activities will be required. The selected remedy provides overall effectiveness proportionate to the costs. To the extent that the estimated cost of the remedy exceeds the cost of other alternatives, the difference in cost is reasonably related to the greater overall effectiveness provided by the selected remedy. The detailed evaluation of the balance of these criteria among the alternatives considered is set forth in the FS and in Section 10.0, Comparative Analysis of Alternatives, in this ROD. The estimated cost of the selected remedy of MNA ($143,300) and ICs ($76,000) is $219,300.

14.0 DOCUMENTATION OF NOTABLE CHANGES FROM THE PREFERRED REMEDY

The Proposed Plan for the MWYE Facility was released for public comment on June 6, 2019. The Proposed Plan identified a combination of Alternative 4 (ICs) and Alternative 5 (MNA, including long-term monitoring) to address the remaining PCE and TCE contamination in subsurface soil, soil vapor, and groundwater. DEQ has reviewed and responded to all written comments for the Proposed Plan submitted during the public comment period, and comments

and responses are presented in Part 3 of this ROD. DEQ incorporated some of those comments into the ROD when appropriate. However, there were no changes necessary to the final remedy selected in this ROD.

- The proposed plan had a typographical error in the soil tilling cost text ($27,570). The actual soil tilling cost depicted in Appendix A (proposed plan) and Appendix B (ROD) is $36,100. However, this did not affect the comparison of the alternatives.
- The proposed plan indicated property use would be restricted to commercial/industrial. Public comment was received regarding potential future use, which resulted in DEQ re-evaluating confirmation soil sample results. Based on confirmation surface soil sample results, the residential SSCLs are met; therefore, property does not need to be restricted to commercial/industrial. However, other ICs are still needed to restrict groundwater use, excavations, and construction of buildings.
- DEQ clarified that the remedy for groundwater and soil vapor, MNA, is also the remedy for subsurface soil.

15.0 ADMINISTRATIVE RECORD REFERENCES

DEQ cited, relied upon, or considered the following documents in selecting the remedy for the MWYE Facility. It does not include legal citations such as those found in the MCA, ARM, United States Code, and Code of Federal Regulations (CFR). Any document, model, or other reference identified in the Final RI reports (RETEC, 1991 and RETEC, 1992), RA and RA Amendment (RETEC, 1993 and AECOM 2014a)), and the FS (AECOM, 2020a) are also incorporated herein as part of the administrative record.

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Part 3

Responsiveness Summary

1.0 INTRODUCTION

The Montana Department of Environmental Quality (DEQ) solicited public comment on the Feasibility Study (FS) and Proposed Plan for the Mission Wye (MWYE) Facility near Livingston, Montana, during a public comment period that ran from June 6, 2019, through July 6, 2019. DEQ also held a public meeting and hearing in Livingston on June 19, 2019. At the public hearing, people were offered the opportunity to submit oral comments and three people provided comment during the hearing. DEQ received 14 written comments and three of those commenters also provided oral comments during the public hearing.

1.1 COMMUNITY INVOLVEMENT BACKGROUND

The Montana Comprehensive Environmental Cleanup and Responsibility Act (CECRA) provides for the public to have input into the DEQ decision-making process with respect to the final cleanup of state Superfund facilities. At the MWYE Facility, DEQ involved the community, including local officials and residents, in various aspects of investigations and cleanup; see Part 2, Section 3.0, of the Record of Decision (ROD) for details. Most recently, DEQ held a public meeting and hearing at the Livingston City-County Building to summarize DEQ's preferred final remedy for the MWYE Facility and provide officials and citizens the opportunity to ask questions and submit oral comments on the FS and Proposed Plan. DEQ also sought written public comment on the Proposed Plan and FS, evaluated and considered public comment, prepared this written responsiveness summary, and made changes to the ROD based on public comments, where appropriate.

1.1.1 NOTIFICATION OF PUBLIC COMMENT PERIOD

Press releases were sent to newspapers, television stations, and radios stations to announce the public comment period for the Feasibility Study Report and Proposed Plan, and the public meeting and hearing. Printed notices were published in the *Livingston Enterprise*, a daily newspaper, and on DEQ's website. DEQ sent letters to local government officials (City and County Commissioners, City Manager, and County Sanitarian) and a site update factsheet to other stakeholders from the MWYE Facility mailing list. Each type of notification provided information to public meeting, how to access the hard and electronic copies, and announced the opportunity to provide comment.

1.2 EXPLANATION OF RESPONSIVENESS SUMMARY

All comments received during the public comment period on the FS and Proposed Plan have been reviewed and considered by DEQ in the decision-making process and are addressed in this Responsiveness Summary. To assist in developing responses, DEQ added its own numbering to comments where appropriate to add clarity. Each specific oral and written comment is stated verbatim. DEQ considered each comment submitted in its entirety. In order to avoid duplication of some responses, similar comments are usually addressed only once for the first occurrence of the comment and thereafter referenced to the appropriate response. The written comments and

the transcript from the June 19, 2019, public hearing are part of the administrative record and are referenced in Part 2, Section 15.0 of the ROD.

2.0 RESPONSE TO ORAL COMMENTS

2.1 COMMENTS FROM MAX HJORTSBERG REPRESENTING THE PARK COUNTY ENVIRONMENTAL COUNCIL

Then I will. Okay. I'm sure if it's not too loud in here, you can hear me. My name is Max Hjortsberg. That's spelled H-J-O-R-T-S-B-E-R-G. I am the Conservation Director with Park County Environmental Council. I'm going to provide just a brief oral comment to you and then we will be sending a more thorough written comment before the deadline, so. I'd like to thank DEQ, first and foremost, for coming here tonight and providing this really informative presentation and background on the Mission Wye site. I know that this issue has been ongoing for a couple decades now and it has been of very important concern to our community and especially the members in support of PCEC. We know that the cleanup efforts have been ongoing to varying degrees of success, as you have noted, and we think that the cleanup efforts should continue in the most thorough and responsible manner going forward in order to ensure that the Mission Wye site is able to be, you know, technically buttoned up and closed down and that it is proven to be safe to human health and the local environmental. We currently recommend that Alternative 3, the soil vapor extraction system, remain in place and be used to the extent that it can be in this process since there are still signs of subsurface soil contamination. I read in the report that if Alternative 3 is not chosen that the system will be terminated and then removed and I don't – you know, we don't think that should necessarily happen until it is shown that it is no longer needed. We also agree with Alternative 4, Institutional Controls, putting deed restrictions on the property to limit building and construction that could potentially have health effects to both the people, the construction workers or the buildings that would be going onto place. It's at a potentially busy intersection, that area of land is, could have a very real commercial value in the future for any number of reasons based on its location. And it is still at a railroad junction and there are new proposals being put forth in Park County for Rails to Trails System that could potentially utilize the Shields Valley Spur Line to the north and would be—that would be the area in which the trail from – that's also being discussed from Yellowstone Park to Livingston could potentially extend out to that 89, 90 intersection and then move north up the Shields Valley. So it's still in a very critical crossroads, so to speak, literally and figuratively for future activities and development, so. Those institutional controls should take that into mind. Granted a trail system would not impact subsurface soils, but getting that site cleaned up as thoroughly as possible would ensure that something like that could be instructed and utilized in the future. Let's see here. While we understand that the monitored natural attenuations alternative will – you know, eventually we'll see, as we are seeing, a diminishment of the contamination. We don't necessarily want to take on the wait-and-see approach. Its taken 20 years for us to see that diminishment. It could take another 20 years for it to get to where we need it to be and we honestly don't think that that's an appropriate amount of time to take. And so the additional

alternatives should be employed to expedite the cleanup and to ensure that the health and safety of that site is guaranteed. On another note, Burlington Northern knowingly dumped wastes at that site for decades. I've spoken with employees who actually dumped that waste when they were right out of high school working for Burlington Northern. They were powerless to do anything about it but they knew that that material was toxic and hazardous. And if they knew as a 19-year-old employee, then Burlington Northern, you know, senior employees knew and, therefore, we think that Burlington Northern should do as thorough and proper of a cleanup as possible since they did that knowingly and are responsible for that cleanup. And they will be paying for it and they are—they have initiated cleanups and we think they should just finish that job in a complete manner. And I would say that about sums it up. I'd like to thank you for having this meeting and allowing us to give public comment and ask questions. Thank You.

Response:

DEQ considered the commenter's preference for Alternative 3 with ICs as the final cleanup. As part of its evaluation, DEQ reviewed the SVE soil vapor baseline results and results from when the SVE was shut down in 2017. The baseline concentrations ranged from 650 to 12,000 micrograms per cubic meter ($\mu g/m^3$) for PCE and 64 to 3,800 $\mu g/m^3$ for TCE. The last sample from the pre-treatment location, collected in June 2017, showed results of 630 $\mu g/m^3$ for PCE and 94 $\mu g/m^3$ for TCE, which is significantly less than the highest baseline concentrations.

The overall mass removed of PCE and TCE, 30 pounds for PCE and 3.94 pounds for TCE, demonstrates that the overall mass remaining is also low. Mass removal rates were highest based on vapor concentrations of up to 6.47 $\mu g/m^3$ for PCE and 0.89 $\mu g/m^3$ TCE, which were recorded the month of November in 2015. Even when quarterly monitoring began, the amount removed over the longer period of time was not reaching quantities removed anywhere near the highest concentrations removed when the SVE system was first turned on, such as the period from March through June 2017, the amount removed for PCE was 2.13 $\mu g/m^3$ for PCE and 0.22 $\mu g/m^3$ for TCE. This is due to a decrease in actual mass of TCE and PCE available to remove and not because the SVE system performance is becoming less effective or reaching its technical limitations (AECOM, 2020a). The SVE system at MWYE has shown an asymptotic trend already for TCE, but PCE was still being removed when the system was shut down (Figure 8, Part 2 of ROD). While SVE may continue to remove contaminant mass (PCE at the least), the energy needed to remove lower contaminant concentrations on the 1.9 acres of impacted area remains the same. Currently, there are no occupied structures at the MWYE Facility and the primary use is commercial/industrial operation of an active rail line.

In addition to the contaminant mass removed by the SVE pilot test, BNSF's various interim actions at the MWYE Facility have removed approximately 11,000 tons of soil that required treatment for disposal, 9,000 tons of debris, and 1,200 tons of asphalt-like substance (AECOM, 2012). Based on current information, reactivating the SVE system with institutional controls (ICs) will cost more than MNA with ICs, but will not provide any additional risk reduction. In addition, the SVE system has already demonstrated an asymptotic trend for TCE, and it is

unknown when an asymptotic trend would be reached for PCE. Therefore, DEQ selected MNA and ICs as the final remedy for the MWYE Facility. However, in response to this comment, DEQ will require that the SVE infrastructure remain in place until SSCLs are met and consistently maintained. If SSCLs are not met in the manner and timeframe predicted in the FS, DEQ will determine what actions are necessary and, if they are, address them through a revision to the ROD.

Historically, groundwater contamination was more wide-spread and interim actions that addressed the source of the groundwater contamination have reduced contaminant concentrations in groundwater and the area where groundwater exceeds site-specific cleanup levels (SSCLs) has decreased over time. Groundwater has been sampled from 14 monitoring wells on a semi-annual to annual basis since 1991. At one point, the contaminant plume extended past Highway 89, but in recent years contamination has only exceeded SSCLs at MW-3. When an SVE is shut down, it is not unusual to see some increases in groundwater concentrations. These increases are often temporary as monitored natural attenuation continues to address the remaining groundwater contamination.

The commenter also expressed concerns about the ability to use the property recreationally in the future. DEQ has included text in the ROD and in the ICs that clarifies that a rails to trails project is not precluded if the property owners provide permission for such an above-ground trail to be constructed on their property.

BNSF is responsible for cleanup of the MWYE Facility. Over the years, workers at the Livingston Shop Complex shared information they had about railroad waste disposal practices with DEQ. That information was valuable in identifying areas to explore during investigations at both facilities. DEQ identified BNSF as responsible for the MWYE Facility and required BNSF to perform necessary investigations and interim actions as described in Sections 2.4 of the ROD. The investigations and interim actions occurred under the Modified Partial Consent Decree, Order, and Judgment in Montana Federal District Court Cause No. 88-141-H-CCL, dated April 27, 1990 and subsequently amended February 14, 2007, as the result of a Stipulation and Joint Motion to Amend Caption and Modified Partial Consent Decree, Order, and Judgment, and it also requires BNSF to implement the final cleanup.

2.2 COMMENTS FROM SALLY HUGHES

My name is Sally Hughes and I live on Fox Run. This is just downstream from this cleanup site and I would just like to – like to see some acknowledgment of the fact that this isn't just an area that there is no activity or there's just some cows. There's two subdivisions immediately downstream just east of 89 and other residences. And we've been, you know, living with the knowledge of this site just very close to us and our area also is in a zoning district and it's zoned for agricultural and residential use. And so as far as future growth is concerned, that particular strip east of 89 and between the interstate and the river, all the way down to the Mission Creek, is not going to be commercial and industrial because that's prohibited by the zoning. And so, you

know, some acknowledgment of the potential impact on that area would be good. It was kind of ignored in the comments because the focus was just on that small amount of acreage really and the Superfund site. But I'd like to thank you for the presentation. It was very interesting and informative.

Response:
DEQ clarified the current and potential future use of the surrounding area and clarified current zoning restrictions, including the area east of Highway 89, in the ROD (see Part 2, Section 6.0).

2.3 COMMENTS FROM ANN BUCKLEY

My name is Ann Buckley and my husband, Reed and I are – our address is 5 Fox Run and we're the property owners that are listed on your map at the Stillman property, so we own acreage very close to the Superfund site. And first of all, I really appreciate you all coming out, and the presentation was really helpful and I really appreciate the ability to have this hearing. So, thank you very much.

I just want to echo the previous two speakers and –whereas, the process has been – the cleanup process has been ongoing, it isn't finished yet. And speaking specifically about Alternative Number 3, and I understand the cost effective of this argument, but it does seem like if – if the infrastructure is already in place for the SVE system, it seems a little bit penny wise and pound foolish not to keep implementing that, even though perhaps it isn't the most – you know, on the surface, ironically, it isn't the most cost effective option. It seems like in conjunction, particularly the institutional controls and then the monitored natural attenuation, it seems like a particularly important thing to keep doing. It's not a huge burden of cost to Burlington Northern and, as the first speaker mentioned, they knowingly dumped toxic waste in there for decades. It seems like that is just an important control and important remediation to have going forward until the site is completely cleaned up, particularly looking to future use of hopefully something with Rails to Trails or other uses that might be more friendly towards public use and public access. And then as Sally also pointed out, it's important to take into consideration the entire area. Right just on the other side of 89 it is limited to residential and agriculture use. So that even though the appropriate use of that particular piece is commercial industrial, it's important to understand the impacts on the properties and the land within a very short distance, you know, quarter mile, half a mile away. So, I thank you again and we appreciate it.

Response:
Please refer to DEQ's responses to Comments 2.1 and 2.2. DEQ does note that the MWYE Facility is privately owned and DEQ will not mandate that it be made available for public use or access. However, individuals or organizations are not precluded from collaborating with the property owners to obtain access for public use.

3.0 RESPONSES TO WRITTEN COMMENTS

3.1 COMMENTS FROM PARK COUNTY ENVIRONMENTAL COUNCIL

Dear Ms. Foslund, I am writing on behalf of the Park County Environmental Council (PCEC), a local grassroots environmental group with over 500 members and 2,300 supporters. I appreciate your time and consideration on this important matter. I would like to thank you for the opportunity to provide comments to the Montana Department of Environmental Quality (DEQ) on the planned cleanup and remediation of the site contamination at the Mission Wye Comprehensive Environmental Cleanup and Responsibility Act (CECRA - state superfund) Facility (MWYE). PCEC has been working to protect and preserve Park County's vast natural resources since 1990. We are the only countywide environmental group focusing exclusively on issues affecting Park County. PCEC works with people to preserve and restore the county's world-class rivers, diverse wildlife, landscapes, and outstanding natural beauty, while protecting the health and wellbeing of people who live and work here. Initially formed by a small group of community members concerned about resource extraction on public lands, PCEC has grown to cover numerous issues related to the Yellowstone River and its tributaries, public and private land management and community engagement and values. Montana DEQ is "charged with protecting a clean and healthy environment as guaranteed to our citizens by our State Constitution." (Montana Department of Environmental Quality Home Page, http://deq.mt.gov/ - last accessed June 4, 2019). The DEQ is tasked with implementing this clear constitutional mandate. (Mont. Const. art II, § 3.) Further, the DEQ's "goal is to protect public health and to maintain Montana's high quality of life for current and future generations." This mission statement has guided DEQ through the long process of cleanup with Livingston's two Burlington Northern Santa Fe Railroad (BNSF) superfund sites, and continues to do so. We applaud you for these laudable goals and hope that we can continue to work together to protect our community and to inform our members on how to engage thoughtfully in your decision making process. PCEC has taken an active role in protecting the health and well being of the residents of Park County, especially with the community of Livingston, regarding the legacy of pollution at the BNSF rail yard, and its subsequent and continued cleanup. We've been advocating for the BNSF rail yard cleanup from our founding, and later took an active role in the process, serving as a liaison for the community through a Technical Assistance Grant from the EPA. We have also hosted many public meetings with DEQ, providing updates on the remediation process for the local community. BNSF's Livingston rail yard contamination and cleanup have rightfully received the most attention, as the threats to human health and the environment are more immediate in town. The MWYE site, however, often gets overlooked, either because of its rural location outside of town, or the fact that from the perspective of a passerby it doesn't appear to be an industrial landfill. This should by no means diminish the very real impacts of the MWYE. Many are also unaware of the ongoing cleanup efforts of the last couple decades and the time elapsed since the site was last active in the 1970s. Regardless, BNSF needs to address the total and complete remediation of the MWYE. BNSF knowingly and intentionally disposed of hazardous industrial waste generated at the Livingston shops at the MWYE. An egregious act, to say the least, but altogether too common in the industry, as the multiple rail yard remediation projects across the state and the country can attest.

Therefore, PCEC insists that BNSF and DEQ implement the most thorough and stringent final remediation efforts possible at the MWYE. After a review of DEQ's Proposed Plan Burlington Northern Mission Wye State Superfund Facility (Plan), we would like to offer the following reasoning for our recommendations regarding the MWYE. The MWYE location is within a half mile of the Yellowstone River, a world-class blue ribbon trout stream, which stands as a centerpiece for Park County as it flows out of Yellowstone National Park and makes its turn to the east. As the Plan notes, the groundwater table at MWYE, which comes into contact with the site, is shallow and directly connected to the river via the Yellowstone alluvial aquifer. (Plan, 8) Down gradient from MWYE are small residential subdivisions, which rely on groundwater wells for their household water. Agricultural operations are active on neighboring properties. Wildlife thrive in the riparian corridor of the river. Resident and migratory birds depend on the same habitat. Naturally, we humans and all flora and fauna rely on a clean and healthy environment. Any lingering contamination at the MWYE must be remediated, not only for the reasons given above, but because it is the morally responsible thing to do. The efforts at MWYE should include both the active remediation and cleanup utilizing the Soil Vapor Extraction (SVE) system presented Alternative 3, the Institutional Controls (IC) presented in Alternative 4, and any additional measures to address the remaining contamination at the site outside of the alternatives presented in the Plan. Naturally monitoring will need to continue past the completed remediation efforts to ensure that no lingering contamination remains at the MWYE. Based on information in the Plan, we presently do not think that the MWYE site has fully reached a point in the remediation process for DEQ's preferred Alternative 5, Monitored Natural Attenuation (MNA), to commence. As DEQ clearly states, "Groundwater remains a risk to potential users because results remain above DEQ-7 standards. Samples collected from MW-3 consistently contain concentrations of PCE and TCE above the DEQ-7 standard" (Plan, 13). This indicates that hazardous materials still remain at MWYE in the area of MW-3 in a quantity that needs further remediation efforts to address. DEQ acknowledges this matter, indicating that "Leaching to groundwater is a potential pathway in subsurface soil, particularly for PCE. This is based on groundwater results not meeting the DEQ-7 standard for PCE. Therefore, the final remedy must address subsurface soils" (Plan, 13). AECOM's BNSF Mission Wye Feasibility Study Report Revision 3 (Report) provides additional information that gives us reason to believe that continuing to run the SVE system is a prudent and reasonable treatment to continue with at MWYE: PCE and TCE concentrations in groundwater above DEQ-7 Standards have been limited to a few wells following completion of soil excavation activities in 2000 and exceedances were observed only during seasonally high groundwater. While the interim remedial actions removed the majority of soil impacts influencing groundwater, this suggests a residual VOC mass remained and was located in soil that was generally unsaturated (smear zone soils) as leaching to groundwater only occurred when the groundwater elevations were high. The DEQ-7 Standards were met during high groundwater elevations in June and July 2017; however, these samples were collected as the SVE system was concurrently operating. (Report, 23) We assume that the SVE system currently in place at MWYE is capable of addressing this lingering contamination. If that is indeed the case, we recommend that DEQ implement Alternative 3:

bring the SVE system back online and operate it until measurable results determine a reduction in the localized contaminants. As AECOM states above, the SVE system demonstrated proven results in addressing the "residual VOC mass" that remains at the site through sampling efforts done while the "SVE system was concurrently operating." The fact that BNSF installed the SVE system, operated it with positive results and then shut it down to await DEQ's orders to resume its use is perplexing to us. From our perspective, BNSF knowingly left the site unfinished when it had a remedy in place. This neglect is irresponsible, especially when it has been clearly reported that systems that are in place are working to address the lingering contamination at MWYE. If the SVE system cannot address the contamination at MWYE adequately, we recommend that DEQ and BNSF employ additional measures, or a new Alternative that can, either through state-of-the-art technologies, or through additional excavation and treatment of the contaminated soils onsite, or disposal at a licensed facility. While it's clear that much of the hazardous waste at MWYE site has been removed or remediated, there obviously remain pockets of contamination that need attention.

Allowing these pockets of contamination to continue to leach into the area groundwater only prolongs the risks to human health and the environment in the area. Should DEQ decide to stay the course with its preferred MNA alternative, which we understand is a viable and standard practice in the industry, just not necessarily in this instance, a contingency measure must be added. The contingency should state clearly that if contamination now present does not reach the acceptable standards within the stated time frame of two years (Plan, 21) that active measures must then be taken to address the contamination at the site. This should include keeping the SVE system in place and operational at MWYE until that time. In other words, removal of the SVE system should not be allowed until the MWYE is removed from the state superfund list, since its proven effectiveness may be necessary to further treat subsurface contamination if it doesn't naturally attenuate. We agree with DEQ that Institutional Controls suggested in Alternative 4 are a necessary part of the remediation and long-term management of the MWYE site. Currently, Park County has no land use policies to address MWYE. In 2016, Park County did update its Growth Policy, which contains objectives and goals that would support the IC's. Goal 16 in the Growth Policy encourages the county to "take an active role in the land use and development process." And further states in Objective 16.7 that the county should "protect air quality, important soils and water quality during and after development." (http://www.parkcounty.org/uploads/files/pages/36/ Growth-Policy-with-Appendices-attached.pdf) Requiring BNSF and Montana Rail Link (MRL) to work with Park County to place deed restrictions and covenants on their properties as put forth in Section 13.2 of the Plan would be a prudent measure to ensure that public health and safety are not unknowingly impacted by any future activities. The location, in all likelihood, will increase in value and as local growth and development increases. It is located at a major highway intersection, which could potentially interest developers. The limitations listed in the Plan to place "restrictive covenants prohibiting groundwater use and any development, construction, or excavation for the portion of the Facility where contamination remains above SSCLs (Figure 4, Figure 6). [and that] the restrictive

covenants prohibit residential use of the properties within the Facility" (Plan, 24) provide a suitable measure of protection. We do think that the deed restrictions and covenants should not necessarily prohibit all potential use of the property. For instance, Park County has been selected as part of the nationwide Great American Rail Trail corridor. (https://www.railstotrails.org/greatamericanrailtrail/) While the route connecting Livingston with Gallatin County to the west has not been determined yet, one possibility would be for the trail to utilize the old Shields Valley railbed, connecting to the Gallatin Valley by way of Clyde Park or Wilsall. This would potentially bring the trail adjacent to, or through, the MWYE site. It would likely not require meaningful impacts to construct, such as excavation or new buildings, but we feel that the ICs at the site should recognize that low impact use, such as the proposed rail trail, or another form of pedestrian path could be allowed, with proper precautions to ensure public health and safety at the site. Park County Environmental Council would like to thank DEQ for the opportunity to provide comments on the MWYE remediation project. Cleanup and remediation of the site is important to our members, supporters and the local community. The railroad built Livingston and sustained the town for a century, but it also left a legacy of pollution that unfortunately also came to define the town. Much effort has gone into holding BNSF accountable, and consequently remediation efforts have and continue to address the toxic legacy of the railroad industry. We commend DEQ in the efforts with this issue and only ask that every effort go into completely removing all contamination and restoring the area of MWYE to its pre-industrial conditions. Sincerely, Max Hjortsberg Conservation Director

Response:

Please refer to DEQ's responses to Comments 2.1, 2.2, and 2.3.

Groundwater at the MWYE Facility is part of the Yellowstone aquifer. The Yellowstone River is less than a mile downgradient/cross-gradient of the MWYE Facility – see Section 5.1.4 in Part 2 of the ROD for a detailed description about the Yellowstone River. In March 1991, BNSF sampled sediment at nine locations, four in the Vallis Ditch, and five others from the old haul road near the active rail line and topographic low areas near the waste disposal cells. Volatile organic compounds (VOCs), including solvents, were not detected in any of the samples. Polycyclic aromatic hydrocarbons (PAHs) in upstream Vallis Ditch samples were greater than or equal to on-site PAHs and not detected downgradient from the MWYE Facility. Metals were detected but were equal to natural background metal concentrations – see Section 5.2.3 in Part 2 of the ROD.

Surface water typically becomes contaminated by surface runoff or contaminated groundwater, depending on the hydrogeology. While the Yellowstone River was not sampled and analyzed for either PCE or TCE, the gravel pit pond, another surface water location, located downgradient of the contamination source and on the east side of Highway 89 has been sampled since 2003. PCE and TCE were historically present in the gravel pit pond; however, no contaminants have been detected since 2013. Since the gravel pit pond is closer to the MWYE Facility than the Yellowstone River, contamination would be detected at the gravel pit before it would be detected

in the Yellowstone River. The previous sediment data and the post 2013 surface water data indicates that the Yellowstone River is not impacted by contamination associated with the MWYE Facility.

The commenter indicates that wildlife thrives in the river corridor. Section 7.5 in Part 2 explains there is no unacceptable risk to wildlife from the MWYE Facility contamination. See above or refer to Comment 3.4 for additional information regarding contamination affecting the Yellowstone River.

Historically, contaminant concentrations exceeding SSCLs were found across a larger area than current exceedances of SSCLs in groundwater. Interim actions have removed several sources of groundwater contamination, which have resulted in a smaller footprint of groundwater that exceeds SSCLs. As depicted in Figures 11 and 12, the footprint of the area where contaminant concentrations exceed SSCLs has decreased throughout time and no drinking water wells are located within the historic or current plume. Long-term monitoring will continue to ensure that natural attenuation continues and contaminant concentrations in groundwater decline.

DEQ agrees that contamination remains at the MWYE Facility in the area near MW-3 that still requires remediation. The selected remedy relies upon MNA to reduce contaminant concentrations to levels that no longer result in exceedances of SSCLs. Section 5.2.1 describes that subsurface soil contamination in the area around MW-3 is periodically in contact with the groundwater table. PCE and TCE are volatile organic compounds that tend to attenuate through volatilization and dilution (see Section 9.1.5 of Part 2 of the ROD). The post interim action contaminant trend information indicates that monitored natural attenuation is occurring (Section 5.2 in Part 2 of the ROD). The selected remedy will result in further decreases of contaminant concentrations in groundwater. Based on this comment, DEQ included a provision in Section 12.2.2 of the ROD requiring BNSF to keep the SVE infrastructure in place until SSCLs are met.

Based on future use comments DEQ received, DEQ re-evaluated the surface soil data for the MWYE Facility. Based on DEQ's review, none of the surface soil contaminant concentrations exceed direct contact SSCLs (see Section 5.2.1 of Part 2 of the ROD); however, there were a few locations where the concentrations exceeded leaching to groundwater SSCLs. Therefore, no residential use restriction is needed for direct contact with the soil. Since the soil is protective of residential use, it is also protective of recreational use. Based on the most recent surface soil data, no institutional control is needed to restrict residential use. Therefore, the final remedy has been revised to clarify that ICs are only needed to restrict groundwater use and excavation and construction of buildings in a limited area.

DEQ also included text in the ROD and ICs that clarifies that an above-ground trail is not precluded if the property owners provide permission for a project such as rails to trails.

3.2 COMMENTS FROM BARBARA ULRICH O'GRADY

I am writing to express my preference for the cleanup options presented in the Proposed Plan for the above referenced site. I believe that a combination of Alternative 3 (Soil Vapor Extraction) and Alternative 4 (Institutional Controls) is the best approach. I would encourage you to consider combining those two alternatives into the Preferred Cleanup Plan. If as you say in the FS that "The decrease in PCE and TCE concentrations in groundwater between the baseline events conducted in July 2015 and the events conducted in June and July 2017 events provide the strongest line of evidence that SVE operation has been effective at reducing COCs in groundwater at Mission Wye." then why would you want to cease the SVE operation? Combined with Institutional controls, which you have already included in the Preferred Cleanup Plan, it would provide the best protection of human health and the environment. The cost does not appear to be prohibitive and the technology is straightforward and effective. Thank you for the opportunity to submit comments on this plan. I hope you will seriously consider the alternative I have suggested for the final cleanup plan. Sincerely, Barbara Ulrich O'Grady.

DEQ Response:

Please refer to DEQ's response to Comment 2.1.

3.3 COMMENTS FROM TRACY AND DAVID RAICH

If this site is not cleaned-up the residents of Livingston will continue to be subjected to health and safety hazards and a decrease in property values. This decision is a no-brainer! Tracy and David Raich.

DEQ Response:

Comment noted, please see response to comment 2.1 and 3.4.

3.4 COMMENTS FROM ROSEMARY SMITH MANAGING DIRECTOR OF GETTING BETTER FOUNDATION

Thank you for your efforts to clean up the BNSF and Mission Wye properties for the citizens of Livingston and tourists of Yellowstone's Gateway. As someone who'd been raised in Toms River, NJ – home of that state's largest Superfund site, and a transplant from Michigan's Upper Peninsula – home of the Great Lakes and largest freshwater source on the planet – I'm a fan of clear, fresh drinking water and self-researcher of it's importance to our health. When our family moved to Livingston this past November, I could smell and taste the chemicals used to clean Livingston's public drinking water. As our community lives, thrives and takes resources from the Yellowstone ecosystem, we have a vested interest and a responsibility to see that it's legacy remains pristine. Please don't make the mistake of skimping on the dedication to our community's water supply and our #1 tourist industry -- the Yellowstone's float reputation. Skimping shows up years later – in cancer and other health issues, plus declines in tourism. I've witnessed the phenomenon firsthand. The time and money we spend now will assure us and our children of the legacy that is Yellowstone's gateway. Thank you. Rosemary Smith, Managing, Director, www.GettingBetterFoundation.org.

Response:
Livingston is five miles upgradient from the MWYE Facility, and Livingston's public water supply is not impacted by the contamination associated with the MWYE Facility. There are six public water supply wells that provide drinking water to Livingston residents. Chlorine is used to disinfect the Livingston public water supply to prevent exposure to harmful bacteria; however, chlorine often leaves a residual odor and taste in water. Livingston's public water supply is regulated under the Safe Drinking Water Act and the water is periodically tested, including tests for the byproducts of chlorination. The results of the water tests are made public through the Public Works Department and the 2018 Drinking Water Quality Report (Livingston Water Department, 2018b) (http://www.livingstonmontana.org/Documents/Public%20Works/Annual%20Drinking%20Water%20Quality%20Report%202018.pdf) and all current water quality reports may be accessed on the Livingston Public Works Department's website (Livingston Public Works, 2018a): http://www.livingstonmontana.org/living/public_works_department/water_department.php

The commenter also identified the potential impact to the Yellowstone River and tourism. As indicated in response to Comment 2.1, groundwater contamination that exceeds SSCLs, which include Montana's water quality standards, is limited to a localized area on BNSF and Montana Rail Link property. There are no drinking water wells at the Facility, the contaminated groundwater plume is not expanding, and contaminated groundwater is not affecting the Yellowstone River. The final MWYE Facility cleanup will meet SSCLs that are protective of human health and the environment.

3.5 COMMENTS FROM DAN VERMILLION

I am writing regarding the Mission Wye Cleanup Proposal. In my review, I think that DEQ's preferred Alternatives, 4 & 5, don't go far enough to remediate the residual contamination remaining at the site. I feel that the more thorough Soil Vapor Extraction (SVE) method in Alternative 3, coupled with the Institutional Controls of Alternative 5 offer the more comprehensive remediation option. These alternatives will thoroughly and actively remove remaining residual contaminants from the soils and ground water at the site and will limit any potential future human exposure. An SVE system is already in place at the site, and it should be utilized. As you know, the site sits right in the underground aquifer that is an integral part of the Yellowstone watershed between Livingston and Big Timber. The Wye spot is at the top end, it seems, of a vast network of wetland that extend all the way down to the Mission Creek exit. These waters flow downstream and are relied upon by ranchers, farmers, recreationalists, and cities and towns that rely upon the Yellowstone for their water. Thank you for your consideration. Sincerely, Dan Vermillion, Sweetwater Travel Co.

Response:
Please refer to the responses to Comment 2.1 and Comment 3.4. The commenter indicated the presence of wetlands in the area. DEQ reviewed the Montana Natural Heritage Wetland and Riparian Map Viewer to identify any nearby wetlands. Although the surrounding area does not

appear to have a permanent wetland leading to navigable waters, wetland vegetation, such as cottonwoods, have been observed in a depression that is downgradient from the MWYE Facility (Montana Natural Heritage Program (MNHP), 2020). The primary soil type, as mapped using the U.S. Natural Resources Conservation Service (NRCS) Web Soil Survey, is Beaverell-Beavan Complex with 0 to 2 percent slopes (NRCS, 2019). This is also the mapped soil type for the area where cottonwoods occur and it is not listed as a hydric (wetland) soil as per the NRCS State Hydric Soils List for Montana. Surface soils have met SSCLs, as discussed in Section 5.2.1 of Part 2 of the ROD, and samples collected from the groundwater well, MW-9, present in the depression area, have met SSCLs since 2016. Therefore, runoff or groundwater from the MWYE Facility are not impacting the area with wetland vegetation.

3.6 COMMENTS FROM JOHN FECKANIN

After reviewing the documents I urge you to adopt Alternative 3 coupled with Institutional Controls of Alternative 5 for the most effective and permanent cleanup of this site. John Feckanin, Livingston, MT.

Response:
Please refer to DEQ's response to Comment 2.1.

3.7 COMMENTS FROM ANNE BUCKLEY

Dear Ms. Foslund, My name is Anne Buckley; my husband Reid and I own the former Stillman property at 5 Fox Run, Livingston (former legal address was 146 Hwy 89 N) under the legal name of Yellowstone Shields Property LLC. With our proximity to the Mission Wye site, we are closely concerned with the integrity of the clean-up. With our proximity to the Mission Wye site, we are closely concerned with the integrity of the clean-up. I attended the public hearing about the Mission Wye project in Livingston, and spoke on the record that evening. Here are my written comments on the Proposed Plan. I am sending an email to you as I cannot access the online public comment form on the DEQ website. I strongly urge the DEQ to add SVE to IC's and MNA to the proposed plan for the following reasons:

•The SVE system is already in place and has done an effective job extracting vapor according to your data.

•The costs of implementing the SVE system are minimal compared with the overall BNSF/MR budget.

•The SVE system adds another layer of protection to the public and environment.

•There is no good reason not to continuing using this effective tool.

I urge the DEQ to keep in mind that the future use of the Mission Wye area could include greater access by the public if the Wye easement is used for bicycle trails or other recreational purposes. Simply because the current owners do not plan to use the land for a different purpose that what

they currently employ, this is not a guarantee that future use won't include other options. One viable example is this proposed Rail-to-Trail development: https://www.railstotrails.org/greatamericanrailtrail/route/. BNSF shamefully abused the land at Mission Wye for decades by making it into a toxic water dump. They should bear full cost of the clean-up and employ all available tools at their disposal to do so. The SVE system has proven effective and is not cost prohibitive to the BNSF. It is already in place and works. It should be used. Thank you, Anne Buckley.

Response:

Please refer to DEQ's responses to Comments 2.1 and 3.1.

3.8 COMMENTS FROM KIMBALL LEIGHTON

I'm in favor of the Soil Vapor Extraction (SVE) method in Alternative 3, coupled with the Institutional Controls of Alternative 5 because they offer the more comprehensive remediation options and they are the alternatives that will thoroughly and actively remove remaining residual contaminants from the soils and ground water at the site, and limit any potential future human exposure. Sincerely, Kimball Leighton.

Response:

Please refer to DEQ's response to Comment 2.1.

3.9 COMMENTS FROM BOB AND SALLY HUGHES

Heather, Thanks for your presentation in Livingston recently on the Mission Wye situation and cleanup options. We have reviewed the materials you handed out at the meeting as well as the AECOM BNSF Mission Wye Feasibility Study Report Revision 3 April 2019. We have also reviewed the five alternatives in Table 6 of the handout materials you distributed. We strongly believe that the Soil Vapor Extraction (SVE) alternative should be carried out. We understand that alternative would be in conjunction with Institutional controls per Alternative 4. The SVE system in place can actively help reduce the level of remaining contamination. It may not be possible to eliminate every last bit of contamination, but the best possible effort should be made. Since the railroad is paying for the cleanup, the relatively small additional cost of SVE would not be an additional burden on Montana taxpayers. We live on Fox Run, east of US 89 and downstream of the Mission Wye. The aquifer in our area is shallow and shifting. We are within the Country Acres subdivision with several individual residential wells and septic systems. Another small subdivision, Sheep Mountain Meadows also exists along Fox Run, also with individual wells and septics. All of these residential drinking water supplies and waste treatment systems could possibly be affected by contamination from the Mission Wye. We are very concerned about PCEs migrating into our residential groundwater and TCEs ending up in our soil. Thanks for the opportunity to comment. Regards, Bob Hughes and Sally Hughes.

Response:

Please refer to DEQ's response to Comment 2.2. The selected remedy in the ROD will protect nearby residents. The potential current and future risks to people is in a localized area near MW-3, which is nearly 0.6 miles (as the crow flies) from Fox Run. No residential structures are present above MW-3. As depicted in Figures 11 and 13, the footprint of the area where contaminant concentrations exceed SSCLs has decreased throughout time and no drinking water wells are located within the historic or current plume. Long-term monitoring will continue to ensure that natural attenuation continues and contaminant concentrations in groundwater decline.

The commenters indicate a concern that their soil will also become contaminated. Contaminated soil may be transported when surface soil is blown around by wind or transported by erosion. However, as explained in the Response to Comment 3.1, none of the remaining surface soil contamination exceeds residential direct contact SSCLs. The residual contamination is found in subsurface soil, soil vapor, and groundwater (localized near MW-3) and cannot be transported by wind or erosion. Subsurface soil may be transported by wind if an excavation is constructed, but the ICs will not allow such activities to take place without explicit written approval from DEQ. Section 5.2.1 in Part 2 of the ROD provides more information on soil contamination.

3.10 COMMENTS FROM LAURIE TALCOTT

Dear Ms. Foslund, Thank you for your work to protect Montana's environment and natural beauty that we all rely on and enjoy. I strongly support PCEC's analysis that DEQ's preferred Alternatives, 4 & 5, don't go far enough to remediate the residual contamination remaining at the Mission Wye site. I support PCEC's recommendation that the more thorough Soil Vapor Extraction (SVE) method in Alternative 3, coupled with the Institutional Controls of Alternative 5 offer the more comprehensive remediation option; they are the alternatives that will thoroughly and actively remove remaining residual contaminants from the soils and ground water at the site, and limit any potential future human exposure. An SVE system is already in place at the site it should be utilized. Thank you for your consideration. Sincerely, Laurie Talcott, Livingston, MT.

Response:

Please refer to DEQ's response to Comment 2.1.

3.11 COMMENTS FROM HEIDI ANDERSON

Dear Ms. Heather Foslund, I feel that the more thorough Soil Vapor Extraction (SVE) method in Alternative 3, coupled with the Institutional Controls of Alternative 5 offer the more comprehensive remediation options; they are the alternatives that will thoroughly and actively remove remaining residual contaminants from the soils and ground water at the site, and limit any potential future human exposure. Thank you for consideration of my comments. Sincerely, Heidi Anderson.

Response:

Please refer to DEQ's response to Comment 2.1.

3.12 COMMENTS FROM MARIAN HJORTSBERG

To Heather Foslund: Please consider using the (SVE) Soil Vapor Extraction Method in Alternative #3 coupled with the Institutional Controls of Alternative #5 as they offer the more comprehensive and thorough remediation option. This procedure will limit any potential future human exposure. Thank you. Sincerely, Marian Hjortsberg.

Response:

Please refer to DEQ's response to Comments 2.1 and 2.2.

3.13 COMMENTS FROM REID BUCKLEY

Dear Ms. Foslund: My name is Reid Buckley, and I live close to the Mission Wye. My wife, Anne Buckley, spoke at the public hearing on the project, and she has also submitted comments. I would like to have the record show that I, like my wife, urge the DEQ to add SVE to IC's and MNA to the proposed plan. The cost to do so is minimal for BNSF, and these additions provide the greatest protection to nearby residents such as my wife and I. Sincerely, Reid Buckley, Livingston, MT.

Response:

Please refer to DEQ's responses to Comments 2.1.

3.14 COMMENTS FROM ANDREW MITCHELL

Alternative 3 is the best course of remediation for the BNSF site NW of interchange 340 on I-90. I strongly recommend that you select it. Andrew Mitchell, Livingston.

Response:

Please refer to DEQ's response to Comment 2.1.

Tables

Table 1. Soil Tilling Pilot Test Analytical Results Compared to Site-specific Cleanup Levels (SSCLs)

Sample Location Sample Depth (feet bgs) Sample Date	Soil Direct Contact for Child Resident SSCL[1] (µg/kg)	Leaching SSCLs (µg/kg)	Baseline		Post-Tilling	
			SBS-7D 0-2 8/11/2015	SS-88D 0-2 8/11/2015	SBS-7D 0-2 8/13/2015	SS-88D 0-2 8/13/2015
COCs (µg/kg)						
Tetrachloroethene	112,000	130	< 11.0	< 10.6	46.7 J	< 11.4
Trichloroethene	5,700	100	< 12.9	< 12.4	< 13.3	< 13.3

ug/kg = microgram per kilogram

COC = contaminant of concern

bgs = below ground surface

< = analyte not detected above the method detection limit

J = Estimated value

[1] = The direct contact soil SSCL chosen represents the most conservative presented in the Human Health Risk Assessment Amendment.

Results presented in this table obtained from AECOM. 2020a. Feasibility Study Report: Table 3. March 2020.

Table 2. Groundwater PCE Concentrations µg/L) in All Monitoring Wells Over Time

Well Number	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
MW-1	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.40	<0.20	<0.20	<0.20	<1.0	<1.0	<1.0	<0.10	<1.0	<1.0	<0.19	<0.13	<0.25	<0.17	<0.18
MW-3	1,000	1,600	564	381	726	910	845	314	180	173	200	223	195	48.3	165	117	85.6	<1.0	37	260	30	93	35.2	67.4.	6.4	4.7	16.6	15.1
MW-4	<1.0	NA	NA	NA	NA	NA	31	12	<6.8	2.6	14	2.86	10.4	0.67	12.2	0.38	13.6	4.1	3.9	2.6	5.3	2	4.7	1.4	<0.13	1.1	0.47J	<0.18
MW-5	17	15	26	18	22	29	43	18	<9.9	17	15	26	5.59	3.63	4.47	2.59	2.79	1.2	2.4	3	0.83	1.4	2.7	1	<0.13	0.75J	0.44J	<0.53
MW-9	96	NA	NA	NA	NA	50	87	39	<12	6.4	8.8	6.07	16.1	3.91	15.1	10.6	5.45	2.6	2.4	8.6	1.5	0.67	3.1	5.2	0.90J	1.1	0.73J	0.53J
MW-12	NA	NA	NA	NA	NA	NA	1.8	1.2	<1.0	1.2	<1.0	<1.0	0.800J	0.330J	1.01	0.39	0.21	0.19	<1.0	0.7	<0.10	0.51J	1.1	0.24J	<0.13	0.80J	<0.17	<0.18
MW-14	29	17	19	18	14	NA	NA	NA	NA	NA	NA	NA	1.7	2.04	3.25	1.98	1.35	0.43	1.1	2.7	1.5	0.67J	1.3	1.8	1.0	0.85J	<0.17	<0.18
MW-18	NA	NA	NA	NA	3.4	3.8	3.7	3.9	<2.4	2.1	2.3	1.36	1.13	1.01	0.85	0.94	0.89	<1.0	<1.0	0.39	<1.0	0.37J	1.1	0.39J	0.40J	0.83J	<0.17	<0.18
MW-19	NA	NA	NA	<1.0	<1.0	NA	<1.0	0.5	<1.0	<1.0	<1.0	<1.0	0.36	0.29	0.27	0.3	0.31	<1.0	<1.0	0.23	<0.10	<1.0	<1.0	0.23J	<0.13	<0.25	<0.17	<0.18

Notes:

The DEQ-7 standard for PCE is 5 µg/L

NA - not analyzed

µg/L - microgram per liter

"<" - analyte not detected above the laboratory method detection limit (MDL); result is considered non-detect.

"J" - the result was detected above the MDL and below the laboratory's reporting limit; result is considered an estimated value

Results compiled from: AECOM. 2020a. Feasibility Study Report: Appendix E, Attachment 4, Table 1. March 2020; AECOM. 2019. 2018 Groundwater Monitoring Report. Table 3. March 19, 2019; and AECOM. 2019. 2019 Groundwater Monitoring Report. Table 3. August 2019

Table 3. Groundwater TCE Concentrations (µg/L) in all Monitoring Wells Over Time

Well Number	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
MW-1	<1.0	<1.0	<1.0	<1.0	<1.0	<0.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<0.40	<0.20	<0.20	<0.20	<1.0	<1.0	<1.0	<0.10	<0.40	<0.40	<0.14	<0.40 U	<0.052	<0.15	<0.20
MW-3	1,400	1,500	631	314	660	750	344	138	81	62	66	38.4	23.2	7.34	11	9.86	8.23	<1.0	4.7	27	2.9	5.3	2.6	4.6	0.43	0.35J	1.3	1.0
MW-4	60	NA	NA	NA	NA	NA	26	19	12	4.9	9.8	2.57	4.24	2.51	2.19	2.4	2.49	1.2	1.2	0.7	1.1	0.71	0.96	0.6	0.75	0.48	0.43	<0.20
MW-5	35	26	59	33	52	62	29	15	6.3	3.0	6.9	2.67	1.84	0.85	1.92	0.94	1.75	1.2	1.3	1.1	0.69	1.1	1.00	0.44	0.49	0.64	0.60	<0.30J
MW-9	200	NA	NA	NA	NA	89	75	38	16	4.7	8.9	5.44	5.21	2.36	5.56	3.24	2.08	1.6	1.1	2.8	0.65	1.1	0.77	1.5	0.26J	0.27J	0.46	0.24J
MW-12	NA	NA	NA	NA	NA	NA	2.7	3	2.3	2.5	2.1	<1.0	1.33	0.79	1.05	0.55	0.36	1.3	1.0	0.8	<1.0	1.1	1.3	0.58	<0.051	0.77	0.66	0.78J
MW-14	79	41	51	24	32	NA	NA	NA	NA	NA	NA	NA	1.01	1.0	1.6	0.89	0.59	0.54	0.47	1.1	0.48	0.26J	0.3	0.64	0.40	<0.052	0.27J	<0.20
MW-18	NA	NA	NA	NA	5.6	5.6	5.0	4.5	2.9	2.2	2.5	1.54	0.940J	0.92	0.72	0.86	0.71	0.34	0.50	0.05	0.52	0.29J	0.49	0.44	0.5	0.29J	0.27J	0.35J
MW-19	NA	NA	NA	2.2	1.5	NA	<1.0	1.3	<1.0	<1.0	<1.0	<1.0	0.82	0.80	0.670J	0.76	0.77	0.64	0.081	0.39	0.59	0.46	0.27	0.57	0.62	0.4	0.6	<0.20

Notes:

The DEQ-7 standard for PCE is 5 µg/L

NA - not applicable

µg/L - microgram per liter

"<" - analyte not detected above the laboratory method detection limit (MDL); result is considered non-detect.

"J" - the result was detected above the MDL and below the laboratory's reporting limit; result is considered An estimated value

"U" - The result was qualified for a detection because of detections in blank QC samples.

Results compiled from: AECOM. 2020a. Feasibility Study Report: Appendix E, Attachment 4, Table 2. March 2020; AECOM. 2019. 2018 Groundwater Monitoring Report. Table 3. March 19, 2019; and AECOM. 2019. 2019 Groundwater Monitoring Report. Table 3. August 2019

Table 4. Remaining Risks at Mission Wye

	Human Health						Environment		
	Residential (adult)	Residential (child)	Commercial/ industrial worker	Construction/ excavation worker	Utility worker	Trespasser	Groundwater	Surface soil	Subsurface soil
Surface soil particle inhalation	X	X	X	X	X	X			
Subsurface soil particle inhalation				X	X				
Incidental Ingestion of soil	X	X	X	X	X	X			
Soil vapor/indoor air	X	X	X	X	X				
Surface dermal contact	NA	NA	NA	NA	NA	NA			
Subsurface dermal contact				NA	NA				
Contact with contaminated groundwater	X	X	X	X	X		X		
Leachng potential								X	X

NA- Not applicable; Although this is an exposure pathway, the assumed dermal absorption is 0 percent based on the rapid volatilization of VOCs[1].

X	This pathway exists for the receptor.
X	An unacceptable risk exists for this pathway.
X	These risks were identified in the Human Health Risk Assessment Amendment. However, cleanup levels have been met during subsequent pilot test study and/or could be supported based on empirical data in monitoring wells downgradient from areas that have had samples exceed soil cleanup levels. Site-specific cleanup levels for residential direct contact (child) were met during the soil tilling pilot test in both pre- and post tilling events and in other areas during confirmation sampling after interim actions; thus no unacceptable risk exists for these receptors. The leaching potential cleanup levels have been based on the same pre- and post-tilling results and empirical data demonstrated by decreasing trends in groundwater.

[1] This information comes from the Human Health Risk Assessment Amendment and its source is from the following citation: Unites States Environmental Protection Agency. 2004. Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). July 2004.

Table 5. Site-specific Cleanup Levels (SSCLs)

COC	Soil Direct Contact, mg/kg[1]					Soil vapor/vapor intrusion cleanup levels, µg/m^3				Leaching[1,5], mg/kg	Groundwater[4], µg/L
	Commercial/Industrial Worker	Construction Worker	Adult Trespasser	Adult Residents	Child Resident	Utility Worker	Construction worker/excavator[2]	Residential indoor air[3]	Commercial/Industrial indoor air[3]		
Tetrachloroethene (PCE)	557	739	4,077	134	112	1,460	353	47	235	0.13	5
Trichloroethene (TCE)	27	38	222	6.4	5.7	73	17	2.15	15	0.10	5

Acceptable cancer risk level is $1x10^{-5}$

Acceptable non-cancer level is 1.0

COC - Contaminant of concern

mg/kg - milligram per kilogram

µg/m^3 - microgram per cubic meter

µg/L - micrograms per liter

[1] Cleanup levels calculated in the *Human Risk Assessment Amendment* (AECOM, 2014b).

[2] Cleanup level calculated in the DEQ's Soil Vapor Risk Memorandum (DEQ, 2018b).

[3] Cleanup levels calculated in the Soil Vapor Monitoring and Vapor Intrusion Evaluation (AECOM, 2014a).

[4] Circular DEQ-7 Montana Numeric Water Quality Standards (DEQ, 2019); also the EPA Maximum Contaminant Level.

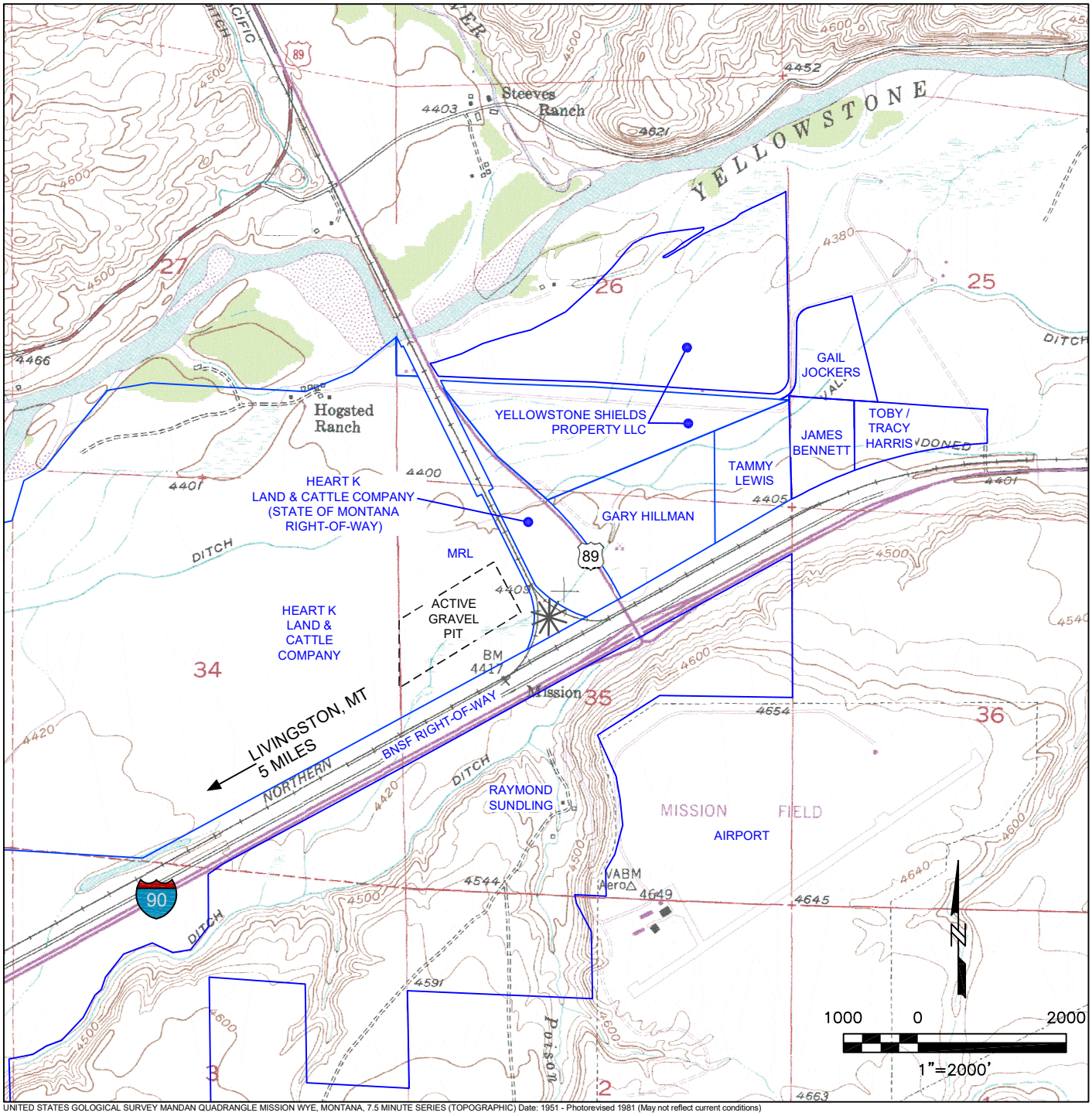
[5] Empirical data demonstrates surface soil contamination is no longer leaching at levels cause DEQ-7 exceedances. Therefore, the leaching SSCL will apply to subsurface soils.

Table 6. Summary of Comparative Analysis of Alternatives

Alternative number	Alternative	Protection of Human Health and the Environment	Compliance with ERCLs	Permanent Solutions	Treatment or Resource Recovery Technologies	Short-term Effectiveness	Implementability	NPV Cost
1	No Further Action	No	No	No	No	No	Yes	$0
2	Soil Tilling	Yes, when combined with another alternative	Yes, when combined with another alternative	Yes	Yes	Yes, when combined with another alternative	Yes, only for surface soil and not for subsurface soil	$36,100
3	SVE System	Yes, when combined with another alternative	Yes, when combined with another alternative	Yes	Yes	Yes, when combined with another alternative	Yes	$167,100
4	Institutional controls	Yes, when combined with another alternative	Yes, when combined with another alternative	Yes, when combined with other alternatives and implemented adequately to ensure compliance	No	Yes	Yes	$76,000
5	Monitored Natural Attenuation	Yes, when combined with another alternative	Yes, when standards are met	Yes	Yes, when combined with another alternative	Yes, when combined with another alternative	Yes	$143,300

ERCLs - Environmental Requirements, Criteria, and Limitations
NPV - Net Present Value

Figures



UNITED STATES GOLOGICAL SURVEY MANDAN QUADRANGLE MISSION WYE, MONTANA, 7.5 MINUTE SERIES (TOPOGRAPHIC) Date: 1951 - Photorevised 1981 (May not reflect current conditions)

QUADRANGLE LOCATION

LEGEND

LOCATION OF HISTORICAL LANDFILL OPERATION

SURROUNDING PROPERTY OWNERS

NOTE:
SITE LEGAL DESCRIPTION -
TOWNSHIP 1 SOUTH,
RANGE 10 EAST,
SECTION 35

Figure Source: Feasibility Study Report. Prepared for BNSF by AECOM. 2020.

DEQ
Montana Department of Environmental Quality

BNSF Railway Company Mission Wye, Montana			Facility Location Map	
DATE: 2/7/2020				Figure 1

HEART K
LAND & CATTLE COMPANY

HEART K
LAND & CATTLE COMPANY
(STATE OF MONTANA
RIGHT-OF-WAY)

HWY 89

FORMER RR TRACK

MRL PROPERTY

HEART K
LAND & CATTLE COMPANY

FORMER RR TRACK

DECON PAD
(REMAINS)

SVE SYSTEM SHED
(ON CONCRETE PAD)

BNSF RIGHT OF WAY

FORMER TD
BUILDING
(CONCRETE
PAD REMAINS)

89

I-90

I-90

80 0 160

1"=160'

NOTES:

1. ONLY UTILITIES IDENTIFIED ON, OR ADJACENT TO, BNSF MISSION WYE ARE SHOWN.
2. POSSIBLE FIBER OPTIC LINE. ESTIMATED LOCATION BASED ON FLAGGING OBSERVED IN THE FIELD.

LEGEND

- PROPERTY BOUNDARIES
- MRL PROPERTY AND RIGHT OF WAY
- BNSF RIGHT OF WAY
- HEART K LAND & CATTLE COMPANY (STATE OF MONTANA RIGHT-OF-WAY)
- BNSF RIGHT-OF-WAY
- OVERHEAD ELECTRIC LINE
- UNDERGROUND ELECTRIC LINE
- UNDERGROUND GAS LINE
- FIBER OPTIC LINE (SEE NOTE 2)
- AREA POTENTIALLY POSING A LEACHING TO GROUNDWATER RISK (IDENTIFIED IN JULY 2014 HUMAN HEALTH RISK ASSESSMENT ADDENDUM)
- PAVED ROAD
- UNPAVED ROAD
- RAILROAD TRACKS

Figure Source: Feasibility Study Report. Prepared for BNSF by AECOM. 2020.

PROPERTY OWNERSHIP AND UTILITY MAP

FIGURE 2

BNSF RAILWAY COMPANY
MISSION WYE, MONTANA

DATE: 2/7/20

DEQ
Montana Department of Environmental Quality

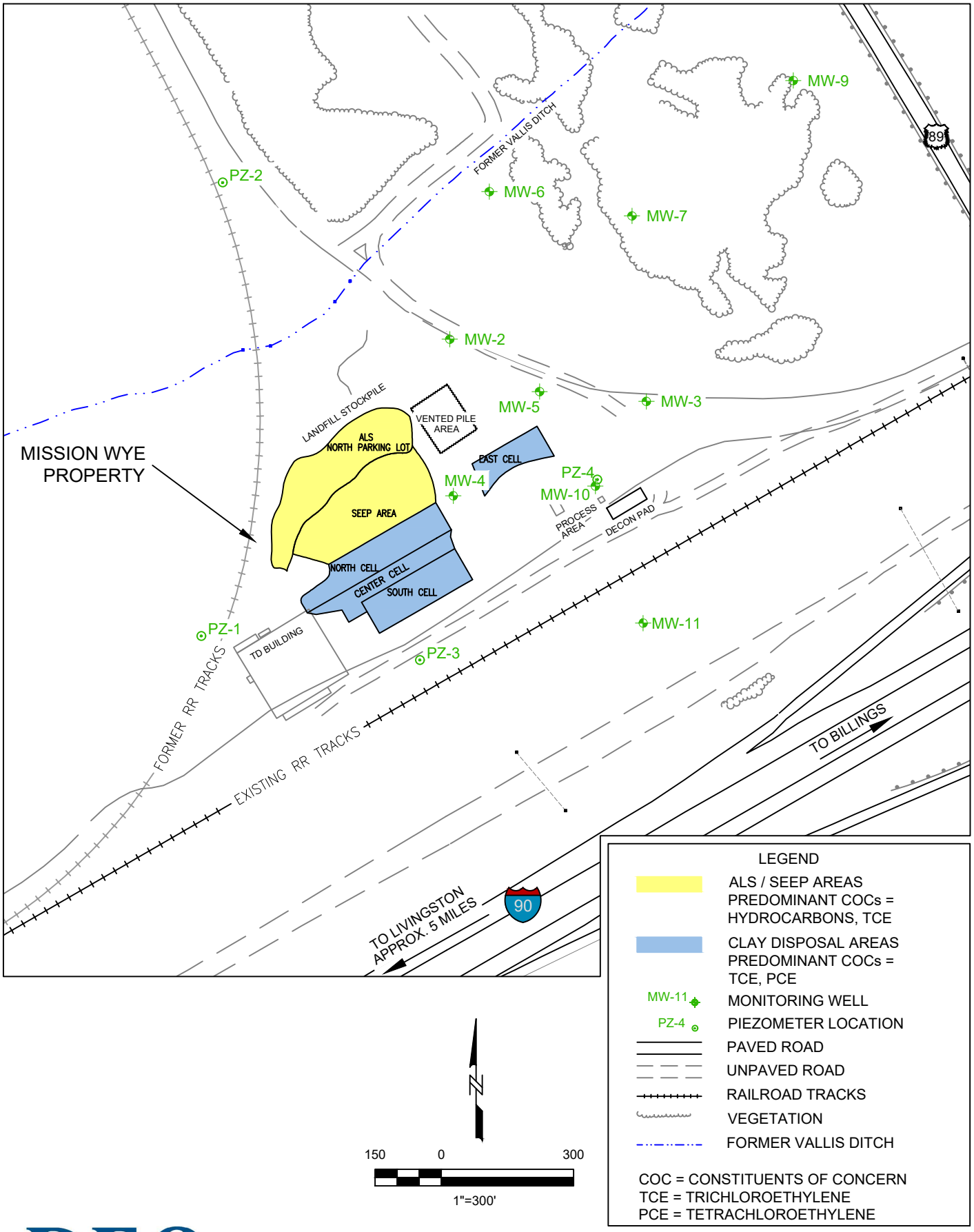


Figure Source: Construction Completion Report for Interim Action at the Mission Wye Facility. Prepared for BNSF by AECOM. 2012.

DEQ
Montana Department of Environmental Quality

BNSF Railway Company Mission Wye, Montana	**PRE - 2000 INTERIM ACTION EXCAVATION AREAS**
DATE: 02/07/20	**FIGURE 3**

MW-6
MW-7
MW-2
MW-21
MW-22
MW-5
VMP-2
MW-3
TP-4
TP-2
TP-3
SS-580
SS-423
VENTED PILE AREA
SS-481
SS-420
SS-388
ALS
NORTH PARKING LOT
ASLAB-4
SS-262
TP-5
SS-228
EC-E
TP-7
EAST CELL
EC-C
EC-A
TP-1
SS-443
ASLAB-3
SS-352
SS-161
SAB-4
ASLAB-2
SEEP AREA
SAB-3
MW-10
FORMER DECON PAD
SS-65
SS-157
TP-8
MW-4
TP-6
SS-344
SAB-2
ASLAB-1
SAB-1
SS-254
VMP-1
SS-30
SS-310
NORTH CELL
SS-88d
SS-88
CENTER CELL
CC-B
CC-A
SOUTH CELL
SS-146
SS-83
FORMER THERMAL DESORPTION BUILDING
MW-11
SS-4
EXISTING RR TRACKS
I-90 WEST
I-90 EAST
89

LEGEND

- EXCEEDS LEACHING CLEANUP LEVEL
- SEPTEMBER 2007 TEST PIT SAMPLE LOCATION
- SEPTEMBER 2007 SURFACE SOIL SAMPLE LOCATION
- SUBSURFACE SOIL SAMPLE (APPROXIMATE LOCATION)
- SOIL VAPOR MONITORING POINT LOCATION (APPROXIMATE LOCATION)
- MONITORING WELL
- RAILROAD RIGHT OF WAY
- PAVED ROAD
- UNPAVED ROAD
- RAILROAD TRACKS
- VEGETATION
- FORMER VALLIS DITCH
- AREA POTENTIALLY POSING A LEACHING TO GROUNDWATER RISK

NOTES:
1. RESULTS SHOWN FOR PCE AND TCE ONLY, IRON EXCEEDANCES NOT INCLUDED.

N

50 0 100
1"=100'

SURFACE AND SUBSURFACE SOIL SAMPLING LOCATIONS AND EXCEEDANCES OF LEACHING TO GROUNDWATER SSCLs

FIGURE 4

BNSF RAILWAY COMPANY
MISSION WYE, MONTANA

DATE: 2/7/20

DEQ Montana Department of Environmental Quality

Figure Source: Human Health Risk Assessment Amendment. Prepared for BNSF by AECOM. 2014.
Figure Source: Feasibility Study Report. Prepared for BNSF by AECOM. 2020.

FACILITY MAP

FIGURE 5

BNSF RAILWAY COMPANY
MISSION WYE, MONTANA

DATE: 2/7/20

DEQ Montana Department of Environmental Quality

N

250 0 500

1"=500'

MW-19
MW-17
HARRIS STOCK WELL
MW-18
GRAVEL PIT POND
GRAVEL PIT WELL
MW-8
PZ-5
MW-14
MW-9
PZ-6/MW-12
MW-7
PZ-2
MW-6
MW-2
MW-21
MW-22
MW-5
MW-3
PZ-4
MW-10
MW-4
PZ-1
PZ-3
MW-11
MW-1
EXISTING RR TRACKS

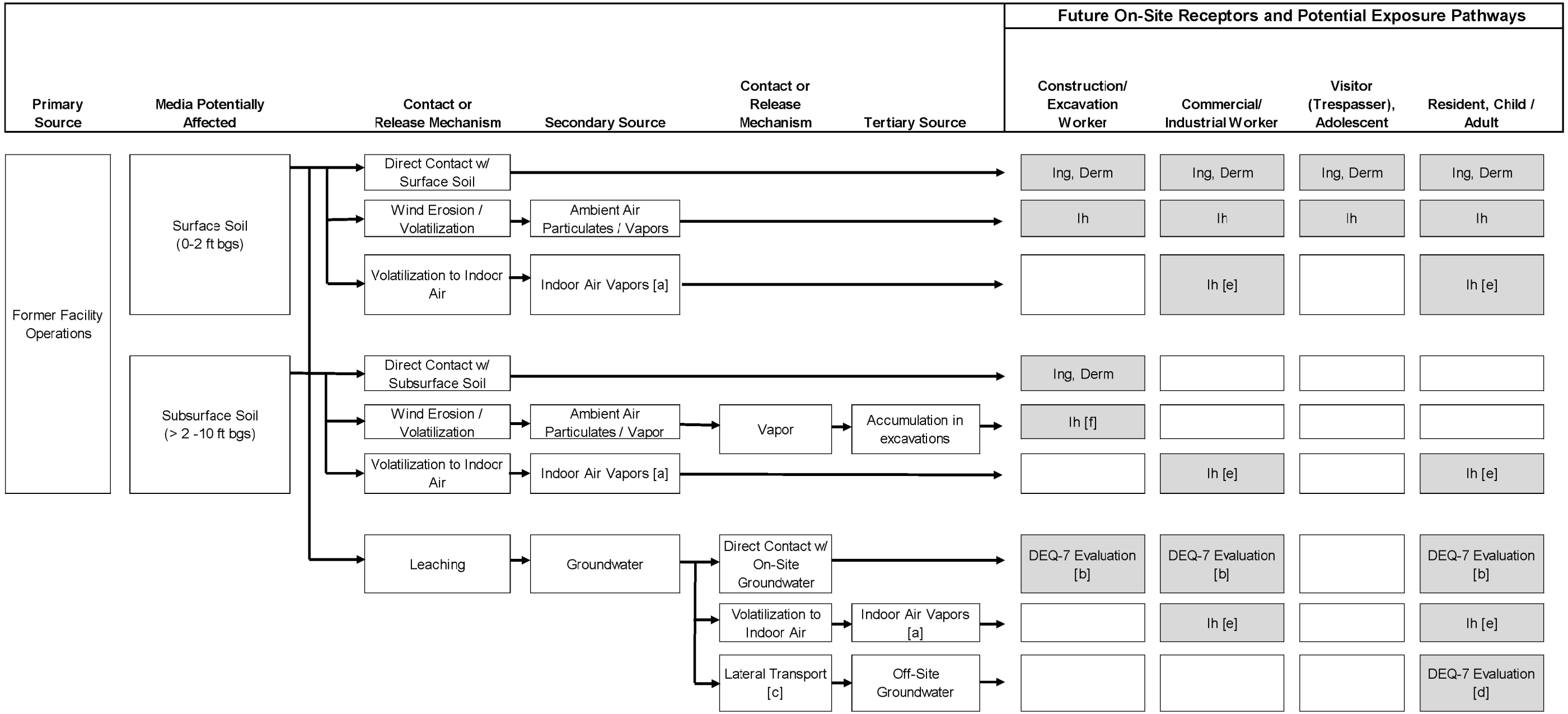
0 300

1"=300'

LEGEND

- SURFACE WATER LOCATION
- MW-18 EXISTING MONITORING WELL
- PZ-4 EXISTING PIEZOMETER LOCATION
- STOCK WELL
- AREA POTENTIALLY POSING A LEACHING TO GROUNDWATER RISK (IDENTIFIED IN JULY 2014 HUMAN HEALTH RISK ASSESSMENT ADDENDUM)
- FACILITY BOUNDARY UNDER CECRA, THE FACILITY INCLUDES ANWHERE A HAZARDOUS OR DELETERIOUS SUBSTANCE HAS BEEN DEPOSITED, STORED, DISPOSED OF, OR OTHERWISE COME TO BE LOCATED.

Figure Source: Feasibility Study Report. Prepared for BNSF by AECOM. 2020.



Notes:

[a] Under current conditions, the vapor intrusion pathway is incomplete as no occupied buildings are present at the Facility. The potential for vapor intrusion into future buildings was evaluated in accordance with the Soil Vapor Monitoring Plan approved by DEQ. The results of the vapor intrusion monitoring are presented in the "Soil Vapor Monitoring and Vapor Intrusion Evaluation Report" and are summarized in the risk assessment (AECOM 2013).
[b] Site-specific receptor risks and cleanup levels for groundwater were not calculated in the risk assessment. Instead, groundwater data was compared to DEQ-7 standards and exceedances reported as requested by DEQ.
[c] Existing downgradient domestic wells indicate no evidence of impacts.
[d] Clean-up to DEQ-7 standards on the Facility is protective of potential future off-site groundwater use.
bgs = below ground surface
[e] = While currently no vapor intrusion pathways exist, future development of the facility may result in completed pathways.
[f] = Pathway only exists where construction projects require excavations and vapors may accumulate in them.

Legend:
Ing = Ingestion
Derm = Dermal contact
Ih = Inhalation
Blank = incomplete exposure pathway not evaluated in the risk assessment
Shading = complete exposure pathway evaluated quantatively in the risk assessment

References:

1) AECOM. 2014a. Human Health Risk Assessment. October 23, 2014.
2) AECOM. 2014b. Soil Vapor Monitoring and Vapor Intrusion Evaluation Report - Revision 2. April 21, 2014.
3) BNSF. 2018. Electronic Coorespondance to H. Foslund from Yueh Chuang. RE: Draft description for Mission Wye Report. September 20, 2018.

SITE CONCEPTUAL EXPOSURE MODEL

FIGURE 6

BNSF RAILWAY COMPANY
MISSION WYE, MONTANA

DATE: 2/7/20

DEQ Montana Department of Environmental Quality

	SOIL VAPOR CLEANUP LEVELS (µg/m^3)			LEACHING POTENTIAL SSCL (mg/kg)
	CONSTRUCTION WORKER	COMMERICAL/ INDUSTRIAL WORKER	RESIDENT	
PCE	353	235	47	0.13
TCE	17	15	2.15	0.10

Note:
1. CLEANUP LEVEL CALCULATED IN THE DEQ'S SOIL VAPOR RISK MEMORANDUM (DEQ,2018)

MW-7
MW-2
FORMER RR TRACKS
MW-22
MW-21
MW-5
TP-4
MW-3
TP-3
TP-2
SVE-7
VMP-2D
VMP-2S
VMP-3
VMP-4
SVE-6
TP-5
EC-E
TP-7
EC-C
EAST CELL
EC-A
SVE-8
TP-1
SVE-5
MW-10
MW-4
TP-8
TP-6
VMP-5
VMP-1D
VMP-1S
SVE-4
SVE-3
SVE SYSEM (SVE/CVE)
ALSAB-4
ALSAB-3
ALS NORTH PARKING LOT
ALSAB-2
SAB-4
SAB-3
SAB-2
ALSAB-1
SEEP AREA
SAB-1
NORTH CELL
CC-B
CC-A
CENTER CELL
SVE-2
SVE-1
SOUTH CELL
MW-11
FORMER RR TRACKS
EXISTING RR TRACKS
N
40 0 80
1"=80'

EXPLANATION

- EXCEEDS LEACHING CLEANUP LEVEL FOR PCE AND TCE
- TP-5 — SETEMBER 2007 TEST PIT SAMPLE DESIGNATION
- EC-E — SUBSURFACE SOIL SAMPLE AND DESIGNATION (APPROXIMATE LOCATION)
- VMP-5 — SOIL VAPOR MONITORING POINT AND DESIGNATION (APPROXIMATE LOCATION)
- SVE-1 — SOIL VAPOR EXTRACTION POINT
- SVE-1/ VMP-1 — SOIL VAPOR EXTRACTION POINT OR VAPOR MONITORING POINT THAT EXCEEDS ALL SSCLs
- SVE-4 — SOIL VAPOR EXTRACTION POINT THAT EXCEEDS RESIDENTIAL SSCLs[1]
- MW-21 — MONTIORING WELL AND DESIGNATION
- AREA POTENTIALLY POSING A LEACHING TO GROUNDWATER RISK
- MRL PROPERTY AND RIGHT OF WAY
- BNSF RIGHT OF WAY
- HEART K LAND & CASTLE COMPANY (STATE OF MONTANA RIGHT-OF-WAY)
- RAILROAD
- SVE SYSTEM PIPING
- µg/m3 — MICROGRAMS PER CUBIC METER
- PCE — TETRACHLOROETHENE
- TCE — TRICHLOROETHENE

FOOTNOTE:
1. RESIDENTIAL EXCEEDANCES IN ADDITION TO EXCEEDANCES OF TCE SSCL FOR THE COMMERCIAL/INDUSTRIAL AND CONSTRCTION WORKERS AT SVE-4 AND SVE-7.

Figure Source: Feasibility Study Report. Prepared for BNSF by AECOM. 2020.

SOIL VAPOR AND SUBSURFACE SOIL EXCEEDANCES

FIGURE 7

BNSF RAILWAY COMPANY
MISSION WYE, MONTANA

DATE: 2/7/20

DEQ Montana Department of Environmental Quality

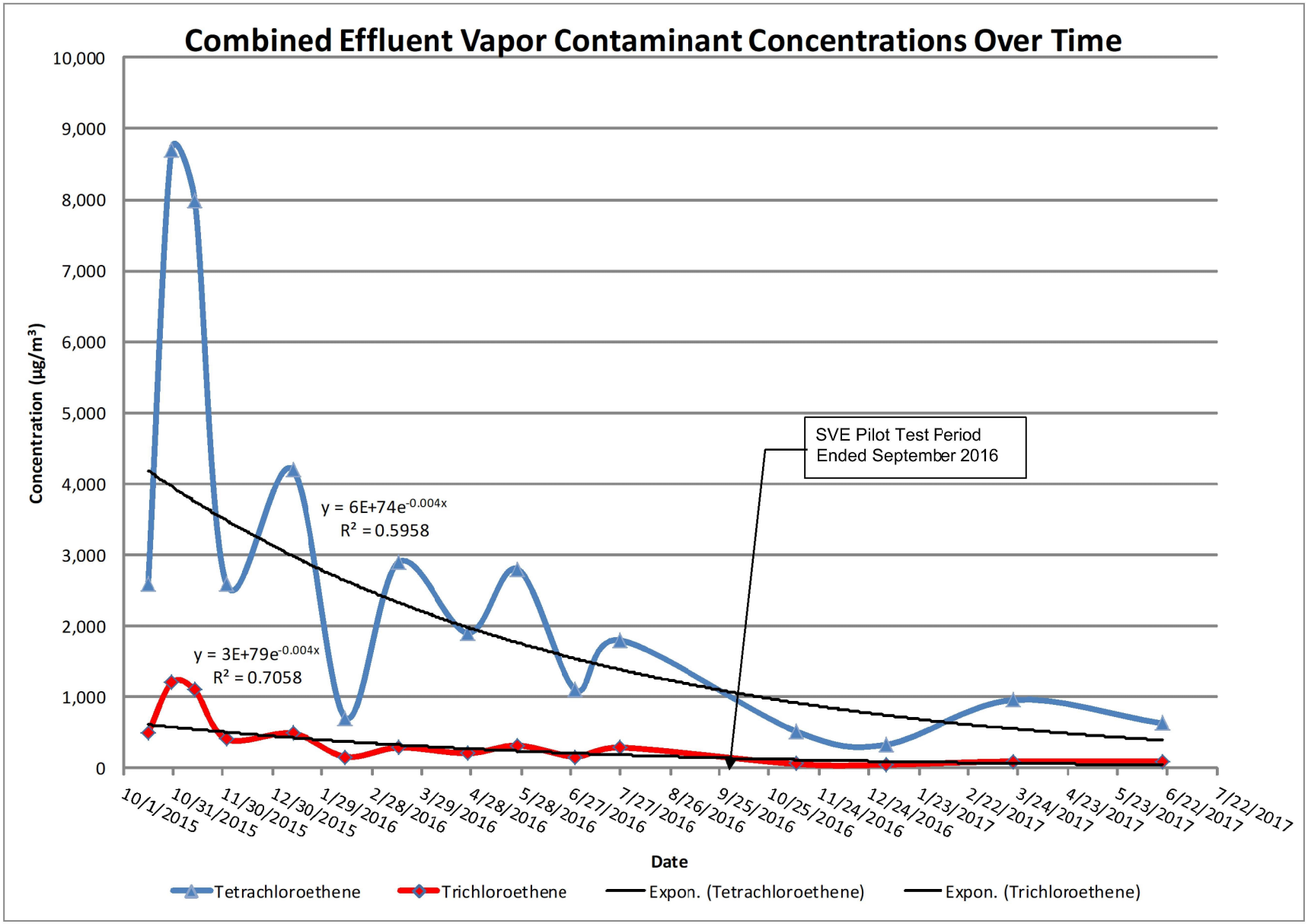


Figure Source: Feasibility Study Report. Prepared for BNSF by AECOM. 2020.

DEQ
Montana Department of Environmental Quality

BNSF RAILWAY COMPANY MISSION WYE, MONTANA	PCE AND TCE COMBINED VAPOR SAMPLE CONCENTRATIONS OVER TIME
DATE: 2/7/2020	FIGURE 8

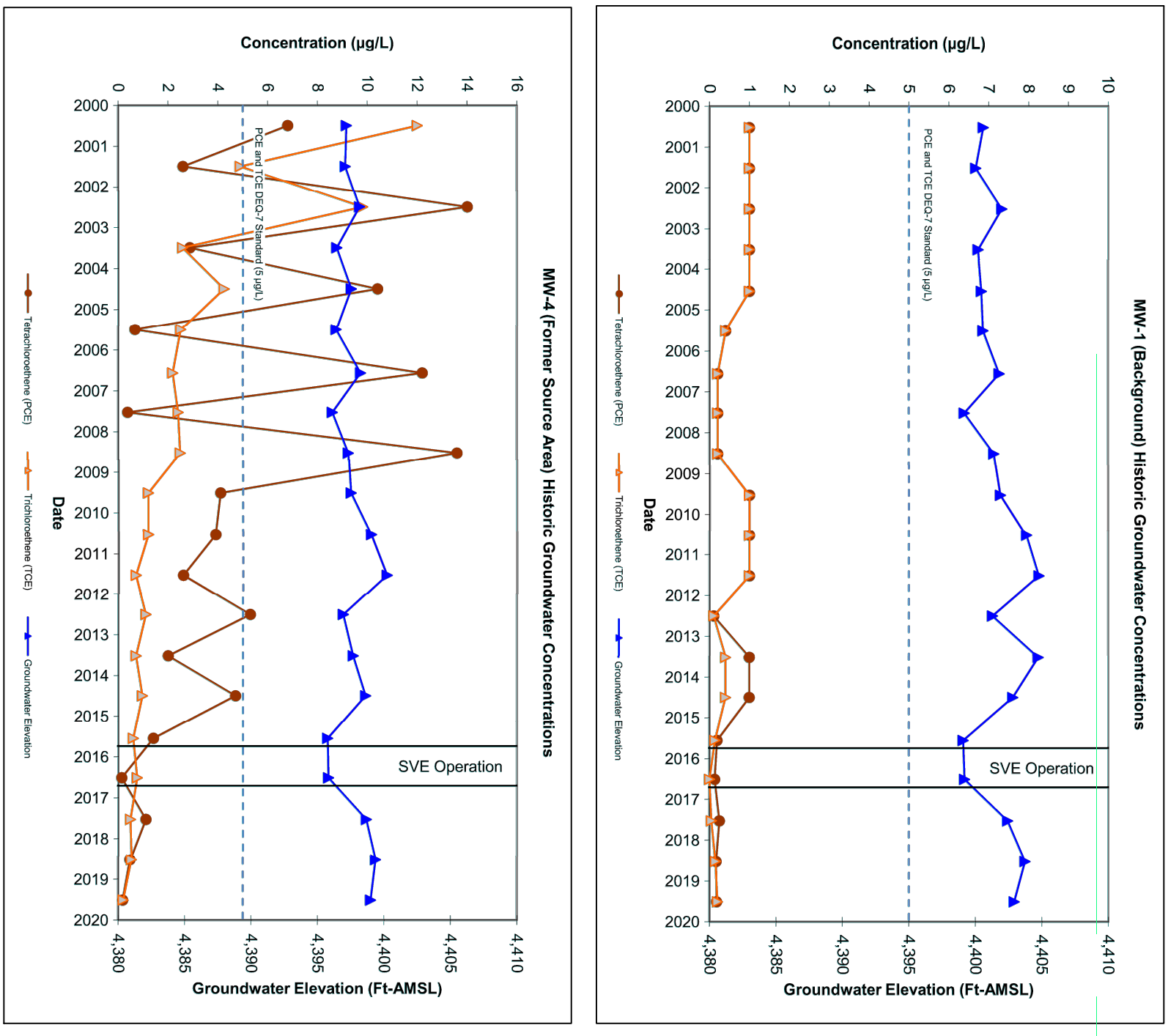


Figure Source: July 2019 Groundwater Monitoring Report. Prepared for BNSF by AECOM. 2019.

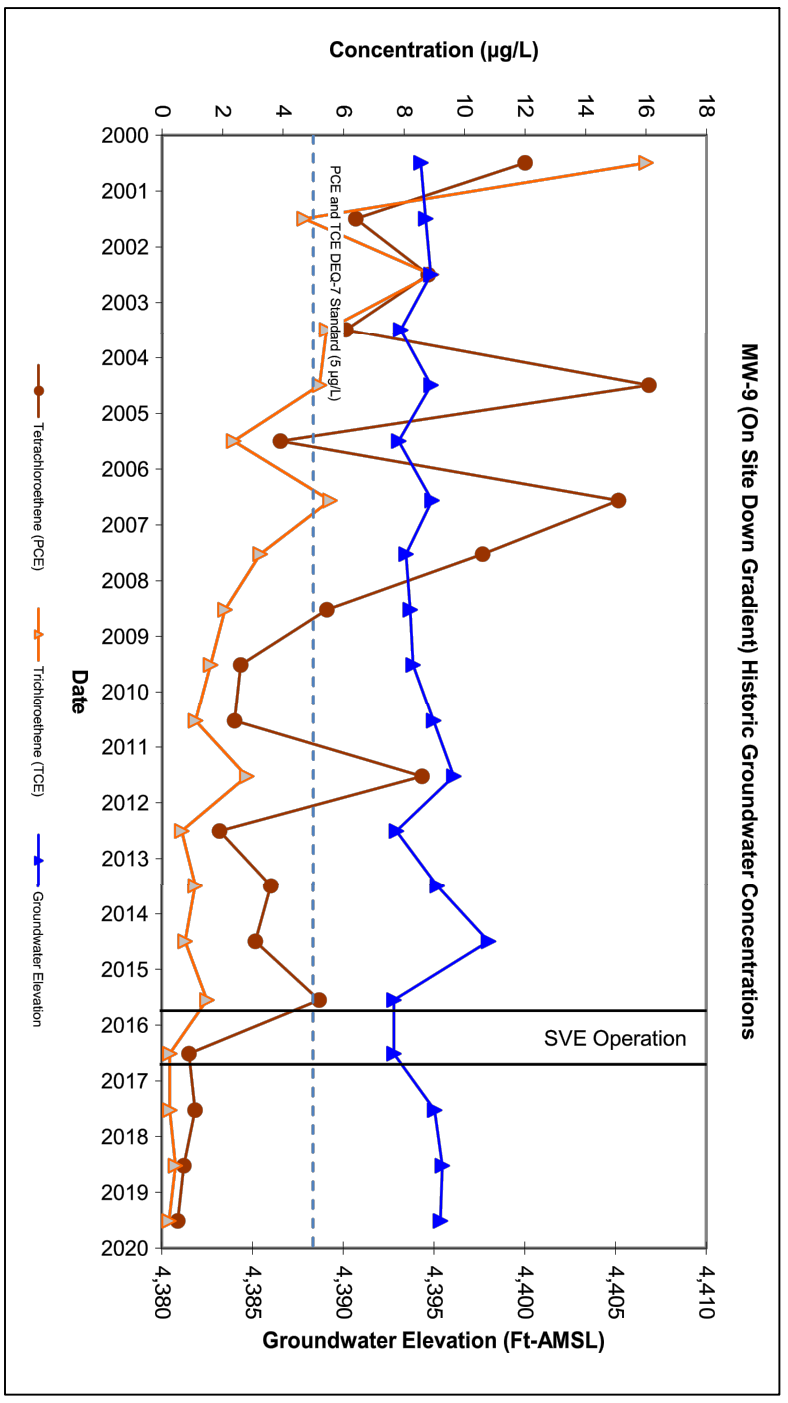
DEQ
Montana Department of Environmental Quality

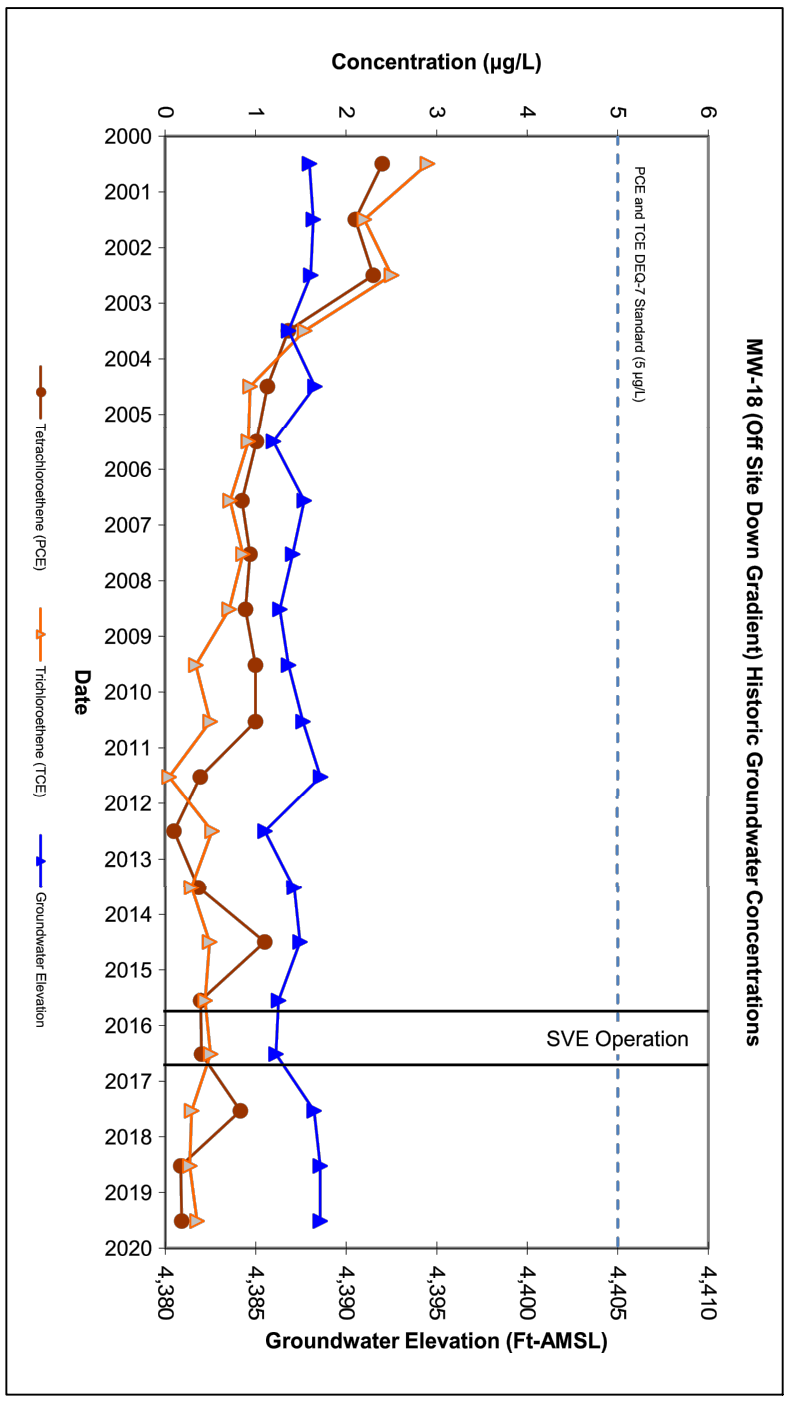
BNSF RAILWAY COMPANY
MISSION WYE, MONTANA

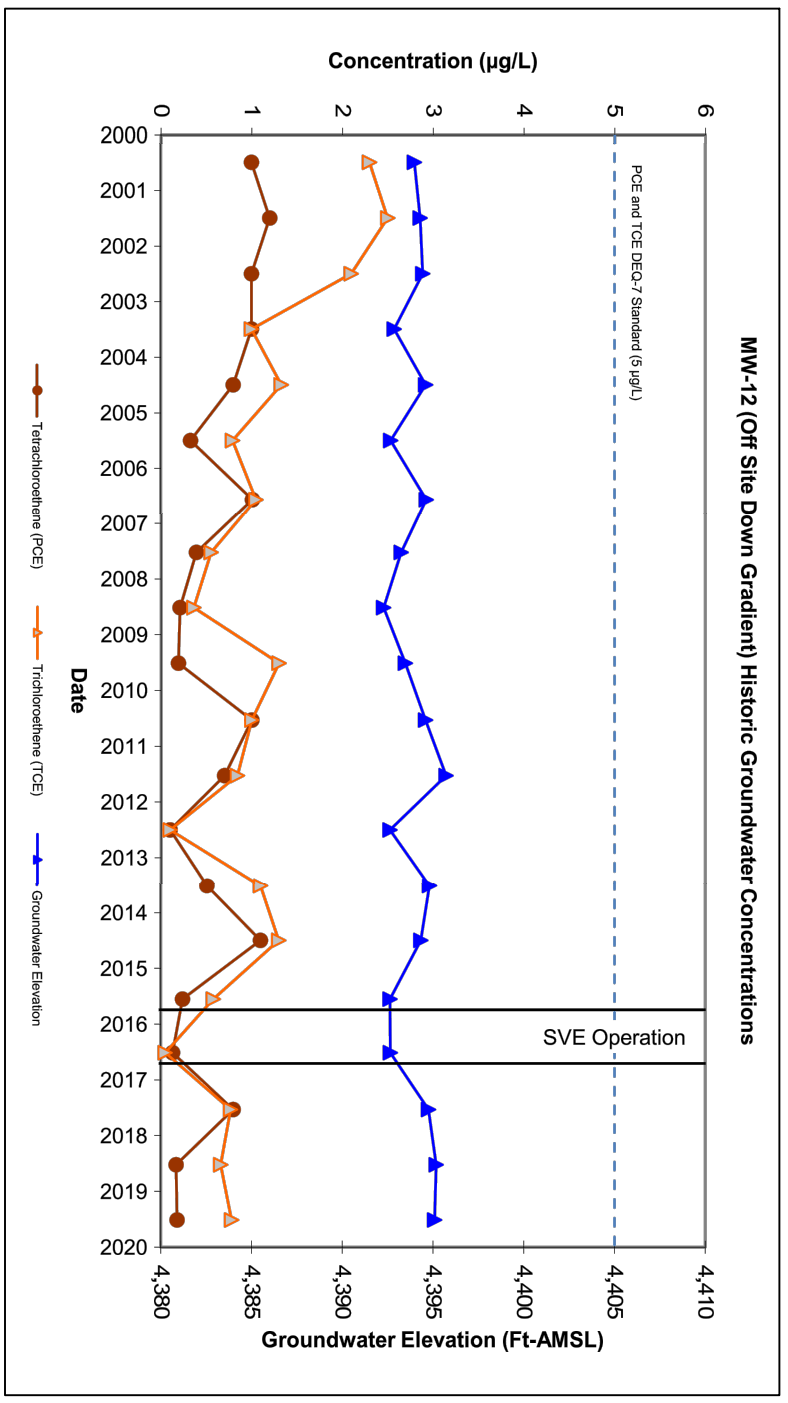
HISTORIC GROUNDWATER CONCENTRATIONS (PCE AND TCE) AND ELEVATIONS
WELLS MW-1, MW-3, MW-4, AND MW-5

DATE: 2/7/2020

FIGURE 9







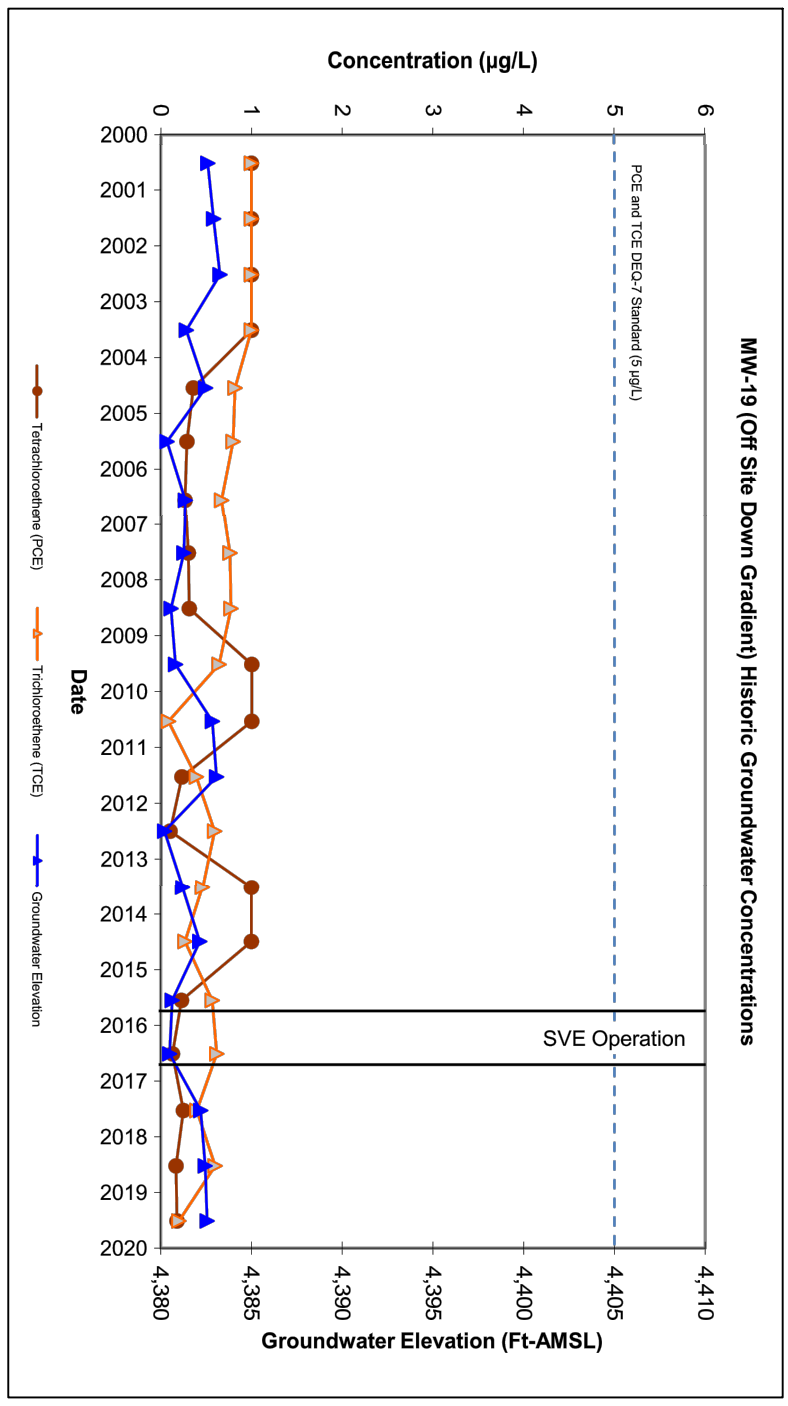


Figure Source: July 2019 Groundwater Monitoring Report. Prepared for BNSF by AECOM. 2019.

DEQ
Montana Department of Environmental Quality

BNSF RAILWAY COMPANY
MISSION WYE, MONTANA

HISTORIC GROUNDWATER CONCENTRATIONS (PCE AND TCE) AND ELEVATIONS
WELLS MW-9, MW-12, MW-18, AND MW-19

DATE: 2/7/2020

FIGURE 10

PCE CONCENTRATIONS FROM GROUNDWATER MONITORING JULY 2004 / JULY 2019

Figure 11

BNSF RAILWAY COMPANY
MISSION WYE, MONTANA

DATE: 2/7/2020

Figure Source: July 2004 Groundwater Monitoring Report. Prepared for BNSF by AECOM. 2004
July 2019 Groundwater Monitoring Report. Prepared for BNSF by AECOM. 2019

250 0 500
1"=500'

MW-19
0.36 / <0.18

MW-17

HARRIS STOCK WELL
0.66 / NS

MW-18
1.13 / <0.18

GRAVEL PIT POND
0.78 / < 0.04

GRAVEL PIT WELL
NS / < 0.04

MW-8
PZ-5
MW-14
1.7 / <0.18
MW-9
16.1 / 0.53J
PZ-6/MW-12
0.8 / <0.18
PZ-2
MW-7
MW-6
MW-21
NS / <0.18
MW-2
MW-22
NS / 1.1
MW-5
5.59 / 0.30J
MW-3
195 / 15.1
MW-4
10.4 / 0.42J
MW-10
PZ-4
PZ-1
PZ-3
MW-11

MW-1
<1.0 / <0.18

NOTE: DEQ-7 = MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY CIRCULAR DEQ-7 MONTANA NUMERIC WATER QUALITY STANDARDS, JUNE 2019.

LEGEND

- SURFACE WATER LOCATION
- MW-18 MONITORING WELL
- PZ-4 PIEZOMETER LOCATION
- STOCK WELL
- MW-8 MONITORING WELL/PIEZOMETER (NOT SAMPLED)
- XX / XX PCE CONCENTRATIONS IN µg/L JULY 2004 / JULY 2019
- J ESTIMATED CONCENTRATION
- < NON-DETECT RESULTS
- NS NOT SAMPLED
- APPROXIMATE EXTENT OF PCE IN GROUNDWATER ABOVE THE GROUNDWATER STANDARD - **JULY 2004**
- APPROXIMATE EXTENT OF PCE IN GROUNDWATER ABOVE THE GROUNDWATER STANDARD - **JULY 2019**

PZ-5
MW-8
MW-14
1.7 / <0.18
MW-9
16.1 / 0.53J
PZ-6/MW-12
0.8 / <0.18
PZ-2
MW-6
MW-7
MW-2
MW-21
NS / <0.18
MW-22
NS / 1.1
MW-5
5.59 / 0.30J
MW-3
195 / 15.1
MW-4
10.4 / 0.42J
MW-10
PZ-4
PZ-1
PZ-3
MW-11
MW-1
<1.0 / <0.18

0 300
1"=300'

DEQ Montana Department of Environmental Quality

TCE CONCENTRATIONS FROM GROUNDWATER MONITORING JULY 2004 / JULY 2019

BNSF RAILWAY COMPANY MISSION WYE, MONTANA

Figure 12

DATE: 2/7/2020

Figure Source: July 2004 Groundwater Monitoring Report. Prepared for BNSF by AECOM. 2004
July 2019 Groundwater Monitoring Report. Prepared for BNSF by AECOM. 2019

250 0 500

1"=500'

MW-19
0.82 / <0.2

MW-17

HARRIS STOCK WELL
1.3 / NS

MW-18
0.94 / 0.35 J

GRAVEL PIT POND
<1.0 / <0.044

GRAVEL PIT WELL
NS / <0.044

MW-8
PZ-5
MW-14
1.1 / <0.2
MW-9
5.21 / 0.24 J
PZ-6/MW-12
1.33 / 0.78 J
PZ-2
MW-7
MW-6
MW-21
NS / <0.2
MW-2
MW-22
NS / <0.2
MW-5
1.84 / 0.3 J
MW-3
23.2 / 1.0
MW-4
4.24 / <0.2
MW-10
PZ-4
PZ-1
PZ-3
MW-11

MW-1
<1.0 / <0.2

NOTE: DEQ-7 = MONTANA DEPARTMENT OF ENVIRONMENTAL QUALITY CIRCULAR DEQ-7 MONTANA NUMERIC WATER QUALITY STANDARDS, JUNE 2019.

LEGEND

- SURFACE WATER LOCATION
- MW-18 MONITORING WELL
- PZ-4 PIEZOMETER LOCATION
- STOCK WELL
- MW-8 MONITORING WELL/PIEZOMETER (NOT SAMPLED)

XX / XX TCE CONCENTRATIONS IN µg/L JULY 2004 / JULY 2019

J ESTIMATED CONCENTRATION

< NON-DETECT RESULTS

NS NOT SAMPLED

APPROXIMATE EXTENT OF TCE IN GROUNDWATER ABOVE THE GROUNDWATER STANDARD **(JULY 2004)**

NOTE: TCE WAS NOT DETECTED ABOVE THE DEQ-7 STANDARD DURING THE JULY 2019 SAMPLING EVENT AND, THEREFORE, A TCE CONTOUR WAS NOT DRAWN.

PZ-5
MW-8
MW-14
1.1 / <0.2
MW-9
5.21 / 0.24 J
PZ-6/MW-12
1.33 / 0.78 J
PZ-2
MW-6
MW-7
MW-2
MW-21
NS / <0.2
MW-22
NS / <0.2
MW-5
1.84 / 0.3 J
MW-3
23.2 / 1.0
MW-4
4.24 / <0.2
MW-10
PZ-4
PZ-1
PZ-3
MW-11
MW-1
<1.0 / <0.2

0 300

1"=300'

DEQ Montana Department of Environmental Quality

SSCL µg/m3	CONSTRUCTION WORKER	COMMERCIAL/INDUSTRIAL INDOOR AIR	RESIDENTIAL INDOOR AIR
PCE	353	235	47
TCE	17	15	2.15

VMP-2D	August 2015 µg/m3
5.5 ft bgs	
PCE	3,500
TCE	340

VMP-2S	August 2015 µg/m3
8 ft bgs	
PCE	1,400
TCE	120

VMP-3	August 2015 µg/m3
10 ft bgs	
PCE	1,700
TCE	150

VMP-4	August 2015 µg/m3
11 ft bgs	
PCE	1,900
TCE	170

VMP-1D	August 2015 µg/m3
8.5 ft bgs	
PCE	12,000
TCE	3,800

VMP-1S	August 2015 µg/m3
6 ft bgs	
PCE	8,900
TCE	2,400

VMP-5	August 2015 µg/m3
12 ft bgs	
PCE	650
TCE	64

SVE-1 µg/m3	June 2016
PCE	570
TCE	67

SVE-2 µg/m3	June 2016
PCE	9,700
TCE	970

SVE-3 µg/m3	June 2016
PCE	4,000
TCE	970

SVE-4 µg/m3	June 2016
PCE	51
TCE	30

SVE-5 µg/m3	June 2016
PCE	88
TCE	13

SVE-6 µg/m3	June 2016
PCE	81
TCE	9

SVE-7 µg/m3	June 2016
PCE	140
TCE	31

SVE-8 µg/m3	June 2016
PCE	580
TCE	57

MW-22 MW-21 MW-5 MW-3 MW-4 MW-10

SVE-7 SVE-8 SVE-6 SVE-5 SVE-4 SVE-3 SVE-2 SVE-1

VMP-2D VMP-2S VMP-3 VMP-4 VMP-5 VMP-1D VMP-1S

TP-7 (SBS-7D) SS-88d

SVE SYSTEM SHED

DECON PAD

LEGEND

- TILLING AREA, APPROXIMATELY 10' x10' (NOT SHOWN TO SCALE)
- ACTIVE SOIL VAPOR EXTRACTION WELL
- VMP-2 EXISTING VAPOR MONITORING POINT
- SVE SYSTEM PIPING
- UNDERGROUND ELECTRICAL LINE
- AREA POTENTIALLY POSING A LEACHING TO GROUNDWATER RISK (IDENTIFIED IN JULY 2014 HUMAN HEALTH RISK ASSESSMENT ADDENDUM)
- TP-7 (SBS-7D) TEST PIT
- SS-88d SURFACE SOIL SAMPLE
- EXISTING MONITORING WELL
- UNPAVED ROAD
- RAILROAD TRACKS
- RIGHT-OF-WAY / RAILROAD OWNED PROPERTY BOUNDARY

40 0 80

1"=40'

N

Figure Source: Feasibility Study Report. Prepared for BNSF by AECOM.2020.
Mission Wye Proposed Plan. Prepared for DEQ by AECOM. 2019.

DISTRIBUTION OF MOST RECENT SOIL VAPOR RESULTS

FIGURE 13

BNSF RAILWAY COMPANY
MISSION WYE, MONTANA

DATE: 2/7/2020

DEQ Montana Department of Environmental Quality

Appendix A

Environmental, Requirements, Criteria, or Limitations

ENVIRONMENTAL REQUIREMENTS, CRITERIA OR LIMITATIONS
MISSION WYE CECRA FACILITY
March 2020

At the Mission Wye CECRA Facility (MWYE Facility), DEQ is using the remedy selection criteria provided in § 75-10-721, MCA, as it existed in 1993. That version is used because the 1995 legislation that revised the statute included a savings clause making the amendments inapplicable to civil actions initiated prior to the date of the legislation. On December 27, 1988, DEQ filed an action against BNSF Railway Company in federal court for response costs, remedial action, declarative and injunctive relief, penalties, and natural resource damage claims for the Livingston Shop Complex and the MWYE Facility. Because that action was filed prior to the 1995 amendments, the savings clause applies at the MWYE Facility (Section 25(1), Ch. 584, L. 1995). In the 1993 version of the statute, DEQ must require cleanup consistent with applicable state and federal environmental requirements, criteria, or limitations (ERCLs) and may consider substantive state and federal ERCLs that are well-suited to site conditions.

There is a distinction between "applicable" requirements and those that are "well-suited to site conditions." Applicable requirements are those requirements that would legally apply at the facility regardless of the CECRA action. Requirements that are well-suited to site conditions are those requirements that are not applicable, but address situations or problems sufficiently similar to those at the facility and, therefore, are well-suited for use at the facility. Attainment of applicable requirements is mandatory under CECRA. Well-suited requirements may be considered by DEQ in approving remedial actions under CECRA. All applicable and well-suited ERCLs identified in the Record of Decision (ROD) must be attained.

ERCLs are generally of three types: action-specific, contaminant-specific, and location-specific. Action-specific requirements are those that are triggered by the performance of a certain activity as part of a particular remedy. They do not in themselves determine the remedy but rather indicate the manner in which the remedy must be implemented. Contaminant-specific requirements are those that establish an allowable level or concentration of a hazardous or deleterious substance in the environment or that prescribe a level or method of treatment for a hazardous or deleterious substance. Location-specific requirements are those that serve as restrictions on the concentration of a hazardous or deleterious substance or the conduct of activities solely because the facility is in a specific location or the action affects specified types of areas. Some ERCLs could be categorized in more than one way; in this case, they are generally not duplicated within the document. For example, dust suppression and control of certain substances that may be released into the air as a result of earth moving, transportation and similar actions may be necessary to meet air quality requirements and could be included in the contaminant-specific or action-specific analysis.

CECRA defines as cleanup requirements only state and federal ERCLs. Remedial designs, implementation, operation, and maintenance must, nevertheless, comply with all other applicable laws, both state and federal. Many such laws, while not strictly environmental, have environmental impacts. Identification of all applicable laws, including health and safety laws

and local regulations that must be complied with during implementation of the remedy, remains BNSF Railway Company's responsibility.

Many requirements listed here are promulgated as identical or nearly identical requirements in both federal and state law, usually pursuant to delegated environmental programs administered by the Environmental Protection Agency and the states, such as the requirements of the federal Clean Water Act and the Montana Water Quality Act. ERCLs and other laws that are unique to state law are also identified.

The description of applicable and well-suited federal and state requirements that follows includes summaries of the legal requirements that attempt to set out the requirement in a reasonably concise fashion that is useful in evaluating compliance with the requirement. These descriptions are provided to allow the user a basic indication of the requirement without having to refer back to the statute or regulation itself. However, in the event of any inconsistency between the law itself and the summaries provided in this document, the actual requirement is ultimately the requirement as set out in the law, rather than any paraphrase of the law provided here.

1.0 ACTION-SPECIFIC ERCLs

1.1 Water Quality Requirements

1.1.1 Clean Water Act, Point Source Discharges Requirements, 33 USC §1342 (applicable, substantive provisions only): Section 402 of the Clean Water Act, 33 USC §§ 1342, *et seq.*, authorizes the issuance of permits for the discharge of any pollutant. This includes storm water discharges associated with industrial activity. *See*, 40 CFR 122.26(b)(14). Because the State of Montana has been delegated the authority to implement the Clean Water Act, these requirements are enforced in Montana through the Montana Pollutant Discharge Elimination System (MPDES). There is no remedial action required in the ROD that is anticipated to trigger the need for a water quality permit. If information regarding the need for a permit changes, DEQ may identify applicable or well-suited ERCLs.

1.1.2 Montana Water Quality Act, §§ 75-5-101, *et seq.*, MCA:

Section 75-5-605, MCA (applicable), prohibits causing pollution of any state waters. Pollution is defined as contamination or other alteration of physical, chemical, or biological properties of state waters that exceeds that permitted by the water quality standards or the discharge, seepage, or drainage of any substances into state water that will likely create a nuisance or render the water harmful, detrimental or injurious to public health, recreation, safety, or welfare, or to livestock or wild animals. Also, it is unlawful to place or cause to be placed any wastes where they will cause pollution of any state waters.

Section 75-5-303, MCA (applicable), states that existing uses of state waters and the level of water quality necessary to protect the uses must be maintained and protected. Section 75-5-317, MCA, provides an exemption from nondegradation requirements that allows changes of existing water quality resulting from an emergency action or reclamation that is designed to protect the

public health or the environment and that is approved, authorized, or required by the department. Degradation meeting these requirements may be considered nonsignificant.

ARM 17.30.637 (applicable), prohibits discharges containing substances that will: (a) settle to form objectionable sludge deposits or emulsions beneath the surface of the water or upon adjoining shorelines; (b) create floating debris, scum, a visible oil film (or be present in concentrations at or in excess of 10 milligrams per liter) or globules of grease or other floating materials; (c) produce odors, colors or other conditions that create a nuisance or render undesirable tastes to fish flesh or make fish inedible; (d) create concentrations or combinations of materials that are toxic or harmful to human, animal, plant or aquatic life; or (e) create conditions that produce undesirable aquatic life.

ARM 17.30.705 (applicable), provides that for all state waters, existing and anticipated uses and the water quality necessary to protect these uses must be maintained and protected unless degradation is allowed under the nondegradation rules at ARM 17.30.708.

ARM 17.30.1011 (applicable), provides that any groundwater whose existing quality is higher than the standard for its classification must be maintained at that high quality unless degradation may be allowed under the principles established in Section 75-5-303, MCA and the nondegradation rules at ARM 17.30.701, *et seq.*

1.1.3 Stormwater Runoff Control Requirements

There is no remedial action required in the ROD that is anticipated to trigger the need for stormwater runoff controls. If information regarding the need for a general permit for stormwater changes, DEQ may identify applicable or well-suited ERCLs.

1.2 Air Standards

There is no remedial action required in the ROD that is anticipated to trigger air quality requirements. If information regarding air quality changes, DEQ may identify applicable or well-suited ERCLs.

1.3 Water Well Requirements

Sections 37-43-101 to 402, MCA (applicable) provides regulations and licensing requirements for drillers or makers of water wells and monitoring wells.

Section 85-2-505, MCA (applicable) precludes the wasting of groundwater. Any well producing waters that contaminate other waters must be plugged or capped, and wells must be constructed and maintained so as to prevent waste, contamination, or pollution of groundwater.

Section 85-2-516, MCA (applicable) states that within 60 days after any well is completed a well log report must be filed by the driller with the Montana Bureau of Mines and Geology.

ARM 36.21.801-810, (applicable) specifies certain requirements that must be fulfilled when constructing and abandoning monitoring wells.

1.4 Solid Waste Management Requirements

There is no remedial action required in the ROD that is anticipated to trigger solid waste management requirements. If information regarding solid waste changes, DEQ may identify applicable or well-suited ERCLs.

1.5 Hazardous Waste Management Requirements

There is no known listed or characteristic hazardous waste at the Facility. If information regarding hazardous waste changes, DEQ may identify applicable or well-suited ERCLs.

1.6 Reclamation and Revegetation Requirements

Certain portions of the Montana Strip and Underground Mining Reclamation Act and Montana Metal Mining Act, as outlined below, are well-suited requirements for activities at the Facility. While no mining activities are occurring at the Facility, these requirements are well-suited for the management and reclamation of areas disturbed by excavation, grading, or similar actions. To the extent that soil is disturbed at the time that monitoring wells are closed and the SVE system is removed, these ERCLs are well-suited.

ARM 17.24.501 (well-suited) gives general backfilling and final grading requirements.

ARM 17.24.713 (well-suited) provides that seeding and planting of disturbed areas must be conducted during the first appropriate period for favorable planting after final seedbed preparation but may not be more than ninety days after soil has been replaced.

ARM 17.24.714 (well-suited) requires use of a mulch or cover crop or both until an adequate permanent cover can be established. Use of mulching and temporary cover may be suspended under certain conditions.

ARM 17.24.716 (well-suited) establishes the required method of revegetation and provides that introduced species may be substituted for native species as part of an approved plan for alternate vegetation.

1.7 Noxious Weed Requirements

Section 7-22-2101(9)(a), MCA (applicable) defines “noxious weeds” as any exotic plant species established or that may be introduced in the state that may render land unfit for agriculture, forestry, livestock, wildlife, or other beneficial uses or that may harm native plant communities and that is designated: (i) as a statewide noxious weed by rule of the department; or (ii) as a district noxious weed by a board, following public notice of intent and a public hearing.

Section 7-22-2116(1), MCA (applicable), declares it is unlawful for any person to permit any noxious weed to propagate or go to seed on the person’s land unless they adhere to the noxious weed management program of the applicable weed management district or a noxious weed management agreement.

Designated noxious weeds are listed in ARM 4.5.201 through 4.5.210 (applicable).

Section 7-22-2152, MCA (applicable) requires that any person proposing certain actions including but not limited to a solid waste facility, a highway or road, a commercial, industrial, or government development, or any other development that needs state or local approval and that results in the potential for noxious weed infestation within a district must notify the district weed board at least 15 days prior to the activity. The board will require that the areas be seeded, planted, or otherwise managed to reestablish a cover of beneficial plants. The person committing the action must submit to the board a written plan specifying the methods to be used to accomplish revegetation at least 15 days prior to the activity. The plan must describe the time and method of seeding, fertilization practices, recommended plant species, use of weed-free seed, and the weed management procedures to be used. The plan is subject to approval by the board, which may require revisions to bring the revegetation plan into compliance with the district weed management plan. The activity for which notice is given may not occur until the plan is approved by the board and signed by the presiding officer of the board and by the person or a representative of the agency responsible for the action. The signed plan constitutes a binding agreement between the board and the person or agency. The plan must be approved, with revisions if necessary, within 10 days of receipt by the board.

2.0 CONTAMINANT-SPECIFIC ERCLs

2.1 Groundwater Standards

2.1.1 Safe Drinking Water Act – 42 U.S.C. § 300f *et seq*. and the National Primary Drinking Water Regulations (40 CFR Part 141) (applicable) establish maximum contaminant levels (MCLs) and maximum contaminant level goals (MCLGs) for contaminants in drinking water distributed in public water systems. The requirements were evaluated in this ERCLs analysis in conjunction with the groundwater classification standards promulgated by the State of Montana. These ERCLs are identified as applicable because the groundwater is Class I and is a potential source of drinking water.

Use of these standards for this action is fully supported by EPA regulations and guidance. The Preamble to the National Contingency Plan (NCP) provides that MCLs are relevant for groundwater that is a current or potential source of drinking water (55 Fed.Reg. 8750, March 8, 1990), and this determination is further supported by requirements in the regulations governing conduct of the RI/FS studies found at 40 CFR 300.430(e)(2)(i)(B). EPA's guidance on Remedial Action for Contaminated Groundwater at Superfund Sites states that "MCLs developed under the Safe Drinking Water Act generally are ARARs [the federal equivalent of ERCLs] for current or potential drinking water sources." MCLGs that are above zero are relevant under the same conditions (55 Fed.Reg. 8750-8752, March 8, 1990). *See also*, State of Ohio v. EPA, 997 F.2d 1520 (D.C. Cir. 1993), which upholds EPA's application of MCLs and non-zero MCLGs as ARARs for groundwater that is a potential drinking water source.

Chemical	MCLG	MCL
Tetrachloroethene	0[1]	5 µg/l
Trichloroethene	0[1]	5 µg/l

[1] An MCLG of zero is not an appropriate standard for Superfund site cleanups.

2.1.2 The Montana Water Quality Act, §§ 75-5-101, *et seq.,* MCA (applicable) and regulations.

ARM 17.30.1005–1006 (applicable) provides that groundwater is classified I through IV based on its beneficial uses. Class I is the highest quality class; class IV the lowest. The groundwater at the Facility is classified as Class I, because it has a natural specific conductance less than or equal to 1,000 microSiemens/cm at 25ºC.

ARM 17.30.1006 (applicable) sets the standards for the different classes of groundwater. The quality of Class I groundwater must be maintained suitable for the following beneficial uses with little or no treatment: (i) public and private water supplies; (ii) culinary and food processing purposes; (iii) irrigation; (iv) drinking water for livestock and wildlife; and (v) commercial and industrial purposes.

Concentrations of dissolved substances in groundwater may not exceed the human health standards listed in Circular DEQ-7 Montana Numeric Water Quality Standards[1], (applicable) including narrative standards, which are promulgated pursuant to the state Water Quality Act, §§ 75-5-101, *et seq.*, MCA. Concentrations of other dissolved or suspended substances must not exceed levels that render the waters harmful, detrimental or injurious to beneficial uses. DEQ may use any pertinent credible information to determine these levels.

For the primary contaminants of concern, the DEQ-7 standards are listed below. However, compliance with all DEQ-7 standards is required and remedial actions must meet the DEQ-7 standards for all contaminants at the MWYE Facility, including any breakdown products generated during remedial actions.

Chemical	DEQ-7 Standard for Groundwater
Tetrachloroethene	5 µg/l
Trichloroethene	5 µg/l

No increase of a parameter that causes a violation of the nondegradation provisions of 75-5-303, MCA, is allowed for Class I groundwater.

ARM 17.30.1011 (applicable) provides that any groundwater whose existing quality is higher than the standard for its classification must be maintained at that high quality unless degradation may be allowed under the principles established in § 75-5-303, MCA, and the nondegradation rules at ARM 17.30.701 *et seq.*

[1] Montana Department of Environmental Quality, Water Quality Division, *Circular DEQ-7, Montana Numeric Water Quality Standards* (June 2019) ("DEQ-7").

2.2 Surface Water Quality Standards

As described in Part 2, Section 5.1.4, of the ROD, Vallis Ditch once contained surface water flowed from west to east and was supplied with non-potable irrigation water. However, during a site visit in 1990, it was observed that much of the ditch had been filled in and regraded; further discussions with the foreman of the Heart K Land and Cattle indicated no surface water has been transported, including in the portion that lies at the northern end of the MWYE Facility, for nearly 10 years. As described in Part 2, Section 6.3, other periodic surface water may exist at the MWYE Facility as rain water that has not evaporated into the atmosphere or infiltrated into the soil but it is not expected to contain contamination because there is no surface soil exceeding site-specific cleanup levels. Therefore, DEQ has not identified any additional surface water ERCLs. If information regarding the presence of or impact on surface water changes, DEQ may identify applicable or well-suited ERCLs.

2.3 Air Standards

There is no remedial action required in the ROD that is anticipated to trigger air quality requirements. If information regarding air quality changes, DEQ may identify applicable or well-suited ERCLs.

3.0 LOCATION-SPECIFIC ERCLS

3.1 Endangered Species

3.1.1. The Endangered Species Act (well-suited). This statute and implementing regulations (16 U.S.C. § 1531 *et seq.*, 50 CFR Part 402, and 40 CFR 257.3-2) require that any federal activity or federally authorized activity may not jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify a critical habitat. Compliance with this requirement involves consultation with the U.S. Fish and Wildlife Service (USFWS) and a determination of whether there are listed or proposed species or critical habitats present at the Facility, and, if so, whether any proposed activities will impact such wildlife or habitat.

3.1.2 Montana Nongame and Endangered Species Act, §§ 87-5-101 *et seq.* (applicable): Endangered species should be protected in order to maintain and to the extent possible enhance their numbers. These sections list endangered species, prohibited acts and penalties. *See also*, § 87-5-201, MCA, (applicable) concerning protection of wild birds, nests and eggs; and ARM 12.5.201 (applicable) prohibiting certain activities with respect to specified endangered species.

3.2 Migratory Bird Treaty Act

This requirement (16 USC §§ 703 *et seq*.) (well-suited) establishes a federal responsibility for the protection of the international migratory bird resource and requires continued consultation with the appropriate program within the USFWS during remedial design and remedial construction to ensure that the cleanup of the Facility does not unnecessarily impact migratory birds.

3.3 Bald Eagle Protection Act

This requirement (16 USC §§ 668 *et seq.*) (well-suited) establishes a federal responsibility for protection of bald and golden eagles, and requires continued consultation with the appropriate program within the USFWS during remedial design and remedial construction to ensure that any cleanup of the Facility does not unnecessarily adversely affect the bald and golden eagle.

3.4 Protection of Wetlands Order

This requirement (Executive Order No. 11,990, referenced in 40 CFR Part 35, Appendix A to Subpart H) (well-suited) mandates that federal agencies and potentially responsible parties avoid, to the extent possible, the adverse impacts associated with the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practicable alternative exists.

Section 404(b)(1), 33 U.S.C. § 1344(b)(1) (well-suited) also prohibits the discharge of dredged or fill material into waters of the United States. Together, these requirements create a "no net loss" of wetlands standard.

OTHER LAWS (NON-EXCLUSIVE LIST)

The 1993 version of CECRA defines ERCLs as applicable or well-suited state and federal environmental laws. Remedial design, implementation, and operation and maintenance must nevertheless comply with all other applicable laws. The following "other laws" are included here to provide a reminder of other potentially legally applicable requirements for actions at the MWYE Facility. They do not purport to be an exhaustive list of such legal requirements but are included because they do set out related concerns that must be addressed and, in some cases, may require some advanced planning. They are not included as ERCLs because they are not "environmental laws."

Other Federal Laws

Occupational Safety and Health Regulations

The federal Occupational Safety and Health Act regulations found at 20 CFR § 1910 are applicable to worker protection during conduct of all remedial activities.

Other Montana Laws

1. Well Driller Licensing

Sections 37-43-101 to 402, MCA (applicable) provide regulations and licensing for drillers or makers of water wells and monitoring wells.

2. Water Rights

Section 85-2-101, MCA, declares that all waters within the state are the state's property, and may be appropriated for beneficial uses. The wise use of water resources is encouraged for the

maximum benefit to the people and with minimum degradation of natural aquatic ecosystems. Parts 3 and 4 of Title 85, Chapter 8, MCA, set out requirements for obtaining water rights and appropriating and utilizing water. All requirements of these parts are laws which must be complied with in any action using or affecting waters of the state. Some of the specific requirements are set forth below.

Section 85-2-301, MCA, provides that a person may only appropriate water for a beneficial use.

Section 85-2-302, MCA, specifies that a person may not appropriate water or commence construction of diversion, impoundment, withdrawal, or distribution works therefor except by applying for and receiving a permit from the Montana Department of Natural Resources and Conservation. While the permit itself may not be required under federal law, appropriate notification and submission of an application should be performed and a permit should be applied for in order to establish a priority date in the prior appropriation system.

Section 85-2-306, MCA, specifies the conditions on which groundwater may be appropriated, and, at a minimum, requires notice of completion and appropriation within 60 days of well completion.

Section 85-2-311, MCA, specifies the criteria which must be met in order to appropriate water, including requirements that:

1. There are unappropriated waters in the source of supply;
2. The proposed use of water is a beneficial use; and
3. The proposed use will not interfere unreasonably with other planned uses or developments.

Section 85-2-402, MCA, specifies that an appropriator may not change an appropriated right except as provided in this section with the approval of the DNRC.

Section 85-2-412, MCA, provides that, where a person has diverted all of the water of a stream by virtue of prior appropriation and there is a surplus of water, over and above what is actually and necessarily used, such surplus must be returned to the stream.

3. Montana Safety Act

Sections 50-71-201, 202, and 203, MCA, state that every employer must provide and maintain a safe place of employment, provide and require use of safety devices and safeguards, and ensure that operations and processes are reasonably adequate to render the place of employment safe. The employer must also do every other thing reasonably necessary to protect the life and safety of its employees. Employees are prohibited from refusing to use or interfering with the use of safety devices.

Appendix B

Selected Remedy Cost Estimates

Table B-1: Scope of Remedial Alternative and Assumptions used for Cost Estimates

Technologies	Assumed Timeframe (years)	Total Capital Cost	Total O&M Cost	Total Cost	Net Present Value (NPV)* Cost	Notes
Monitored Natural Attenuation (MNA)	0-4	$ 13,200	$ 140,000	$ 153,200	$ 143,300	Preparation of Work Plan. Annual groundwater monitoring includes VOC analysis at 14 sample locations and collection of 4 QA/QC samples and measurement of groundwater depth at 23 locations. Assumes MNA parameters analyzed at 6 of the sampling locations.
Institutional Controls (ICs)	0-30	$ 25,000	$ 78,000	$ 103,000	$ 76,000	Assumes restrictive covenants of property and annual inspections to ensure compliance and a review of the title records (once every 5 years) to ensure compliance.
Total Costs	--	--	$ 218,000	$ 256,200	$ 219,300	

Notes:

* = 3% discount factor used for NPV calculation used for remedies with time frames greater than one year.
All Technologies assume two years of post-remediation confirmation groundwater sampling (8 wells) and groundwater levels (23 wells) at $45,600.
The 2-year post remediation groundwater monitoring period, as included in the FS Report (AECOM, 2020a) is not included in the Assumed Timeframes.
bgs - below ground surface
ft - feet
GAC - granular activated carbon
HP - horsepower

Table B-2: Estimated Cost of Monitored Natural Attenuation

Site	BNSF Mission Wye
Location	Livingston, MT
Task	Monitored Natural Attenuation cost Estimate Backup
Base Year	2019

GW Remedial Option - MNA with Annual GW Monitoring			
MNA - Capital Cost	$	13,200	Work Plan Prep
MNA - Annual O&M Cost	$	35,000	Sample & Report
MNA - 4 years O&M Cost	$	140,000	Sample & Report

Key Assumptions

Remedial Action Work Plan. Annual MNA groundwater monitoring at the site. Annual groundwater monitoring includes VOC analysis at 14 sample locations and collection of 3 QA/QC samples and measurement of groundwater depth at 23 locations. MNA parameters analyzed at 6 of the sampling locations. Annual Report.

Work Description	Quantity	Units	Unit Cost	Total
Remedial Action Work Plan				
RA Work Plan	1	LS	$ 9,150	$ 9,150
MDEQ Oversight	1	LS	$ 4,000	$ 4,000
TOTAL CAPITAL COSTS				**$ 13,150**
Annual Groundwater Monitoring and Reporting				
Annual GW Sampling	1	Each	$ 15,500	$ 15,500
Analytical Laboratory	1	Each	$ 3,390	$ 3,390
Annual Report	1	Each	$ 12,150	$ 12,150
MDEQ Oversight	1	Each	$ 4,000	$ 4,000
TOTAL ANNUAL O&M COSTS				**$ 35,040**

Net Present Value Analysis:

Estimated Duration of Remedial Alternative (years)	4
Discount Factor (MDEQ Requested)	3%

Year	Cost Type	Total Cost Per Year	Total Cost	Present Value
0	Capital Cost	$13,200	$13,200	$13,200
1	Periodic Monitoring Cost	$35,000		$33,981
2	Periodic Monitoring Cost	$35,000		$32,991
3	Periodic Monitoring Cost	$35,000		$32,030
4	Periodic Monitoring Cost	$35,000		$31,097

Total Capital Cost:	**$13,200**	**Total Net Present Value**	**$143,300**
Total O&M Cost:	**$140,000**		

Notes:

The 2-year post remediation groundwater monitoring period, as included in the FS Report (AECOM, 2020a) is not included in the Assumed Timeframes.

Table B-3: Estimated Cost of Institutional Controls

Site	BNSF Mission Wye
Location	Livingston, MT
Task	Institutional Controls Cost Estimate Backup
Base Year	2019

Institutional Controls		
IC - Capital Cost	$	25,000
IC - Annual O&M Cost	$	2,600
IC - 30 years O&M cost	$	78,000

Description[1]

Restrictive covenants will be placed on railroad owned property. Any survey will be completed by MT licensed PLS. O&M costs include inspection program for annual inspections and deed review every 5 years, including a brief letter report.

Work Description	Quantity	Units	Unit Cost	Total
Restrictive Covenants				
Restrictive Covenants	2	LS	$ 12,500	$ 25,000
MDEQ Oversight	1	LS	$ 4,000	$ 4,000
TOTAL CAPITAL COSTS				**$ 25,000**
Inspection Program				
Annual Inspection Program	1	Each	$ 1,350	$ 1,350
5-yr Deed Restriction Review	1	Each	$ 270	$ 270
MDEQ Oversight	1	Each	$ 1,000	$ 1,000
TOTAL ANNUAL O&M COSTS				**$ 2,620**

Net Present Value Analysis:

Estimated Duration of Remedial Alternative (years)	30
Discount Factor (MDEQ Requested)	3%

Year	Cost Type	Total Cost Per Year	Total Cost	Present Value
0	Capital Cost	$25,000	$25,000	$25,000
1	Annual O&M Cost	$2,600		$2,524
2	Annual O&M Cost	$2,600		$2,451
3	Annual O&M Cost	$2,600		$2,379
4	Annual O&M Cost	$2,600		$2,310
5	Annual O&M Cost	$2,600		$2,243
6	Annual O&M Cost	$2,600		$2,177
7	Annual O&M Cost	$2,600		$2,114
8	Annual O&M Cost	$2,600		$2,052
9	Annual O&M Cost	$2,600		$1,993
10	Annual O&M Cost	$2,600		$1,935
11	Annual O&M Cost	$2,600		$1,878
12	Annual O&M Cost	$2,600		$1,824
13	Annual O&M Cost	$2,600		$1,770
14	Annual O&M Cost	$2,600		$1,719
15	Annual O&M Cost	$2,600		$1,669
16	Annual O&M Cost	$2,600		$1,620
17	Annual O&M Cost	$2,600		$1,573
18	Annual O&M Cost	$2,600		$1,527
19	Annual O&M Cost	$2,600		$1,483
20	Annual O&M Cost	$2,600		$1,440
21	Annual O&M Cost	$2,600		$1,398
22	Annual O&M Cost	$2,600		$1,357
23	Annual O&M Cost	$2,600		$1,317
24	Annual O&M Cost	$2,600		$1,279
25	Annual O&M Cost	$2,600		$1,242
26	Annual O&M Cost	$2,600		$1,206
27	Annual O&M Cost	$2,600		$1,170
28	Annual O&M Cost	$2,600		$1,136
29	Annual O&M Cost	$2,600		$1,103
30	Annual O&M Cost	$2,600		$1,071
	Total Capital Cost:	**$25,000**	**Total Net Present Value**	**$76,000**
	Total O&M Cost:	**$78,000**		

[1] Revised by DEQ for the Record of Decision

Appendix C

Restrictive Covenants

After recording, please return to:
[insert BNSF or MRL and the entity address]

DECLARATION OF RESTRICTIVE COVENANTS ON REAL PROPERTY

THIS DECLARATION OF RESTRICTIVE COVENANTS ON REAL PROPERTY (Restrictive Covenants) is made by [insert owner's name] as of [insert date].

RECITALS

WHEREAS, [insert owner's name] is the owner of certain real property (the Subject Property) located in Park County, Montana, shown on Attachment 1 and more particularly described as:

[insert property description]

WHEREAS, the Subject Property is located within the Mission Wye Facility (Facility);

WHEREAS, the Montana Department of Environmental Quality (DEQ) has determined that releases or threatened releases of hazardous or deleterious substances that may pose an imminent and substantial endangerment to public health, safety, or welfare or the environment have come to be located upon the Subject Property;

WHEREAS, DEQ, under the authority of the Montana Comprehensive Environmental Cleanup and Responsibility Act, §§ 75-10-701 et seq., MCA, has issued a Record of Decision dated [insert date] for the Facility and selected a remedy to abate the imminent and substantial endangerment posed by the hazardous or deleterious substances;

WHEREAS, within the Subject Property, there are areas where groundwater exceeds Montana water quality standards and the site-specific cleanup levels selected in the Record of Decision;

WHEREAS, within the Subject Property, there are areas with identified soil vapor contamination that has the potential to impact indoor air if a structure were constructed in those areas; within those areas, there is also the potential for contaminated soil gas to accumulate in an excavation;

WHEREAS, the selected remedy requires that use of the Subject Property be restricted in order to mitigate the risk to the public health, safety or welfare or the environment and [insert property owner's name] is willing to record, comply with, and enforce such restrictions as provided for in § 75-10-727, MCA;

NOW, THEREFORE, [insert owner's name] hereby agrees and declares:

1. Within the Subject Property, no wells may be drilled without the express advance written approval of DEQ. Groundwater within the Subject Property may not be used for any purpose other than sampling without the express prior written approval of DEQ. The integrity of any monitoring wells must be maintained by the owner of the Subject Property and may not remove any seals on any closed wells.

2. Within the Subject Property, no construction of any type of building may occur without the express advance written approval of DEQ. It is the [insert owner's name] intent that this limitation be construed as broadly as possible to prohibit any type of construction, including structures, containments, footings, or similar below ground appurtenances, unless DEQ's express advance written approval is obtained. As part of providing its approval, DEQ may require a vapor mitigation system in those areas with identified soil vapor contamination in order to limit the risk of human exposure to contaminated soil vapor or mitigate the risk of vapor intrusion into a building.

3. Within the Subject Property, no soil excavation of any kind may occur without the express advance written approval of DEQ. It is the [insert owner's name] intent that this limitation be construed as broadly as possible to prohibit any type of excavation of any kind whatsoever, unless DEQ's express advance written approval is obtained. As part of providing its approval, DEQ may require a ventilation system for any excavation activities in those areas with identified soil vapor contamination in order to limit the risk of human exposure to contaminated soil vapor. The sole exception to this is construction of an above-ground trail in conjunction with a potential Rails-to-Trails project; so long as no excavations occur as part of that project, DEQ's express advance written approval for the trail is not required

4. No action shall be taken, allowed, suffered, or omitted on the Subject Property if such action or omission is reasonably likely to create a risk of migration of hazardous or deleterious substances or a potential hazard to public health, safety, or welfare or the environment or result in a disturbance of the structural integrity of any engineering controls designed or utilized at the Facility to contain hazardous or deleterious substances or limit human or environmental exposure to the hazardous or deleterious substances.

5. [Insert owner's name] agrees to provide DEQ and its representatives and contractors, and all representatives and contractors of any person conducting DEQ-approved remedial actions on the Subject Property, access at all reasonable times to the Subject Property.

6. At all times after [insert owner's name] conveys any portion or all of its interest in the Subject Property and no matter what person or entity is in title to or in possession of any portion or all of the Subject Property, [insert owner's name] agrees that it and its agents shall retain the right to enter the Subject Property at reasonable intervals and at reasonable times of the day in order to inspect for violations of the Restrictive Covenants contained herein. In addition, [insert property owner's name] retains the rights and obligation to enforce these Restrictive Covenants even after it conveys all or any portion of its interest in the Subject Property.

7. DEQ shall also be entitled to enforce these Restrictive Covenants as an intended beneficiary thereof. [Insert owner's name] specifically agrees that the remedy of "specific performance" of these Restrictive Covenants shall be available to DEQ in such proceedings. Venue for enforcement of these Restrictive Covenants by DEQ shall be in the state First Judicial District Court, Montana.

8. The provisions of these Restrictive Covenants of the Subject Property shall run with the land and bind all holders, owners, lessees, occupiers, and purchasers of the Subject Property. These restrictive covenants apply in perpetuity and every subsequent instrument conveying an interest in all or any portion of the Subject Property shall include these Restrictive Covenants. [Insert owner's name] will notify DEQ of any proposed conveyance by [insert owner's name] of all or any portion of the Subject Property at least 30 days prior to any such conveyance. [Insert owner's name] and all future owners will provide notice to all potential purchasers by providing a copy of these Restrictive Covenants prior to the conveyance of all or any portion of the Subject Property and shall provide a copy of this notice to DEQ.

9. [Insert owner's name] and all future owners shall cause the requirements of these Restrictive Covenants to be placed in all instruments that convey an interest in all or any portion of the Subject Property and shall record this document with the county clerk and recorder in Park County, Montana.

10. The rights provided to DEQ in this declaration include any successor agencies of DEQ.

IN WITNESS WHEREOF, [insert owner's name] has executed this Declaration of Restrictive Covenants on Real Property as of the first date written above.

[INSERT OWNER'S NAME]

_____
By:

State of Montana)
:ss.
County of [insert county name])

On this __ day of _____, 20__, personally appeared _____, before me, a Notary Public for the State of Montana, known to me to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same.

IN WITNESS WHEREOF I have hereunto set my hand and affixed my official seal the day and year hereinabove first written.

_____
NOTARY PUBLIC FOR THE STATE OF MONTANA
(SEAL) Residing at _____
My Commission Expires: _____