2020
ANNUAL SAMPLING AND MONITORING REPORT
REGARDING THE
MONTANA POLE AND TREATING PLANT
BUTTE-SILVER BOW, MONTANA

Revision 0

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ACRONYMS AND ABBREVIATIONS

°F	Degrees Fahrenheit
µg/kg	Micrograms per kilogram
µg/L	Micrograms per liter
ARCO	Atlantic Richfield Company
BSB	Butte-Silver Bow
CDM	Camp Dresser & McKee, Inc.
cfs	Cubic feet per second
COC	Chain of custody
Dioxin	Polychlorinated dibenzo-p-dioxins
DEQ	Montana Department of Environmental Quality
DSR	Daily Summary Report
EDD	Electronic data deliverable
EPA	U.S. Environmental Protection Agency
FS	Feasibility study
Furans	Polychlorinated dibenzofurans
GAC	Granulated activated carbon
gpm	Gallons per minute
GWMP	Groundwater and Surface Water Monitoring Plan
kg	Kilograms
kg/yr	Kilograms per year
LNAPL	Light non-aqueous phase liquid
LTU	Land treatment unit
MBMG	Montana Bureau of Mines and Geology
MDHES	Montana Department of Health and Environmental Sciences
MDL	Method detection limit
MDT	Montana Department of Transportation
mg/kg	Milligrams per kilogram
MPTP	Montana Pole and Treating Plant
NAPL	Non-aqueous phase liquid
NCRT	Near creek recovery trench
NHRT	Near highway recovery trench
NWS	National Weather Service
O&M	Operations and maintenance
OWS	Oil and water separator

ACRONYMS AND ABBREVIATIONS (Cont.)

PAH	Polycyclic aromatic hydrocarbon
PCP	Pentachlorophenol
pg/L	Picograms per liter
PRP	Potentially responsible party
QC	Quality control
RCRA	Resource Conservation and Recovery Act
RI	Remedial investigation
ROD	Record of decision
RPD	Relative percent difference
SD	Standard deviation
SDG	Sample delivery group
SSP	Soil staging and pretreatment pile
SVOC	Semivolatile organic compound
Tetra Tech	Tetra Tech, Inc. [EMI Unit]
TCDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin
TEF	Toxicity equivalency factor
TEQ	Toxicity equivalence quotient
USGS	U.S. Geological Survey
WTP	MPTP water treatment plant
WWTP	Wastewater treatment plant

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EXECUTIVE SUMMARY

This 2020 Montana Pole and Treating Plant (MPTP) annual report describes site monitoring activities, summarizes analytical data generated, and evaluates progress toward achievement of remedial objectives for MPTP. The report also discusses additional site operation and maintenance (O&M) activities during 2020, such as non-routine maintenance at the MPTP water treatment plant (WTP), use of the south-side infiltration system, operation of the land treatment unit (LTU), planning for the anticipated LTU offload, and other related projects completed at the site during the year.

Primary activities at the site in 2020 included: (1) O&M activities, (2) sampling, and (3) planning for the next and final offload of treated soil from the LTU. The LTU offload is addressed in reports prepared under separate contract task orders. WTP facilities are currently in good working order.

Important operational issues noted in 2020 are as follows:

- Throughout 2020 in the near highway recovery trench (NHRT), the sustainable pumping rate continued to decrease relative to historical rates—from 135 gallons per minute (gpm) in 2009 to about 55 gpm at the end of 2020.

Other than the operational issues stated above, O&M of the MPTP WTP were routine in 2020.

Water Treatment Plant

WTP effluent (treated groundwater at WTP station EFF) was monitored weekly throughout 2020 for pentachlorophenol (PCP). Concentrations of PCP in effluent from both the NHRT and the near creek recovery trench (NCRT) were measured monthly.

During semi-annual monitoring in February 2020, plant water, groundwater, and surface water samples were analyzed for PCP. The annual monitoring event involving plant water, groundwater, and surface water was completed in August 2020. In addition to analysis of samples for PCP, some samples were analyzed for the "extended parameter list" analytes (semivolatile organic compounds [SVOC], polychlorinated dibenzo-p-dioxins [dioxins], and metals).

Concentrations of PCP in WTP effluent samples (station EFF) were below the 1 microgram per liter (µg/L) Record of Decision (ROD) discharge to surface water cleanup level in all 52 weekly samples collected during 2020. Average PCP concentration over 2020 in WTP effluent was 0.237 µg/L with a standard deviation (SD) of ±0.10 µg/L.

Concentrations of dioxin and polychlorinated dibenzofurans (furans), collectively referred to as "dioxins," have varied over time, and low levels of dioxins (comparable to those found in laboratory-grade distilled

water blanks) have been detected in WTP effluent samples collected during monitoring events each year. Given the presence of similar concentrations in blanks, uncertainty as to actual presence of dioxins in WTP effluent is considerable. Regardless, results from sampling in 2020 confirm that the concentration in WTP effluent of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) toxicity equivalence quotient (TEQ), referred to as "dioxin (TEQ)," met the ROD discharge to surface water cleanup level of 1.00E-5 µg/L (equivalent to 10 picograms per liter [pg/L]).

For the purposes of this report, concentrations of dioxin (TEQ) are calculated by application of two different methodologies, referred to as the "MPTP ROD Methodology" and the "Montana Department of Environmental Quality [DEQ]-7 Methodology," as described below. (Calculations from application of both methods are in Appendix A [database] and Appendix B [table in section B-3].)

- **MPTP ROD Methodology**

  Calculation of dioxin (TEQ) includes assignment of 0 to values qualified as "U" (analyte not detected at concentration above the method detection limit [MDL]) when estimated maximum possible concentrations are reported, and use of ROD toxicity equivalency factors (TEF).

- **DEQ-7 Methodology**

  Calculation of dioxin (TEQ) includes application of 2005 World Health Organization methodology, assignment of one-half the project reporting limit to values qualified as "U", assignment of one-half the estimated maximum possible concentration when estimated maximum possible concentrations are reported, and use of 2005 TEFs as specified in DEQ-7 (DEQ 2017).

In WTP effluent samples collected during August 2020, all metals, polycyclic aromatic hydrocarbons (PAH), chlorophenols, and anions for which ROD discharge to surface water cleanup levels had been specified were detected at concentrations below those ROD benchmarks.

No measurable volumes of light non-aqueous phase liquid (LNAPL) were detected in 2020. Coupled with lack of detection of LNAPL in any monitoring well during any sampling event over calendar years 2010 through 2020, these observations suggest that significant ongoing transport of LNAPL is not a major concern at MPTP. However, some residual non-aqueous phase liquid (NAPL) is likely still present near the NHRT, primarily below the interstate highway.

Land Treatment Unit

No soil tilling occurred at the LTU in 2020. Neither odors nor dust was observed at any time during the year. The irrigation system for the LTU has been removed in preparation for the final LTU offload.

Average concentration of PCP in all LTU zones sampled in 2012 was 26.7 milligrams per kilogram (mg/kg); in 2013, average concentration of PCP in LTU soils was 26.8 mg/kg. Thus, average concentration of PCP in LTU soils during the previous two monitoring events was less than the ROD soil cleanup level (34 mg/kg). LTU soils were not analyzed for PAH during the October 2013 round of sampling because all sections of the LTU previously had met the cleanup goal for PAH in two successive monitoring events. Average dioxin (TEQ) concentrations (calculated by application of the MPTP ROD Methodology) in all LTU zones sampled in 2012 (2.8 micrograms per kilogram [µg/kg]) and 2013 (2.6 µg/kg) were above the ROD soil cleanup level of 0.2 µg/kg. LTU soil was not sampled in 2020 as part of site operations.

Surface Water – Silver Bow Creek

During both 2020 monitoring events, concentrations of PCP at three surface water stations (SW-05, SW-09 and SS-06A) were below the laboratory detection limit (0.1 µg/L) and the ROD surface water cleanup level (1.0 µg/L). In samples collected from Silver Bow Creek, all SVOCs and dioxins for which ROD cleanup levels had been specified were detected at concentrations below those ROD benchmarks.

Groundwater

During the 2020 semi-annual (February) and annual (August) monitoring events, 62 shallow monitoring wells, four intermediate wells, and eight deep wells were sampled for analysis of PCP via U.S. Environmental Protection Agency (EPA) Method 528.

During the August 2020 annual monitoring event, groundwater samples from three shallow monitoring wells (HCA-21, INF-04, and MW-11-04) and two deep wells (BMW-01A and BMW-01B) were analyzed for the "extended parameter list" of analytes, including SVOCs and dioxins, as per the Groundwater and Surface Water Monitoring Plan (GWMP), Revision 2 (Tetra Tech 2013b). As noted in the 2017 Annual Report, routine inspection of wells 10-12 and GW-14R-98 had revealed deficiencies (ineffective surface sealing) that compromised groundwater sample integrity at those locations. No sampling of those wells has occurred since.

Data from samples collected at shallow wells were plotted and contoured (Figures 4.5 and 4.6) to evaluate trends in concentration and the spatial distribution of PCP contamination. This analysis indicated presence of a plume of PCP, as defined by the 1.0 µg/L contour, approximately 1,000 feet wide by

1,700 feet long on the south side of Silver Bow Creek oriented along the principal direction of groundwater flow (southeast to northwest). In addition, PCP "hot spots" were identified at several locations on the site. The primary plume core is under the interstate highway and extends north under the WTP, as depicted on Figures 4.5 and 4.6.

This annual report was prepared to assess compliance with ROD groundwater cleanup requirements and evaluate progress of remediation. The groundwater cleanup level for PCP is 1.0 µg/L. Comparisons of contours since 1993 indicated a decrease in the original area of the PCP plume by approximately 50 percent, and thus continuing effectiveness of the ongoing remediation.

1.0 INTRODUCTION AND PURPOSE

This 2020 Montana Pole and Treating Plant (MPTP) annual report describes site monitoring activities, summarizes analytical data generated, and evaluates progress toward achievement of remedial objectives for MPTP. The report also discusses additional site operation activities during 2020, such as non-routine operation and maintenance (O&M) activities at the MPTP water treatment plant (WTP), use of the south-side infiltration system, operation of the land treatment unit (LTU), planning for the anticipated LTU offload, and other related projects completed at the site during the year.

1.1 REPORT ORGANIZATION

Section 1.0 summarizes the site's operational and regulatory history. Section 2.0 discusses WTP operation and related activities. Section 3.0 describes LTU operations, soil treatment, and historical soil sampling. Section 4.0 provides results of surface water and groundwater monitoring, and assesses overall system performance and compliance with the requirements of the MPTP Record of Decision (ROD) (U.S. Environmental Protection Agency [EPA] and Montana Department of Environmental Quality [DEQ] 1993). Section 5.0 conveys historical residential well sampling results. Section 6.0 describes additional site activities. Section 7.0 overviews database management. Section 8.0 addresses climate and streamflow considerations. Section 9.0 offers recommendations. The following section lists sources referenced during preparation of this report, followed by tables and figures.

Appendix A (separate CD) includes an electronic copy of the Microsoft Access database pertaining to the MPTP site. Appendix B conveys sampling results and data. Appendix C summarizes 2020 pumping rates in the near highway recovery trench (NHRT) and near creek recovery trench (NCRT). Appendix D provides daily Summary Reports (DSR) regarding WTP-related incidents during 2020. Appendix E includes time series plots of water treatment plant field parameters programmed by use of R-Studio. Appendix F conveys results from Mann-Kendall statistical testing. Appendix G shows plume area maps. Appendix H summarizes quality control (QC) activities pertaining to electronic data deliverables (EDD). Appendices I and J provide climate and streamflow statistics.

1.2 SITE HISTORY

The site, in Butte, Montana, hosted operations of a wood treating facility from 1946 to 1984 (EPA and DEQ 1993) (Figure 1.1). During most of this period, the facility used a solution of about 5 percent pentachlorophenol (PCP), mixed with petroleum carrier oil similar to diesel, to preserve poles, posts, and bridge timbers. The PCP solution was applied to wood products in butt vats and pressure cylinders (retorts). The facility used creosote as a wood preservative for a brief period in 1969.

The plant initially included a pole peeling machine, two butt treating vats, on-site chemical storage tanks, and related ancillary facilities. Major modifications to the plant occurred between 1949 and 1951, and again around 1956. Sometime between 1949 and 1951, a 73-foot-long, 6-foot-diameter retort was installed to increase the efficiency of timber treatment production. A second retort, 66 feet long and 7 feet in diameter, was installed around 1956.

On May 5, 1969, an explosion occurred during treatment of a charge of poles in the east butt-treating vat. The explosion generated a fire that destroyed the east vat, boiler room, and retort building. Petroleum and PCP product reportedly spilled from the east butt-treating vat because of the explosion and fire. Additional seepage of product occurred from both retorts due to broken pipes and valves damaged by the fire. Reportedly, none of the on-site chemical storage tanks was ruptured during the fire. Although the boiler, retorts, and auxiliary equipment were damaged, the plant was rebuilt and functional by December 1969.

In response to implementation of the Resource Conservation and Recovery Act (RCRA), the facility constructed a closed-loop process water system in 1980. Operation of the closed-loop water recovery system involved collection of wastewater in storage tanks, recirculation of this water through the condensing system, and then evaporation of excess water by use of aeration sprays. On May 17, 1984, the MPTP ceased operations.

1.3 SITE INVESTIGATION

In March 1983, a local citizen filed a complaint concerning oil seepage into Silver Bow Creek near the MPTP facility. The Montana Department of Health and Environmental Sciences (MDHES) (now DEQ) investigated the complaint and discovered an oil seep on the south side of Silver Bow Creek directly downgradient of the MPTP facility. Further investigation of the site revealed oil-saturated soils adjacent to the creek and on MPTP property. Subsequent sampling confirmed presence in site soils and oil samples of PCP and polycyclic aromatic hydrocarbons (PAH), as well as polychlorinated dibenzo-p-dioxins (dioxin) and polychlorinated dibenzofurans (furans)—collectively referred to as "dioxins." MDHES and EPA completed a preliminary assessment and site inspection, and subsequently a Hazard Ranking System score in July 1985.

In July 1985, the EPA Emergency Response Branch began a removal action on the site to minimize impacts on Silver Bow Creek and to stabilize the site. As part of the removal action, two groundwater interception and oil recovery systems were installed to minimize oil seepage into the creek. In October 1989, EPA granted MDHES the initial enforcement funding to conduct potentially responsible party (PRP) noticing and to negotiate and issue an administrative order. In April 1990, MDHES signed an administrative order on consent with Atlantic Richfield Company (ARCO) under which ARCO agreed to

conduct a remedial investigation (RI) and feasibility study (FS) of the site. In June 1990, ARCO began the RI/FS following the MDHES- and EPA-approved RI/FS work plan.

In June 1992, EPA proposed an additional removal action to control and recover light non-aqueous phase liquid (LNAPL) (floating oils) in groundwater identified during the RI. The older remedial system installed in 1985 was shut down when the MPTP WTP began operation on January 22, 1993.

1.4 REMEDY IMPLEMENTATION AND STATUS

Implementation of the MPTP cleanup has proceeded in six phases. The design for Phase 1 of the remedial action was finalized in June 1996; construction occurred from May 1996 to November 1997. Primary components of the remedy completed during Phase 1 of the remedial action were constructions of the LTU and 13 soil staging and pretreatment piles (SSP), completion of an addition to the previous WTP, construction of two groundwater recovery trenches that form the current remedy extraction system (the NHRT and the NCRT), removal of the previous EPA groundwater recovery system, and excavation of the north-side contaminated soils.

Phase 2 involved removal and disposal of hazardous and nonhazardous waste debris remaining on site. The design for Phase 2 of the remedial action was finalized in December 1998; construction occurred from March 1999 to May 1999. Off-site disposal methods included incineration or placement in hazardous and nonhazardous waste landfills, as appropriate. Metal debris was pressure washed and recycled.

Phase 3 involved excavation of south-side contaminated soils, offload of Phase 1 treated soils from the LTU, placement of approximately 132,000 cubic yards of contaminated soil on the LTU, installation of the north- and south-side infiltration systems, and relocations of sewer and potable water lines. The design for Phase 3 of the remedial action was finalized in July 1999; construction occurred from October 1999 to December 2000. The infiltration system operated continuously through November 2002. Since that time, the south-side infiltration system has been used periodically to maintain adequate groundwater levels for operation of recovery trench pumps and aid in flushing contaminated soils remaining beneath the interstate highway embankment. The north side infiltration system has not been used since 2002.

Phase 4 is ongoing and involves continued capture and treatment of contaminated groundwater, and biological treatment of contaminated soils. This phase includes offloading the LTU as lifts of surface soil are remediated to below the action limits specified in the ROD for certain contaminants of concern at the site. Offload of remaining LTU soils is tentatively scheduled for 2020. Tetra Tech, Inc. (EMI Unit) (Tetra Tech) completed a data gaps investigation in mid-2017 that addressed site-wide concentrations of

contaminants in soil, and presented results of this investigation in a final report issued in November 2017 (Tetra Tech 2017). Development of the 30 percent design for the final offload has begun. The design will include offload of all soil from the LTU, removal and disposal of the LTU liner and associated materials and equipment, and reclamation of the current LTU and retention pond areas.

Phase 5 addresses contaminated soils beneath the interstate that divides the site. In March 2009, Tetra Tech submitted a report titled Final Treatability Study Workplan, Montana Pole and Treating Plant Site – Phase 5 (Tetra Tech 2009) that evaluated areas of residual soil contamination and potential remedial technologies. The report incorporated a literature review of three in situ treatment technologies: in situ chemical oxidation, in situ soil flushing, and in situ bioremediation. Two of these technologies were retained at that time for further evaluation:

- In Situ Chemical Oxidation Via Application of Modified Fenton's Reagent
- In Situ Soil Flushing.

Tetra Tech revisited the 2009 treatability study in 2013. As part of this effort, Tetra Tech prepared a draft memorandum that considered and screened out the two previous potentially applicable technologies, and outlined a conceptual approach and approximate costs for full-scale implementation of three new potentially promising alternatives (Tetra Tech 2013a):

- Bioventing – Vertical Well Approach
- Bioventing – Horizontal Well Approach
- Chemical Oxidation – Horizontal Well Approach.

Evaluation of these technologies was put on hold temporarily because of complications associated with dewatering the construction site for the Butte-Silver Bow (BSB) Wastewater Treatment Plant (WWTP) in 2014, 2015, and 2016. These technologies will be evaluated again when conditions at the site have relatively stabilized from conditions there during WWTP construction dewatering, and after completion of offload of the LTU (see Section 9.0). In addition, as described on page 44 of the ROD (EPA and DEQ 1993), "After it has been determined by the lead agency, in consultation with the support agency, that recovery of hazardous substances from these areas is no longer effective or practical and contaminant levels have plateaued, these areas will be addressed by in situ bioremediation as outlined under Performance Standards for Groundwater."

Phase 6 involves removal and disposal of the soil treatment facilities on the south side of the site, implementation of final engineering controls (soil cover and stormwater management), revegetation of all disturbed areas, and imposition of appropriate institutional controls to maintain protectiveness of the

remedy. Expectedly, designation of final land use at the site will occur via consultations with BSB County and interested citizens, with certain constraints on land use specified by EPA and DEQ (and consistent with the ROD) to ensure long-term protectiveness of the remedy.

2.0 WATER TREATMENT PLANT OPERATIONS AND ANALYTICAL RESULTS

The following sections provide information related to WTP operations and analytical results during 2020. O&M of the MPTP WTP proceeded routinely over the remainder of 2020, and the WTP was generally in good working order. WTP operations are discussed below.

2.1 WTP OPERATIONS

The groundwater treatment system consists of a WTP, two groundwater recovery trenches (the NHRT and NCRT), and the south-side infiltration system consisting of eight infiltration cells (see Figure 1.1 and Figure 2.1). Inflow rates in 2020 decreased from 65 gallons per minute (gpm) to 55 gpm from the NHRT and remained constant at 205 gpm from the NCRT. The combined pumping rate into the WTP was 260 to 270 gpm over the reporting period of January 1 through December 31, 2020 (Figure 2.2, Table 2.1, and Appendix E). Short periods of time (hours) when WTP flow was temporarily halted to conduct maintenance and repairs are not factored into these daily flow estimates.

Water from the NHRT and NCRT is first pumped directly to groundwater holding tank T1C, and then through the granulated activated carbon (GAC) treatment system. The current (2020) WTP configuration and water quality monitoring points are shown on Figure 2.3.

Treated effluent is discharged to Silver Bow Creek. Except for backwashing, treated effluent was not pumped to the south-side infiltration system in 2020. During 2020, almost 142 million gallons of water were treated at the WTP. Since 1993, over 3.9 billion gallons of water have been treated at the WTP (Table 2.2).

2.2 WTP ANALYTICAL RESULTS

Table 2.3 summarizes sampling and analysis at the site per the Final Groundwater and Surface Water Monitoring Plan (GWMP), Revision 2 (Tetra Tech 2013b). Concentrations of PCP in effluent from both the NHRT and NCRT are measured monthly, and WTP samples are collected weekly. PCP analysis of all water samples collected for that purpose proceeds via EPA Method 528. Annual analyses involving a more comprehensive list of parameters (semivolatile organic compounds [SVOC], dioxins, metals, and anions) occur in August of each year (Tetra Tech 2013b). This list is referred to as the "extended parameter list" in the GWMP, as well as in this annual report. WTP station locations are shown on Figure 2.3.

Results of PCP analyses of samples collected in the NHRT (station NHRTEFF) and the NCRT (station NCRTEFF) over the 2001 to 2020 period of record are listed in Table 2.4; results from 2020 appear on Figure 2.4a, in Appendix A, and in Appendix B-1. Average concentration of PCP in the NHRT in 2020 was 180 micrograms per liter (µg/L) (standard deviation [SD] 36.86 µg/L). Average concentration of

PCP in the NCRT was 5.2 µg/L (SD 2.0 µg/L). Following initiation of operations at the WTP, concentrations of PCP in the NCRT and NHRT decreased initially from 1998 to 2005. Since 2005, detected PCP concentrations in the NHRT and NCRT have trended slowly upward, but remain statistically lower than late-1990s and early-2000s concentrations (Figure 2.4b). The slowly increasing trend observed in PCP concentrations in the trenches likely has resulted from steadily increasing groundwater elevations over the same time-span (Figure 2.5). As groundwater elevation increases at the site, higher elevation layers of the smear zone not contacted by groundwater since the late 1990s reconnect with and contribute increased PCP to groundwater captured by the trenches (Figure 2.5). The strong correlation between groundwater elevation at monitoring well MW-H-95 and NHRT PCP concentration suggests that instituting controls on groundwater elevations could help stabilize WTP influent PCP concentrations to maximize PCP removal by the WTP.

Results from 2020 of sampling for PCP in plant influent (recovered groundwater – station IN), in treatment process water (between carbon units – station BABB), and in effluent (treated discharge from the plant – station EFF) are conveyed in Appendix A, Appendix B-1, and on Figure 2.6a. Long-term WTP PCP sampling results from 1998 to 2020 are indicated on Figure 2.6b, summarized in Table 2.4, and provided in Appendix E. WTP influent PCP concentrations decreased initially from 1998 to 2005, stabilized from 2005 to 2015, and slowly increased from 2015 to 2020 (Figure 2.6b). During 2020, PCP concentration in WTP influent ranged from 1.87 to 56.3 µg/L and averaged 41.5 µg/L (SD 8.3 µg/L). Sampling results throughout 2020 indicate that approximately 94 percent of the contaminant load and 26 percent of the water volume to the WTP come from the NHRT, and 6 percent of the contaminant load and 74 percent of the water volume come from the NCRT.

A WTP between-tanks sample (station BABB) is collected weekly to evaluate filter performance and service life. Concentrations of PCP in BABB samples during 2020 ranged from 0.131 to 3.58 µg/L, and averaged 0.402 µg/L (SD 0.509 µg/L). The plant operator estimates the remaining service life of the primary carbon train at approximately 1-2 years (personal communication with Tom Bowler, MPTP WTP operator, March 2021). Current estimates of remaining service life are based on historical filter performance and total PCP loading to the carbon filters. Carbon currently in the primary carbon train was last replaced on September 13, 2006, and carbon currently in the secondary carbon train was replaced on November 13, 2013. PCP concentrations in WTP influent water during 2020 were near average compared to the previous 13 years since the last carbon replacement (Figure 2.6b). Sustained increase in PCP concentration in influent water, precipitation of iron or manganese, or increase in system flow rate would likely result in additional decrease in remaining service life of the carbon trains.

In 2020, concentrations of PCP in WTP effluent samples (station EFF) never exceeded the 1 µg/L ROD discharge to surface water cleanup level (Figures 2.6a and 2.7a). Maximum and minimum recorded concentrations of PCP at station EFF during the 2020 monitoring period were 0.0.592 and 0.1 µg/L, respectively. Average PCP concentration in WTP effluent was 0.237 µg/L (SD 0.105 µg/L), slightly above the newly revised DEQ-7 human health standard for surface water (0.3 µg/L) (DEQ 2017). Historically, the WTP effluent has exceeded the ROD cleanup level 40 times since 1998, for an exceedance rate of 3.6 percent (Figure 2.7b). Most WTP effluent PCP concentrations (84.4 percent) were detected at or below 0.5 µg/L, half the ROD cleanup level.

Approximately 22.5 kilograms (kg) of dissolved PCP was removed from groundwater at the site in 2020, an estimate calculated by use of flow and concentration data associated with the WTP. Since the initial emergency response, the WTP has treated almost 4 billion gallons of contaminated water (Table 2.2), and has removed about 1,716 kg of PCP from groundwater at the site. Moreover, more than 48,000 kg of PCP-contaminated oil (from the oil and water separator [OWS] and from other locations) has been recovered and sent for disposal since January 1993. No measurable LNAPL has been recovered from the OWS (or other locations) since 2009, as shown on Figure 2.8.

Examination of the data on Figure 2.8 leads to the following observations:

- Most (80 percent) PCP mass removed by the system over the 22-year period from 1998 to 2020 was non-aqueous phase liquid (NAPL) (6,901 kg NAPL vs 1,716 kg dissolved phase).
- NAPL has not been recovered since 2009, and the OWS was removed during construction from December 2018 through March 2020. While the site has moved beyond the oil recovery phase, some residual oil may still be present on the site, as discussed in previous sections.

Neglecting the periods when emergency responses, excavations, etc., led to large mass removal, and focusing on total mass recovery (total of 8,630 kg of both NAPL and dissolved phase) from the system during 1998 to 2020, three periods are evident:

- During 1998-2002 when annual mass recoveries by the WTP exceeded 100 kg per year (kg/yr), and when NAPL recovery also occurred, combined recoveries exceeded 1,000 kg/yr.
    - Total mass recovered = 5,746 kg.
    - Annual average WTP recovery = 215 kg/yr.
    - Annual average NAPL recovery (2000-2002) = 1557 kg/yr.
    - Percent (%) of total mass recovered = 66%.
    - % of total time = 22% .
- During 2003-2006, annual mass recovery exceeded 500 kg/yr.
    - Total mass recovered = 2,308 kg.
    - Annual average WTP recovery = 33.8 kg/yr.

    - Annual average NAPL recovery = 543.3 kg/yr.
    - % of total mass recovered = 27%.
    - % of total time = 17%.

- During 2007-2020, annual mass recovery was less than 100 kg/yr. OWS plant ceased operations in 2009.
    - Total mass recovered = 576 kg.
    - Annual average WTP recovery = 44 kg/yr.
    - Annual average NAPL recovery (2007-2009) = 19 kg/yr.
    - % of total mass recovered = 7%.
    - % of total time = 61%.

During the 12-year period from 2007-2020, approximately 31% of total recovery occurred during the 2 years 2008 and 2012 (15% of the time), during which annual mass recoveries were 86 and 78 kg, respectively (48 kg of NAPL was recovered in 2008; none in 2012). Without consideration of NAPL recovery during these 2 years, average annual mass recovery would have been approximately 37 kg/yr.

Ignoring NAPL recovery, only two periods stand out for recovery of dissolved PCP mass:

- During 1998-2002, annual dissolved mass recovery exceeded 100 kg/yr.
    - Total mass recovered = 1,075 kg.
    - Annual Average = 215 kg/yr.
    - % of total dissolved mass removed = 62%.
    - % of total time = 22%.

- During 2003-2020, annual dissolved mass recovery was less than 79 kg/yr.
    - Total mass recovered = 660 kg.
    - Annual average = 36.6 kg/yr.
    - % of total mass removed = 38%.
    - % of total time = 78 %.

The high dissolved mass recovery rate between 1998 and 2002 likely resulted from dissolution (and possibly emulsification) of NAPL in the recovery and treatment system. Regardless, the dissolved mass recovery rate from 2003 to present has been consistent, ranging between 78 and 20 kg/yr, with a mean of 37 kg/yr. The relatively high recovery in 2012 is responsible for the relatively large range. Ignoring recovery during that year, the range would be 52 to 20 kg/yr (a factor of 2.6). A linear trend fit to the data shows a slight upward trend that flattens considerably upon removal of the 2012 datum. Dissolved mass recovery in 2020 was near average.

The NHRT and NCRT, along with their associated pumps, continued to be reasonably effective in capturing site groundwater during 2020. Groundwater capture and plume containment are assessed by

evaluating groundwater elevation data and verifying hydraulic gradients near the trenches. Performance monitoring, including an assessment of compliance with ROD cleanup levels, is discussed in Section 4.3.

For this report, concentrations of 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) toxicity equivalence quotient (TEQ), referred to in this report as "dioxin (TEQ)," are calculated by application of two different methodologies, referred to as the "MPTP ROD Methodology" and the "DEQ-7 Methodology," as described below. Calculations via application of both methodologies are in Appendix A, and are summarized in Appendix B-3.

- **MPTP ROD Methodology**

  Calculation of dioxin (TEQ) includes assignment of 0 to values qualified as "U" (analyte not detected at concentration above the MDL) when estimated maximum possible concentrations are reported, and use of ROD toxicity equivalency factors (TEF).

- **DEQ-7 Methodology**

  Calculation of dioxin (TEQ) includes application of 2005 World Health Organization methodology, assignment of one-half the project reporting limit to values qualified as "U", assignment of one-half the estimated maximum possible concentration when estimated maximum possible concentrations are reported, and use of 2005 TEFs as specified in DEQ-7 (DEQ 2017).

Dioxin (TEQ) in WTP samples over the 2001 to 2020 period of record is conveyed in Appendix A, Appendix B-3, and Table 2.5. Dioxin levels have varied over time, and low levels of dioxins have been detected in the recovery trenches and WTP influent and effluent samples collected during monitoring events each year. Dioxin (TEQ) concentrations during 2020 are as follows:

Method of TEQ Calculation	Sample Location Dioxin (TEQ) Concentration (picograms per liter)			
	WTP Effluent	WTP Influent	NCRT Effluent	NHRT Effluent
ROD Method	5.23	33.7	4.04	4.44
DEQ-7 Method	3.05	34.7	1.89	1.94

While dioxin (TEQ) concentrations have been detected in WTP effluent, a dioxin (TEQ) value (by application of DEQ-7 Methodology) of about 5 picograms per liter (pg/L) has been shown to be an appropriate "noise threshold" for dioxin (TEQ) using the currently lowest available detection limits, because laboratory -grade, distilled-deionized water has been shown to routinely exhibit dioxin (TEQ) up to about 5.0 pg/L (by application of the DEQ-7 Methodology) (Tetra Tech 2015). Therefore, it is unclear

if dioxin results from the WTP effluent sample in 2020 indicate presence of dioxin in the effluent. Regardless, the results indicate that concentrations of dioxin (TEQ) in WTP effluent, if present, would have met the 1.00E-05 µg/L (equivalent to 10 pg/L) ROD discharge to surface water cleanup level.

The ROD requires analysis of treated discharge to surface water (station EFF) for six metals, including arsenic, cadmium, chromium, copper, lead, and zinc (EPA and DEQ 1993). Acute and chronic DEQ-7 aquatic life standards for cadmium, copper, lead, and zinc are hardness-dependent. A hardness of 125 milligrams per liter is representative of Silver Bow Creek. Table 2.6 lists analytical results for metals from 2020 samples collected from recovery trenches and WTP influent and effluent. In the WTP effluent sample, no concentration of an analyte metal exceeded acute and chronic DEQ-7 aquatic life standards.

Other contaminants of interest not specifically called out in the ROD, but historically included as analytes for various reasons, are the anions bromide, chloride, fluoride, nitrate, nitrite, and phosphate. Although not required by the ROD, samples from stations NHRTEFF, NCRTEFF, IN, and EFF continue to undergo annual analyses for anions (via EPA Method 300.0). Appendix A and Table 2.6 convey concentrations of metals, anions, PAH, and chlorophenols in WTP samples collected from NHRTEFF, NCRTEFF, IN, and EFF during the August 2020 annual monitoring event. All analyte concentrations in the MPTP WTP effluent sample (station EFF) were below ROD discharge to surface water cleanup levels, and below current acute and chronic Montana DEQ-7 aquatic life standards (adjusted for hardness). No ROD cleanup levels were specified for anions or for any analytes at the other three stations (NHRTEFF, NCRTEFF, and IN).

Floating Product Recovery and Treatment

No LNAPL was detected in monitoring wells or recovery trenches in 2020. LNAPL has not been detected in any monitoring well during any sampling in calendar years 2010 through 2020, suggesting that significant ongoing transport of LNAPL is no longer a major concern at MPTP. However, some residual LNAPL is likely still present near the NHRT, primarily below the interstate highway, based on the light oily sheen of LNAPL observed in the NHRT on January 25 and February 22, 2017.

2.3 QUALITY CONTROL

QC samples were collected and analyzed in 2020 as per the GWMP, Revision 2 (Tetra Tech 2013b). QC samples consisted of source water blanks and field duplicates of liquid matrix samples. Source water blanks (distilled-deionized water supplied by the laboratory) were prepared at a frequency of one per 20 samples per monitoring event to assess potential external sources of contamination. Field duplicates were also collected at a frequency of one per 20 water samples per monitoring event.

Source Water Blanks

Seventy-six source water blanks were prepared and analyzed in 2020 (Table 2.7). Concentrations of analytes in 72 of 76 (95 percent) source water blanks were below corresponding laboratory detection limits. All 31 samples analyzed for PCP (100 percent) yielded PCP concentrations below the detection limit (0.1 µg/L). However, dioxin (TEQ), dissolved zinc, and total recoverable zinc and chromium were detected in one source water blank sample (SW-07080920) submitted to the laboratory on August 08, 2020. Detectable concentrations of one or more analytes in a source water blank suggests high bias on that date of original sample concentrations of those analytes. Overall, the data from source water blanks are interpreted to indicate little or no cross contamination during sampling in 2020.

Field Duplicates

Seventy-nine field duplicate samples were collected and analyzed in 2020 to evaluate precision. Precision is the degree of agreement between individual measurements of the same property under similar conditions. Field duplicate samples to undergo analyses for PCP and analytes on the "extended parameter list" were collected at the same time and from the same source at frequency of one per 20 liquid matrix samples per monitoring event. Variations between analytical results from original and duplicate samples were calculated as relative percent differences (RPD) according to the following formula:

$$RPD = \frac{|A - B|}{(A + B)/2} \quad x \quad 100$$

where: A = Concentration of analyte in original sample

B = Concentration of analyte in duplicate sample

The RPD goal for this project is 20 percent (or lower) (EPA 2014). Fifty-nine of 75 duplicate samples (79 percent) met the RPD goal (Table 2.8). Average RPD of results from all original-duplicate sample pairs in 2020 was 19.4 percent. Based on these results, the level of precision for sampling in 2020 is considered to have met the overall project goal.

2.4 WTP IMPROVEMENTS

No WTP improvements of significance occurred in 2020.

2.5 INJECTION ACTIVITIES

An estimated total of about 544,800 gallons of WTP backwash was directed to the south-side infiltration system, cells 2 and 3, in 2020. The WTP primary carbon tanks were backwashed 12 times: January 20, February 17, March 16, April 13, May 18, June 15, July 20, August 17, September 21, October 19, November 16, and December 16, 2020. The secondary carbon tanks were backwashed three times: April 6, August 05, and December 1, 2020.

2.6 OPERATIONAL ISSUES

Several non-routine operational issues arose in 2020. These issues are discussed below.

2.6.1 Pumping Rate in the NHRT

The decrease in sustainable pumping rate for the NHRT throughout 2018 decreased again in 2020 from 65 gpm down to 55 gpm. Historically, the sustainable pumping rate in the NHRT decreased from 135 gpm in 2009 to about 55 gpm in 2020 (see Appendix E, Figure 2.2). Possible explanations for this phenomenon include: (1) impact on aquifer hydraulic conductivity caused by loading of soils during construction of the interstate bridge embankment, and (2) partial clogging of perforated piping and gravels in the NHRT by iron and manganese precipitates, inhibiting flow from trench gravels to the recovery plumbing (Figure 2.9). If compaction during construction were the cause, one would expect a one-time reduction in rate rather than a progressive decrease continuing to at least 2018. Moreover, compaction of soils in a localized area would decrease flow nearby over the short term, but alternate flow paths around this zone would develop, and overall flow would rebound to rates close to those earlier. Alternatively, the NHRT pump was replaced in August 2015, also because of clogging associated with iron and manganese precipitation. Precipitation of these metals was also related to fouling of the NHRT pump in 2017 and changing of the NHRT pump motor on June 20, 2018. Figure 2.9 indicates an increase of iron concentration in the NHRT beginning in approximately 2005 and continuing through the present. That decrease in sustainable pumping rate in the NHRT and that increase in iron concentration affecting WTP operations should be investigated (see Section 9.0). To support this investigation, samples from the trenches should be analyzed for iron species more often than just annually.

While the pumping rate stabilized in 2020, the mass recovery rate was similar to the annual average between 2007 and 2020. Capture of the PCP plume in the NHRT area may or may not have been compromised by the decreased pumping rate, but if not, it is not clear that a higher volumetric pumping rate is needed for a higher mass recovery rate. For example, there have been periods with lower pumping rates but with average mass

recovery rates. Pumping rates at NHRT were low from 1998 to 2001 (and comparable to those from 2014 to 2020) during the period of greatest mass recovery rates.

2.6.2 Municipal Water Line

On December 3, 2018, the site operator suspected a leak in the municipal water line supplying potable water to the treatment plant. To prevent further leaking, the water line was shut off on December 3, 2018. Repair of the leaking water line was completed on October 3, 2020.

2.7 MISCELLANEOUS REPAIRS AND ACTIVITIES

The following miscellaneous repair and activity occurred at the MPTP site in 2020:

> On January 6, 2020, a pump at Near Highway Recovery Trench failed; it was replaced that same day with a backup pump.

No other repairs or activities of significance were required at the MPTP site in 2020.

3.0 LAND TREATMENT UNIT OPERATIONS

Historical LTU soil management, LTU operation in 2020, and results of LTU sampling are discussed in the following sections.

3.1 HISTORICAL LTU SOIL MANAGEMENT

Loading of soil into the LTU (Figure 1.1) began in fall 1996. By spring 1997, approximately 2 feet of soil from the north-side excavation had been placed on the LTU. During fall 1999, 18 of the 24 inches of treated soils (approximately 24,000 cubic yards) had been removed and backfilled on the north side. Six to 8 feet of contaminated soil that had been excavated from the south side was placed on the LTU during fall 1999 and summer 2000. During fall 2000, 18 inches of treated soils (approximately 24,000 cubic yards) was removed and used as backfill in the south-side excavation area. During spring 2001, contaminated soils from the north-side sewer main replacement project were placed on LTU zones 1 and 2.

In fall 2001, 18 to 24 inches of soil (approximately 27,000 cubic yards) was removed from LTU zones 2 to 10 and backfilled into the south-side excavation area. The LTU was tilled monthly during the 2001 treatment season. In response to complaints from residents in the nearby neighborhood regarding odors from the LTU, tilling frequency was reduced to annually beginning in 2002. The LTU was tilled to depth of approximately 8 inches in November 2002, and again in October 2003. In 2005, the top 30 inches of LTU soils was determined to have met the treatment standards for PCP and PAH. The top 24 inches of treated soils (approximately 29,000 cubic yards) was offloaded, leaving a 6-inch "buffer" of treated soils to minimize odor. The treated soils were backfilled into the south-side excavation areas on site.

The LTU was tilled in October 2005 after the summer offload. In 2007, 32,000 cubic yards of treated soil was offloaded from the LTU and backfilled on the southern portion of the site. The five remaining SSP piles were dismantled, and 8,000 cubic yards of contaminated soil was moved from the SSPs and placed on the LTU for final treatment. Work in 2009 associated with NHRT modifications and the sewer realignment project generated approximately 2,000 cubic yards of excavated soil, which was placed on the western portion of the LTU.

In 2010, approximately 3.2 million gallons of water was applied to the LTU through a center pivot unit at regular intervals from April to September to facilitate biologic degradation of the contaminants. Irrigation water was supplied from the retention pond, with make-up water added from the WTP as necessary. The LTU soil was tilled once in April 2010. A small volume of soil excavated during the interstate highway bridge replacement project was placed on the LTU in June 2010.

In 2011, the collection pipe between NHRT manhole #2 and the west-end cleanout was cleaned. A very small volume of solid material and an estimated 15,000 gallons of water removed during the cleanout were transferred into a vacuum collection truck and placed on the LTU for bioremediation. In addition, the Montana Department of Transportation (MDT) contractor removed approximately 200 cubic yards of soil from highway pier drilling and placed it on the LTU as part of the MDT bridge replacement project. Finally, 182 linear feet of drill cuttings (approximately 2.3 cubic yards) from five groundwater monitoring well borings was placed on the LTU. The LTU was irrigated on 14 separate days during the second and third quarters of 2011 (2,141,200 gallons applied). No soil was tilled at the LTU during 2011.

In 2012, five zones (2, 3, 4, 5, and 10) of the LTU were tilled during the second quarter, having not met the cleanup standard for PCP during the 2011 LTU soil monitoring event. In addition, the LTU was irrigated as necessary during the second and third quarters to control fugitive dust when conditions were dry (8 days, between May 14 and September 5, 2012). A total of 1,171,900 gallons of irrigation water was applied in 2012.

In 2013, the three sampling zones (LTU zones 2, 3, and 4) that had not met the cleanup standard for PCP during the 2012 LTU soil monitoring event were tilled two times in May and once in July. Soil moisture during the May and July 2013 tilling events was sufficiently high to preclude generation of dust.

The LTU was irrigated seven times during the third quarter of 2013 as necessary to control dust. A total of 884,700 gallons of irrigation water was applied. Neither odors nor dust was observed and no soil tilling or irrigation occurred at the LTU from 2014 through 2020.

3.2 LTU OPERATIONS IN 2020

Including the sand layer, the volume of soil that remains on the LTU is estimated at 53,000 cubic yards; the sand layer is approximately 6 to 12 inches thick (approximately 15 percent by volume).

No soil tilling occurred at the LTU in 2020. Neither odors nor dust was documented at any time during the year (the site is mostly covered by vegetation). Moreover, no irrigation of the LTU occurred because the site received adequate precipitation throughout the year. Table 3.1 lists historical LTU water application data pertaining to the 1999 to 2020 period of record.

As part of construction at the site that began in December 2018, the LTU irrigation system was dismantled and removed from the LTU as part of the final offload and decommissioning of the LTU.

3.3 LTU SOIL SAMPLING AND RESULTS

Soil currently in the LTU was sampled annually from 2007 through 2013. Based on historical data, LTU soils were not sampled during 2014 to 2017 as part of site operations. Table 3.2 summarizes historical analytical data from these years.

Average concentration of PCP in all LTU zones sampled in 2012 was 26.7 milligrams per kilogram (mg/kg); in 2013, average concentration of PCP in LTU soils was 26.8 mg/kg. These data indicate that average concentration of PCP in LTU soils was less than the ROD soil cleanup level (34 mg/kg) during two consecutive monitoring events. Average dioxin (TEQ) concentrations during the 2012 and 2013 monitoring events were above the ROD cleanup level of 0.2 micrograms per kilogram (µg/kg), as was the case in previous offloads. Therefore, the cleanup goal for dioxin in soil has not been met. LTU soils were not analyzed for PAH during the October 2013 round of sampling because all sections of the LTU previously had met the cleanup goal for PAH during two successive monitoring events.

Tetra Tech completed a data gaps investigation in mid-2017, and issued a final report presenting results of that investigation in November 2017 (Tetra Tech 2017). Development of the 30 percent design for the final offload has begun. The design will include offload of all the soil in the LTU, removal and disposal of the LTU liner and associated materials and equipment, removal the retention pond and berms, and reclamation of the current LTU and retention pond areas.

3.4 LTU UNDERDRAIN AND POND SAMPLING AND RESULTS

During the August 2020 annual monitoring event, the LTU underdrain discharge (station LTUDIS) and LTU retention pond water (station RETPOND) were sampled for analyses to support ongoing planning for the LTU offload. The LTU discharge sample is representative of leachate associated with the underdrain of the LTU soil treatment area. Leachate from the underdrain flows by gravity to the LTU retention pond, where some degradation of PCP is known to occur, as discussed below.

An unfiltered sample from station LTUDIS was submitted to the laboratory for analysis of PCP. The concentration of PCP in unfiltered LTU discharge (station LTUDIS) was 157 µg/L. The concentration of PCP in the unfiltered LTU retention pond water sample (station RETPOND) was substantially lower (6.67 µg/L). These data support a conclusion that physical and biological degradation of PCP occurs in the LTU pond.

Samples from stations LTUDIS and RETPOND were not analyzed for chlorophenols (other than PCP), PAHs, or dioxins in 2020.

4.0 SURFACE WATER AND GROUNDWATER MONITORING

Water quality at the MPTP site was monitored regularly from 2001 until August 2010, as specified in the Site-Wide Operations and Maintenance Manual (Camp Dresser & McKee, Inc. [CDM] 2000). The MPTP monitoring program was revised starting with the November 2010 monitoring event, as specified in the GWMP, Revision 0 (Tetra Tech 2011). Data presented in this 2020 annual sampling and monitoring report were acquired according to the guidelines provided in the GWMP, Revision 2 (Tetra Tech 2013b). GWMP, Revision 2, supersedes previous versions of this document. Future revisions to the GWMP, as needed, will continue to be numbered sequentially.

Semi-annual monitoring occurred during February 2020, and all groundwater and surface water samples were analyzed for PCP. Annual monitoring of surface water and groundwater occurred in August 2020. Table 2.3 summarizes the monitoring program for 2020.

4.1 SURFACE WATER MONITORING

As part of routine monitoring at the MPTP site, three surface water locations (SW-05, SS-06A, and SW-09) were sampled in February 2020 (for PCP analysis only) and again in August 2020 (for analyses for PCP and analytes on the "extended parameter list"), as outlined in Table 2.3. In addition to PCP (analysis via EPA Method 528), analytes on the "extended parameter list" included chlorophenols (analysis via EPA Method SW8270C), PAHs (analysis via EPA Method SW8270C), and dioxins (analysis via EPA Method SW8290). Surface water monitoring locations sampled in 2020 appear on Figure 4.1 and include:

- SW-05: on Silver Bow Creek, due west (downstream) of the MPTP site
- SS-06A: on Silver Bow Creek, on the downstream side of the MPTP site but immediately upstream from the WTP effluent discharge rill
- SW-09: on Silver Bow Creek, due east (upstream) of the MPTP site.

Analytical results for each category of contaminant are discussed below.

PCP

Concentrations of PCP in surface water are conveyed in Appendix A and Appendix B-2, and are summarized in Table 4.1 over the 2001 to 2020 period of record. Concentrations of PCP at surface water stations SW-05, SS-06A, and SW-09 in 2020 were below the laboratory detection limit (0.1 µg/L) and below the ROD surface water cleanup level (1.0 µg/L).

Since 2007, concentrations of PCP at stations SW-05, SS-06A, and SW-09 have been consistently below the ROD surface water cleanup level for PCP (1 µg/L).

In August 2020, samples from surface water stations SW-05, SS-06A, and SW-09 were also analyzed for the "extended parameter list" of analytes. Results appear in Appendix A (full database), Appendix B-3 (dioxin TEQ), Table 4.2 (dioxins), and Table 4.3 (PAH and chlorophenols). Analytical results are discussed below.

Chlorophenols

Detection of 4-chloro-3-methylophenol in SW-09 occurred during the August 2020 sampling event (Table 4.3). The ROD specified no surface water cleanup level for 4-chloro-3-methylophenol, and sample location SW-09 is the upstream sample point. All other chlorophenols for which the ROD specified surface water cleanup levels in surface water were not detected above MDLs at stations SW-05, SS-06A, and SW-09, and were therefore below those ROD benchmarks.

PAHs

All PAHs for which the ROD specified surface water cleanup levels in surface water were detected below those ROD benchmarks at stations SW-05, SS-06A, and SW-09 (Table 4.3). Calculated values of total D PAH[1] at stations SW-05, SS-06A, and SW-09 were 1.66, 2.24, and 1.50 µg/L, respectively, using method detection limits (MDLs) for non-detections; the ROD total D PAH cleanup level is 360 µg/L.

Dioxins

Applying both the MPTP ROD Methodology (Table 4.2 and Appendix B-3) and the DEQ-7 Methodology (Appendix B-3), dioxin (TEQ) was below the 1.00E-05 µg/L (equivalent to 10 picograms per liter [pg/L]) ROD surface water cleanup level at MPTP surface stations SW-05, SS-06A, and SW-09.

4.2 GROUNDWATER MONITORING

Locations of all MPTP groundwater monitoring wells appear on Figure 4.2. Table 4.4 summarizes concentrations of PCP in groundwater at five representative monitoring wells (BMW-01A, BMW-01B, HCA-21, INF-04, and MW-11-04) over the 2000 to 2020 period of record. Analytical results are conveyed in Appendix A and Appendix B-2. Monitoring results are discussed further in Section 4.3.

[1] D PAH concentration equals the sum of acenaphthene, acenaphthylene, anthracene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene concentrations.

Appendix A, Appendix B-3, and Table 4.5 provide analytical results for dioxins in groundwater from historical sampling and from samples collected at five representative monitoring wells (BMW-01A, BMW-01B, HCA-21, INF-04, and MW-11-04) during the 2020 annual monitoring event, as specified in the GWMP, Revision 2 (Tetra Tech 2013b). Analytical results for PAH and chlorophenols in groundwater at these same five monitoring wells are in Appendix A and Table 4.6. Results are discussed further in Section 4.3 below.

Figure 4.3 is a potentiometric surface map based on static water level data acquired from 59 shallow monitoring wells in August 2020. Figure 4.3 indicates that the hydraulic gradient at the MPTP generally was from the southeast to the northwest. The magnitude of the hydraulic gradient was approximately 0.005 foot/foot. These results are consistent with values obtained during historical monitoring events since 2005.

Since the third quarter of 2010, groundwater hydraulic head contours have been influenced by beaver-related activity (beaver dam construction and resulting ponding of water). In August 2020, beaver activity and damming resulted in localized flooding and groundwater mounding, exemplified on Figure 4.3. Groundwater mounding in this area facilitates flow of groundwater south of Silver Bow Creek back toward the NCRT, thus aiding in recovery of dissolved contaminants. Groundwater mounding is expected to continue when beaver dams are present and beaver activity persists. Beaver activity along Silver Bow Creek near the MPTP site in 2020 is discussed in Section 6.3.

Figure 4.4 provides a more focused analysis of groundwater elevations and interpreted flow directions near the NCRT on August 2020. Figure 4.4 indicates radial flow and hydraulic capture in the shallow aquifer near the NCRT. Also evident on Figure 4.4 is groundwater mounding related to flooding resulting from the beaver dam in the WTP discharge rill.

4.3 ROD COMPLIANCE MONITORING

ROD compliance monitoring has historically incorporated water quality data pertaining to ROD contaminants (PCP and the "extended parameter list" of analytes) acquired from plant discharge (station EFF), surface water (stations SW-05, SS-06A, and SW-09), and groundwater (monitoring wells BMW-01A, BMW-01B, and HCA-21), as specified in the GWMP (Tetra Tech 2013b). As noted in the 2017 Annual report, sampling was discontinued at monitoring wells 10-12 and GW-14R-98; therefore, "extended parameter list" data from these two wells are unavailable.

Concentrations of PCP from the February (semi-annual) and August (annual) groundwater monitoring events were evaluated to assess the distribution of PCP in groundwater during 2020. The following

sections present results of groundwater monitoring and assess compliance with ROD requirements and cleanup levels.

4.3.1 2020 Monitoring Events

WTP Effluent

WTP effluent (treated groundwater at WTP station EFF) was monitored for PCP weekly—52 samples were collected (excluding duplicates) and analyzed for PCP in 2020. WTP effluent was also monitored for the "extended parameter list" of analytes during the August 2020 annual sampling event.

One-hundred percent of results from weekly PCP analyses (52 of the 52 samples) were below the PCP 1.0 µg/L ROD discharge to surface water cleanup level (Table 2.4). Dioxins, PAHs, and chlorophenols for which the ROD specified discharge to surface water cleanup levels were detected at concentrations below those ROD benchmarks (Table 2.5 and Table 2.6).

Surface Water

Surface water in Silver Bow Creek (stations SW-09, SS-06A, and SW-05) was monitored for PCP and the "extended parameter list" of analytes during the August 2020 annual sampling event.

PCP concentrations (Table 4.1) were below the PCP 1.0 µg/L ROD discharge to surface water cleanup level. Dioxins (Table 4.2) and PAHs and chlorophenols (Table 4.3) for which the ROD specified discharge to surface water cleanup levels were detected at concentrations below those ROD benchmarks.

Groundwater

Sixty-two shallow monitoring wells, four intermediate monitoring wells, and eight deep monitoring wells were scheduled for sampling during the February 2020 semi-annual monitoring event, and 64 shallow monitoring wells were sampled during the August 2020 annual sampling event, per the GWMP (Tetra Tech 2013b). With few exceptions, samples were collected from all wells listed in the GWMP and were analyzed for PCP via EPA Method 528 (Appendix A and Appendix B). Exceptions included wells that were frozen, blocked, or physically compromised (see Section 4.0 and Appendix A).

Data from shallow wells were plotted and contoured to evaluate trends in concentration and the spatial distribution of PCP contamination. Figure 4.5 and Figure 4.6 show the distribution of PCP in groundwater on the south side of Silver Bow Creek based on data acquired during the February 2020 semi-annual monitoring event and the most current (August 2020) annual monitoring event.

Figures 4.5 and 4.6 indicate presence of a plume of PCP approximately 1,000 feet wide by 1,700 feet long on the south side of Silver Bow Creek oriented along the principal direction of groundwater flow (southeast to northwest). The figures indicate several PCP "hot spots," as summarized in the discussion below of the associated monitoring event.

February 2020 Semi-annual Monitoring Event

As shown on Figure 4.5, the plume core and "hot spots" were noted:

- Plume core under the interstate highway and extending northeast near the WTP and monitoring well MW-11-04
- Hot spot west of the LTU near monitoring wells GW-05
- Relic plume core north of the NCRT adjacent to the Burlington Northern railroad tracks near monitoring well MW-I-01 (the remnant of the plume core on the downgradient side of the NCRT, likely sustained by back diffusion and/or desorption of PCP from organic matter)
- Relic plume core north of the NCRT adjacent to the Burlington Northern railroad tracks near monitoring well MW-H-01 (also a remnant of the plume core on the downgradient side of the NCRT, likely sustained by back diffusion and/or desorption of PCP from organic matter).

August 2020 Annual Monitoring Event

As shown on Figure 4.6, "hot spots" were noted:

- Plume core under the interstate highway and extending northeast near the WTP and monitoring well MW-11-04
- Hot spot west of the LTU near monitoring wells GW-05
- Relic plume core north of the NCRT adjacent to the Burlington Northern railroad tracks near monitoring well MW-I-01 (the remnant of the plume core on the downgradient side of the NCRT, likely sustained by back diffusion and/or desorption of PCP from organic matter)
- Relic plume core north of the NCRT adjacent to the Burlington Northern railroad tracks near monitoring well MW-H-01 (also a remnant of the plume core on the downgradient side of the NCRT, likely sustained by back diffusion and/or desorption of PCP from organic matter).

During the August 2020 annual monitoring event, groundwater sampling from three shallow monitoring wells (HCA-21, INF-04, and MW-11-04) and two deep wells (BMW-01A and BMW-01B) was scheduled for analyses for constituents on the "extended parameter list," including PAH, dioxins, and chlorophenols, as per the GWMP, Revision 2 (Tetra Tech 2013b). These five wells were selected to indicate a range of representative groundwater quality conditions across the site relative to (1) the location of the PCP plume (as defined by the 1 µg/L PCP contour interval), and (2) PCP plume core. Rationale for selecting these wells included:

- Monitoring wells BMW-01A (deep) and BMW-01B (deepest) were selected because they can be considered downgradient sentinel monitoring wells (shallow and deep well completions) on the south bank of Silver Bow Creek. Data from these wells can be used to evaluate plume capture and potential for off-site migration of contaminants.
- Monitoring well HCA-21 (shallow) was selected because of location on the south bank of Silver Bow Creek within the footprint of the PCP plume, a long-term period of record, and usefulness to evaluate progress of groundwater remediation over an extended period.
- Monitoring wells INF-04 and MW-11-04 were selected because of locations in or near "the core of the PCP plume."

All available results for dioxin in groundwater (both historical and during 2020) are conveyed in Appendix A, Appendix B-3, and Table 4.5. In 2020, dioxin (TEQ) was below the 3.00E-05 µg/L (equivalent to 30 pg/L) ROD groundwater cleanup level in all monitoring wells (by application of both the MPTP ROD Methodology and the DEQ-7 Methodology) except wells INF-04 (1.48E-04 µg/L [equivalent to 148 pg/L]) and MW-11-04 (3.36E-05 µg/L [equivalent to 33.6 pg/L]).

Analytical results for PAH and chlorophenols are in Table 4.6 and Appendix A. At the wells sampled, PAHs and chlorophenols (with exception of pentachlorophenol) were detected at concentrations below ROD established benchmarks.

4.3.2 Data Evaluation and Progress of Remediation

One WTP station (station EFF [treated groundwater]), three surface water stations (stations SW-05, SS-06A, and SW-09), and five groundwater stations (monitoring wells BMW-01A, BMW-01B, 10-12, GW-14R-98, and HCA-21) have historically been sampled to evaluate compliance with ROD requirements related to progress of remediation. As previously noted, sampling from wells 10-12 and GW-14-R-98 was discontinued in 2017, and these wells thus were not part of this evaluation. Figure 4.7 shows locations of the original monitoring wells relative to the location of the recent PCP plume boundary (August 2020), as well as locations of the two potential alternative wells (10-04 and 10-05).

To be consistent with ROD requirements, the following seven criteria have been evaluated in previous annual reports, as well as this 2020 annual report. Data historically used to evaluate satisfaction of each criterion are also provided below (with exceptions for this 2020 annual report noted):

<u>Criterion 1</u>. The WTP effluent (station EFF) must meet the 1 µg/L discharge to surface water cleanup level for PCP, and other contaminants for which the ROD specified cleanup levels must be at concentrations below those ROD benchmarks.

<u>Criterion 2</u>. Surface water in Silver Bow Creek must meet the 1 µg/L surface water cleanup level for PCP, and other contaminants for which the ROD specified cleanup levels must be at concentrations below those ROD benchmarks.

<u>Criterion 3</u>. The PCP plume must remain on site. This criterion is assumed to be met if

concentrations of PCP in groundwater in downgradient sentinel monitoring wells continue to meet the groundwater cleanup level for PCP.

Criterion 4. Concentrations of dioxins, PAHs, and chlorophenols for which the ROD specified groundwater cleanup levels must meet those ROD benchmarks in groundwater at representative monitoring wells along the south bank of Silver Bow Creek.

Criterion 5. The long-term trend in concentrations of PCP in groundwater over time should be decreasing, suggesting that groundwater quality will eventually meet the 1 µg/L groundwater cleanup level for PCP.

Criterion 6. The long-term trend around the PCP plume must be stable or shrinking, showing that ongoing remedial action is effectively preventing spread of contamination.

Criterion 7. The short-term trend (previous 5 years) around the PCP plume must be stable or shrinking, showing that ongoing remedial action is effectively preventing spread of contamination.

Water quality data acquired in 2020 were used to evaluate satisfaction of the first four criteria (Criterion 1 through Criterion 4). Available historical data (1993 to 2020) were used evaluate satisfaction of the last three criteria (Criterion 5 through Criterion 7) by analyzing trends through time. Results are listed in Table 4.7 and summarized below.

- **Criterion 1**. Criterion 1 was satisfied. Concentrations of PCP met the 1 µg/L discharge to surface water cleanup level. Concentrations of dioxins, PAHs, and chlorophenols for which the ROD specified surface water cleanup levels met those ROD benchmarks at station EFF.
- **Criterion 2**. Criterion 2 was satisfied. Concentrations of PCP met the 1 µg/L discharge to surface water cleanup level. Concentrations of dioxins, PAHs, and chlorophenols for which the ROD specified surface water cleanup levels met those ROD benchmarks at the three surface water stations on Silver Bow Creek.
- **Criterion 3**. Criterion 3 was satisfied. Concentrations of PCP in downgradient sentinel monitoring wells BMW-01A and BMW-01B continued to meet the 1 µg/L groundwater cleanup level for PCP, indicating that the on-site PCP plume was not migrating off site.
- **Criterion 4**. Criterion 4 was satisfied (for wells BMW-01A, BMW-01B, and HCA-21). Concentrations of dioxins, PAHs, and chlorophenols for which the ROD specified groundwater cleanup levels met those ROD benchmarks at the three wells.
- **Criterion 5**. Criterion 5 was partly satisfied. Mann-Kendall statistical testing of PCP data from monitoring well HCA-21 indicated the long-term (2004 to 2020) trend in concentrations of PCP decreasing at greater than the 99.9 percent confidence level (Appendix F and Table 4.8). Monitoring well GW-14R-98 was not included in the analysis because sampling there had been discontinued. This analysis supports a conclusion that ongoing remediation continues to be effective in the long term.

  Criterion 6. Criterion 6 was satisfied. Digitized PCP plumes and plume area calculations are provided in Appendix G. All available monitoring well data were used to construct the 1 µg/L PCP isocontour for each year when data were accessible. A long-term plume area comparison also appears on Figure 4.8. The long-term trend around the PCP plume indicates ongoing remedial activities have significantly reduced the area of the PCP plume. Specifically, over the past 24 years (since the ROD was signed), total area of the PCP plume on the south side of Silver Bow Creek (based on the 1 µg/L isocontour line) has decreased from 41.7 acres (in August 1993)

to 18.8 acres (in August 2020). This 22.9-acre decrease represents an approximate 55 percent reduction around the PCP plume since 1993. Mann-Kendall statistical testing indicates that, over the long term (2004 to 2020), the area of the PCP plume has been probably decreasing to stable at greater than 89 percent confidence level (see Appendix F).

Criterion 7. Criterion 7 was satisfied. Mann-Kendall statistics indicate the shorter-term 5-year trend (2014 to 2020) in plume area is "No Trend" (Appendix F). In 2018, an additional monitoring well was sampled that changed the west side plume area coverage, resulting in an increased plume size compared to the previous 5 years. The same monitoring well was sampled again in 2020. The "No Trend" determination of plume size is believed to be resulting from increased sampling density for better plume definition near the highway, and not necessarily from an increase in lateral extent of the plume.

Conveyance of results of groundwater monitoring and statistical analysis of the area of the PCP plume will continue in future annual reports to further evaluate the short-term trend in plume area and to suggest operational adjustments, if necessary. Compliance with ROD cleanup levels will also be evaluated annually. If wells 10-12 and GW-14R-98 are not replaced, recommendation is to collect groundwater samples from monitoring wells 10-04 and 10-05 and analyze these for PCP and the "extended parameter list" of analytes during future annual monitoring events.

4.3.3 Light Non-Aqueous Phase Liquid

LNAPL (floating product) was not detected in any monitoring well during any sampling in calendar year 2020. As noted in Section 2.2.1, no floating product was measured in the NHRT in 2020; however, a light sheen was observed. The historical volume of LNAPL recovered during the 2000 through 2020 period of record is listed in Table 4.8.

4.3.4 Pressure Transducers

Pressure transducers were installed in 17 monitoring wells during October 2020 (Figure 4.9). Pressure transducer were set to record static water levels and water temperatures at 1-hour intervals.

5.0 RESIDENTIAL WELL MONITORING

Historical concentrations of PCP in groundwater collected from residential wells were below the ROD groundwater cleanup level during several years leading up to 2010; therefore, no residential wells were sampled in 2020. Results of residential well sampling during the 2001 to 2020 period of record are listed in Table 5.1.

6.0 ADDITIONAL SITE ACTIVITIES

Additional activities at the site in 2020 included monitoring of beaver activity and construction, discussed in the following sections.

6.1 MONITORING OF BEAVER ACTIVITY IN 2020

Groundwater hydraulic head contours have been influenced by beaver-related activity (beaver dam construction and resulting ponding of water) since the third quarter of 2010. In 2020, only one beaver dam was in the WTP discharge rill, resulting in localized flooding and groundwater mounding, as exemplified on Figure 4.3 and Figure 4.4. Groundwater mounding along Silver Bow Creek north of the WTP facilitates flow of groundwater south of Silver Bow Creek back toward the NCRT, thus aiding in recovery of remaining dissolved contaminants in this area.

In the future, DEQ is expected to exert no effort to remove the existing beaver dam on Silver Bow Creek because beaver dam-induced flooding north of the MPTP site helps maintain a hydraulic gradient toward the NCRT, which enhances capture of PCP-contaminated groundwater in this area.

7.0 DATABASE MANAGEMENT

The following database-related activities were completed in 2020:

- Uploaded all electronic data deliverables (EDD) received from the Montana Bureau of Mines and Geology (MBMG) and Pace Analytical Services, Inc. to the MPTP Microsoft Access 2016 database
- Performed QC of all chains of custody (COC), MBMG laboratory EDDs, MBMG sample delivery groups (SDG), and MBMG laboratory Microsoft Excel spreadsheets
- Added 1,400 records to the existing database (at the end of 2020, 22,760 individual data records were in the database for the 2010 to 2020 period of record)
- Corrected selected records in the MPTP database to address any QC issues uncovered during the QC review process
- Maintained an SDG versus COC "lookup table" to easily match SDGs to COCs for future reference (Appendix H).

8.0 CLIMATE AND STREAMFLOW

Climatic conditions such as temperature, precipitation, and stream flow factor into understanding operations and water management on the site. For example, extremes in temperature can affect pipeline integrity, pump operations, or ability to collect samples from shallow monitoring wells. Precipitation affects surface runoff and on-site ponding of water, groundwater recharge, elevation of the water table, and movements of contaminants in the vadose zone and aquifer. Stream flow conditions vary from base flow to flood conditions, and potentially affect sample collection, groundwater flow, and migration of contaminants. Relevant climate statistics for 2020 were obtained from the National Weather Service (NWS) (NWS 2021) (Appendix I). Stream flow statistics were obtained from the U.S. Geological Survey (USGS) National Water Information System Web Interface (USGS 2021) (Appendix J). Climate and streamflow characteristics that affected WTP operations or on-site water management activities in 2020 are summarized below.

2020 – First Quarter

- Overall, mean high temperature during first quarter 2020 (30 degrees Fahrenheit [°F]) was 2°F warmer than average first-quarter temperature (28 °F) based on the 1981 to 2010 period of record. Variations in temperature during first quarter 2020 did not impair operation of the WTP, interfere with any sampling, or result in any site-related problem or concern.
- Total precipitation in Butte, Montana, during first quarter 2020 was 1.9 inches (0.14 inch in January, 1.05 inches in February, and 0.71 inch in March). Measured precipitation during the first quarter 2020 was 0.24 inch more than historical mean first-quarter precipitation during the 1981 to 2010 period of record (1.66 inches). However, due to cold temperature, most of the precipitation remained as snow on the ground surface and has not begun to melt and infiltrate into the smear zone Other than water captured in the LTU retention pond, no localized ponding of water occurred on site. All surface water was contained, and no surface water runoff was documented (Appendix I). The Greenwood Avenue culvert, opened in 2016, directed water as expected. No on-site storm drainage was flowing.
- A steam flow hydrograph for USGS station 12323250 (Silver Bow Creek below Blacktail Creek at Butte, Montana) is in Appendix J. The hydrograph depicts peak flow during first quarter 2020 at 62 cubic feet per second (cfs). Base flows during first quarter 2020 ranged from about 15 to 25 cfs—similar to the long-term mean base flow during first quarters. No stream flooding issues affected operations at the MPTP site during the first quarter of 2020.

2020 – Second Quarter

- Overall, the mean temperature during the second quarter of 2020 (47.2 °F) was 0.2 °F colder than the normal second-quarter temperature (47.4 °F) based on the 1981 to 2010 period of record. Variations in temperature during the second quarter did not impair operation of the WTP, interfere with any sampling, or result in any site-related problems or concerns.

- During the second quarter of 2020, monthly recorded precipitation in Butte, Montana, was 0.64 inch in April, 1.42 inches in May, and 4.41 inches in June (total second-quarter precipitation of 6.47 inches). Measured precipitation during the second quarter of 2020 was 0.96 inch above the average second-quarter precipitation of 5.51 inches based on the 1981 to 2010 period of record (Appendix I). Other than water captured in the LTU retention pond, only minor localized ponding of water occurred on site.
- A steam flow hydrograph for USGS station 12323250 (Silver Bow Creek below Blacktail Creek at Butte, Montana) is in Appendix J. The hydrograph indicates that peak flow during the second quarter of 2020 was 177 cfs, recorded on June 8, 2020. Average flow during the second quarter was 47.1 cfs. Stream flooding issues did not affect operations at the MPTP site during the second quarter of 2020.

2020 – Third Quarter

- Overall, the mean temperature during third quarter 2020 (60.3 °F) was 1.2 °F warmer than the normal third-quarter temperature (59.1 °F) based on the 1981 to 2010 period of record. Variations in temperature during the third quarter did not impair operation of the WTP, interfere with any sampling, or result in any site-related problems or concerns.
- During third quarter 2020, total precipitation recorded in Butte, Montana, was 1.29 inches (0.58 inch in July, 0.22 inch in August, and 0.49 inch in September). Measured precipitation during third quarter 2020 was 2.41 inches below the average third-quarter precipitation of 3.7 inches based on the 1981 to 2010 period of record (Appendix I). Other than water captured in the LTU retention pond, only minor localized ponding of water occurred on the MPTP site. All surface water was contained, and no surface water runoff from the MPTP site to Silver Bow Creek was documented.
- A streamflow hydrograph pertaining to USGS station 12323250 (Silver Bow Creek below Blacktail Creek at Butte, Montana) is in Appendix J. The hydrograph indicates peak flow during third quarter 2020 at 82.5 cfs, recorded on July 1, 2020. Average flow during the third quarter was 32.7 cfs. Stream flooding issues did not affect operations at the MPTP site during third quarter 2020.

2020 – Fourth Quarter

- Overall, mean temperature during fourth quarter 2020 (31 °F) was slightly higher than the average fourth-quarter temperature (28 °F) based on the 1981 to 2010 period of record. Temperature during fourth quarter 2020 did not impair operation of the WTP, interfere with any sampling, or result in any site-related problem or concern.
- Total precipitation in Butte, Montana, during fourth quarter 2020 was 1.39 inch—0.50 inch less than normal fourth-quarter precipitation during the 1981 to 2010 period of record (1.89 inches). No localized ponding of water occurred on site. All surface water was contained, and no surface water runoff was documented. The Greenwood Avenue culvert that opened in 2016 directed water as expected. No on-site storm drainage was flowing.
- A steam flow hydrograph for USGS station 12323250 (Silver Bow Creek below Blacktail Creek at Butte, Montana) appears in Appendix J. This station is about 3,500 feet downstream of MPTP. The hydrograph indicates that peak flow during fourth quarter 2020 was 54.4 cfs, recorded on November 18, 2020. Average flow during fourth quarter 2020 was 26.0 cfs. No stream flooding issues affected operations at the MPTP site during fourth quarter 2020.

9.0 RECOMMENDATIONS

This annual report offers the following recommendations that can be considered as cleanup of the MPTP site progresses:

- Investigate further potentially promising alternatives (Tetra Tech 2013a) to remediate the continuing source of contamination under the interstate highway (see Section 1.4).
- Investigate the decrease in sustainable pumping rate in the NHRT and the increase in iron affecting WTP operations. To support this investigation, analyze trench samples for iron species at greater frequency than annually, and increase monitoring of groundwater pH, dissolved oxygen, and oxidation-reduction potential (see Section 2.6.1).
- Engage a licensed Montana monitoring well contractor to properly abandon monitoring wells MW-11-05, 10-12, and GW-14R-98. Drill replacement wells at these locations to maintain consistency with the existing long-term data sets associated with these wells (see Section 4.0).
- If deficient wells 10-12 and GW-14R-98 are not replaced, recommendation is to include in future annual monitoring events sampling of wells 10-04 and 10-05 for the "extended parameter list" of analytes (Section 4.3).
- Properly abandon Well MW-11-05, where a sampling device is stuck in the borehole (Section 4.0).

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TABLES

TABLE 2.1
2019 WATER TREATMENT PLANT DISCHARGE RATES

Date	Approximate Discharge Rate [a] (gpm)
1/6/2020	270
1/13/2020	270
1/20/2020	270
1/27/2020	270
2/3/2020	270
2/10/2020	270
2/17/2020	270
2/24/2020	270
3/2/2020	270
3/9/2020	270
3/16/2020	270
3/23/2020	270
3/30/2020	270
4/6/2020	270
4/13/2020	270
4/20/2020	270
4/27/2020	270
5/4/2020	270
5/11/2020	270
5/18/2020	270
5/25/2020	270
6/1/2020	270
6/8/2020	270
6/15/2020	270
6/22/2020	270
6/29/2020	270
7/6/2020	270
7/13/2020	270
7/20/2020	270
7/27/2020	270
8/3/2020	270
8/10/2020	270
8/17/2020	260
8/24/2020	260
8/31/2020	260
9/7/2020	260
9/14/2020	260
9/21/2020	260
9/28/2020	260
10/5/2020	260
10/12/2020	260
10/19/2020	260
10/26/2020	260
11/2/2020	260
11/9/2020	260
11/16/2020	260
11/23/2020	260
11/30/2020	260
12/7/2020	260
12/14/2020	260
12/21/2020	260
12/28/2020	260
Annual Average	**266** [b]

Notes:

a The discharge rate is an instantaneous measurement recorded by the plant operator for the date shown.

b The annual average discharge rate is calculated from 365 daily flows and not on the 52 instantaneous measurement provided in this table.

gpm Gallons per minute

TABLE 2.2
APPROXIMATE VOLUME OF WATER TREATED

Dates	Approximate Volume of Water Treated (gallons)
1993 through 1996	231,920,600
1996 through 1997	51,321,600
1998	96,832,800
1999	119,730,200
2000	113,904,000
2001	114,681,600
2002	184,464,000
2003	189,734,400
2004	163,857,600
2005	150,710,400
2006	216,360,000
2007	233,892,000
2008	181,332,000
2009	177,645,600
2010	176,076,000
2011	196,574,400
2012	179,193,600
2013	177,127,200
2014	156,518,200
2015	161,514,000
2016	158,342,400
2017	141,912,000
2018	141,912,000
2019	141,912,000
2020	141,912,000
Total	**3,999,380,600**

TABLE 2.3

SUMMARY OF MONITORING EVENTS - 2020

Monitoring Event[a]	Location	Number of Samples Collected and Analyzed[b]	Analytical Parameters of Interest	Method Number for Analysis
Weekly Sampling Event[a] (3)	Plant Water	Influent Water (1) Effluent Water (1) BABB Water (1)	PCP	EPA Method 528
Monthly Sampling Event[a] (5)	Plant Water	Influent Water (1) Effluent Water (1) BABB Water (1) NCRT/NHRT effluent (2)	PCP	EPA Method 528
Semi-Annual Sampling Event[a] (79)	Plant Water	Influent Water (1) Effluent Water (1) BABB Water (1) NCRT/NHRT effluent (2)	PCP	EPA Method 528
	Groundwater	Shallow Monitoring Wells (59)[c] Intermediate Monitoring Wells (4) Deep Monitoring Wells (8)	PCP	EPA Method 528
	Surface Water	Surface Water Stations (3)	PCP	EPA Method 528
Annual Sampling Event[a]	Plant Water	BABB Water (1)	PCP	EPA Method 528
	Plant Water	Influent Water (1) Effluent Water (1) NCRT/NHRT effluent (2)	PCP Metals (EFF only)[d] PAHs Dioxins and furans Chlorophenols Anions (EFF only)[d]	EPA Method 528 EPA Method 200.8 EPA Method SW8270C EPA Method SW8290 EPA Method SW8270C EPA Method 300.0
	Groundwater	Shallow Monitoring Wells (59)[c] Intermediate Monitoring Wells (4) Deep Monitoring Wells (8)	PCP	EPA Method 528

TABLE 2.3 (Cont.)

SUMMARY OF MONITORING EVENTS - 2020

Monitoring Event[a]	Location	Number of Samples Collected and Analyzed[b]	Analytical Parameters of Interest	Method Number for Analysis
(Continued) **Annual Sampling Event[a] (86)**	Groundwater	Shallow Monitoring Wells (5) Deep Monitoring Wells (2)	PCP PAHs Dioxins and furans Chlorophenols	EPA Method 528 EPA Method SW8270C EPA Method SW8290 EPA Method SW8270C
	Surface Water	Surface Water Stations (3)	PCP PAHs Dioxins and furans Chlorophenols	EPA Method 528 EPA Method SW8270C EPA Method SW8290 EPA Method SW8270C

Notes:

a The number in parenthesis is the total number of samples that are planned to be collected per monitoring event.
b The number in parenthesis is the total number of samples that are planned to be collected per station.
c A pump was lost in monitoring well MW-11-05 in February 2016; thus, the well could not be sampled.
d Analysis for metals includes arsenic, cadmium, chromium, copper, lead, and zinc; analysis for anions includes bromide, chloride, fluoride, nitrate, nitrite, and phosphate.

The depth to water was measured in each well that was sampled.

BABB	BABB station is located between the primary and secondary carbon units in the WTP
EFF	WTP effluent station (EFF)
EPA	U.S. Environmental Protection Agency
MPTP	Montana Pole and Treating Plant
NCRT	Near creek recovery trench
NCRT/NHRT	Refers to the NCRT effluent sample (NCRTEFF) and the NHRT effluent sample (NHRTEFF)
NHRT	Near highway recovery trench
PAH	Polycyclic aromatic hydrocarbon
PCP	Pentachlorophenol
Plant Water	MPTP water treatment plant process water
WTP	MPTP water treatment plant

TABLE 2.4
HISTORICAL CONCENTRATIONS OF PCP FOR WTP SAMPLES

Date	Laboratory	EPA Method	NHRT Effluent (NHRTEFF) (µg/L)	NCRT Effluent (NCRTEFF) (µg/L)	WTP Influent (IN) (µg/L)	WTP Between Tanks (BABB) (µg/L)	WTP Effluent (EFF) (µg/L)	ROD Cleanup Level[a] (µg/L)
2001 Range	MBMG	528	476 - 1185	6.76 - 55.2	130 - 631	--	0.1U - **1.12**	1.0
2002 Range	MBMG	528	272 - 842	11.5 - 24	143 - 463	--	0.1U - **7.08**	1.0
2003 Range	MBMG	528	140 - 304	4.3 - 8.8	47 - 262	17.0	0.04U - **1.7**	1.0
2004 Range	MBMG	528	97 - 192	2.4 - 6.7	33 - 82	0.11 - 4.1	0.056 - 0.39	1.0
2005 Range	MBMG	528	60 - 149	1.10 - 5.8	25.7 - 73.7	0.04 - 1.2	0.1U - 0.4	1.0
2006 Range	MBMG	528	98 - 180	1.56 - 6.06	4.21 - 98.8	0.062 - 9.83	0.1U - **3.35**	1.0
2007 Range	MBMG	528	63.2 - 286	2.69 - 3.92	19.3 - 310	0.126 - 1.05	0.06 - 0.483	1.0
2008 Range	MBMG	528	84.5 - 306	2.98 - 7.81	16.9 - 296	0.11 - 17.2	0.089 - **2.58**	1.0
2009 Range	MBMG	528	36.4 - 306	1.03 - 4.84	17.8 - 153	0.2U - 18.7	0.082 - **7.13**	1.0
2010 Range	MBMG	528	31.1 - 233	1.70 - 7.38	10.8 - 84.6	0.2U - 4.3	0.207 - **1.46**	1.0
2011 Range	MBMG	528	84.2 - 333	3.18 - 11.5	9.14 - 137	0.267 - 39.4	0.208 - **15.7**	1.0
2012 Range	MBMG	528	232 -379	0.79 - 49.4	35.5 - 161	0.456 - 14.6	0.23 - **1.03**	1.0
2013 Range	MBMG	528	126 - 345	2.54 - 8.71	0.852 -176	0.2U - 31.1	0.2U - **11.1**	1.0
2014 Range	MBMG	528	159 - 326	0.2U - 12.2	17.5 - 250	0.2U - 38.9	0.2U - **10.4**	1.0
2015 Range	MBMG	528	100 - 245	4.10 - 9.5	22.7 - 52.3	0.2U - 0.64	0.2U - 0.271	1.0
2016 Range	MBMG	528	97 - 186	3.58 - 6.8	22.3 - 52.5	0.2U - 0.93	0.2U - 0.633	1.0
2017 Range	MBMG	528	121 - 510	4.96 - 8.2	27.4 - 139	0.284- 0.870	0.166 - 0.640	1.0
2018 Range	MBMG	528	174 - 693	6.63 - 21.0	47.9 - 193	0.36 - 3.720	0.242 - **1.810**	1.0
2019 Range	MBMG	528	187 - 402	1.54-7.77	34.8 - 114	0.165 - 2.96	0.16 - 0.872	1.0
2020 Range	MBMG	528	114 - 238	1.54 - 7.77	1.87 - 56.3	0.131 - 3.58	0.1 - 0.592	1.0
1/6/2020	MBMG	528	-	-	1.87	0.455	0.337	1.0
1/13/2020	MBMG	528	238	7.24	51.9	0.257	0.247	1.0
1/20/2020	MBMG	528	-	-	52.4	0.172	0.19	1.0
1/27/2020	MBMG	528	-	-	50.2	0.256	0.196	1.0
2/3/2020	MBMG	528	155	7.77	41	0.24	0.16	1.0
2/10/2020	MBMG	528	-	-	31.1	0.322	0.225	1.0
2/17/2020	MBMG	528	-	-	31.3	0.345	0.259	1.0
2/24/2020	MBMG	528	-	-	33.5	0.593	0.276	1.0
3/2/2020	MBMG	528	156	5.47	38.2	0.317	0.24	1.0
3/9/2020	MBMG	528	-	-	42.6	0.909	0.362	1.0
3/16/2020	MBMG	528	-	-	49.8	3.58	0.37	1.0
3/23/2020	MBMG	528	-	-	42.4	0.838	0.592	1.0
3/30/2020	MBMG	528	180	-	56.3	0.221	0.536	1.0
4/6/2020	MBMG	528	-	6.51	42.9	0.364	0.19	1.0
4/13/2020	MBMG	528	-	-	47.2	0.223	0.184	1.0
4/20/2020	MBMG	528	-	-	37.1	0.154	0.135	1.0
4/27/2020	MBMG	528	-	-	39.6	0.14	0.119	1.0
5/4/2020	MBMG	528	163	1.54	38.7	0.155	0.121	1.0
5/11/2020	MBMG	528	-	-	42.7	0.14	0.134	1.0
5/18/2020	MBMG	528	-	-	41.3	0.187	0.191	1.0
5/26/2020	MBMG	528	-	-	43.6	0.196	0.152	1.0
6/1/2020	MBMG	528	203	5.94	46.7	0.195	0.136	1.0
6/8/2020	MBMG	528	-	-	42.9	0.133	0.143	1.0
6/15/2020	MBMG	528	-	-	34.8	0.203	0.153	1.0
6/22/2020	MBMG	528	-	-	37.8	0.246	0.173	1.0
6/29/2020	MBMG	528	-	-	36.7	0.256	0.183	1.0
7/6/2020	MBMG	528	181	7.3	43.1	0.185	0.167	1.0
7/13/2020	MBMG	528	-	-	47.9	0.15	0.1	1.0
7/20/2020	MBMG	528	-	-	44	0.131	0.109	1.0
7/27/2020	MBMG	528	-	-	47.7	0.78	0.301	1.0
8/3/2020	MBMG	528	-	-	44.1	0.265	0.198	1.0
8/9/2020	MBMG	528	138	2.64	34.9	0.263	0.3	1.0
8/17/2020	MBMG	528	-	-	38	0.293	0.234	1.0
8/24/2020	MBMG	528	-	-	54	0.774	0.176	1.0
8/31/2020	MBMG	528	-	-	25.8	0.246	0.204	1.0
9/8/2020	MBMG	528	114	4.73	42.2	0.164	0.215	1.0
9/14/2020	MBMG	528	-	-	38.5	0.286	0.186	1.0
9/21/2020	MBMG	528	-	-	42.2	0.235	0.201	1.0
10/5/2020	MBMG	528	192	3.17	45.5	0.262	0.541	1.0
10/12/2020	MBMG	528	-	-	43.5	0.31	0.246	1.0
10/19/2020	MBMG	528	-	-	48.4	0.557	0.335	1.0
10/26/2020	MBMG	528	-	-	40.7	0.277	0.19	1.0
11/2/2020	MBMG	528	227	6.62	45.1	1.32	0.203	1.0
11/9/2020	MBMG	528	-	-	47.9	0.34	0.267	1.0
11/16/2020	MBMG	528	-	-	44.4	0.261	0.221	1.0
11/23/2020	MBMG	528	-	-	44.9	0.469	0.294	1.0
11/30/2020	MBMG	528	-	-	46.3	0.235	0.255	1.0
12/7/2020	MBMG	528	213	3.41	41.5	0.444	0.32	1.0
12/14/2020	MBMG	528	-	-	42.1	0.303	0.27	1.0
12/21/2020	MBMG	528	-	-	36.8	0.557	0.316	1.0
12/28/2020	MBMG	528	-	-	32.9	0.284	0.252	1.0
		2020 Average	180	5.2	41.5	0.402	0.237	1.0

Notes:
All units are in µg/L unless otherwise noted.

[a]	Cleanup level applies to the WTP effluent sample, only.
--	Not sampled
µg/L	Micrograms per liter
Bold	WTP effluent concentration exceeds the ROD discharge to surface water cleanup level.
BABB	WTP sample collected from between primary and secondary carbon vessels
EPA	U.S. Environmental Protection Agency
gpm	Gallons per minute
MBMG	Montana Bureau of Mines and Geology
MPTP	Montana Pole and Treating Plant
NCRT	Near creek recovery trench
NHRT	Near highway recovery trench
PCP	Pentachlorophenol
ROD	Record of Decision
U	Analyzed for but not detected above the method detection limit
WTP	MPTP water treatment plant

TABLE 2.5
HISTORICAL CONCENTRATIONS OF DIOXIN (TEQ) FOR WTP SAMPLES
(µg/L)

Sample Date	NHRT Effluent (NHRTEFF)	NCRT Effluent (NCRTEFF)	WTP Influent (IN)	WTP Effluent (EFF)	ROD Cleanup Level[a]
8/13/2001	4.60E-07	9.20E-07	2.03E-06	2.40E-07	1.00E-05
2/4/2002	4.60E-07	1.60E-07	3.21E-06	1.30E-07	1.00E-05
8/12/2002	5.50E-07	1.19E-06	1.53E-06	2.10E-07	1.00E-05
2/3/2003	2.70E-07	4.17E-06	2.16E-06	6.90E-07	1.00E-05
8/4/2003	2.30E-07	2.16E-06	1.57E-06	3.00E-07	1.00E-05
2/2/2004	1.50E-07	8.30E-07	8.50E-07	1.40E-07	1.00E-05
8/2/2004	2.20E-07	3.09E-06	1.40E-06	5.60E-07	1.00E-05
8/8/2005	7.60E-07	1.29E-06	1.95E-05	1.28E-06	1.00E-05
2/6/2006	2.10E-07	8.50E-07	2.78E-06	1.00E-06	1.00E-05
8/21/2006	2.10E-07	2.70E-07	7.70E-07	2.86E-06	1.00E-05
8/27/2007	8.70E-08	8.10E-07	0.00E+00	3.10E-07	1.00E-05
8/26/2008	1.70E-07	1.58E-06	5.60E-07	1.70E-07	1.00E-05
8/10/2009	6.20E-07	3.92E-06	1.80E-06	1.80E-07	1.00E-05
8/16/2010	1.12E-05	5.84E-06	4.40E-06	5.80E-07	1.00E-05
8/15/2011[b]	1.91E-07	1.90E-07	3.91E-07	7.60E-08	1.00E-05
8/13/2012	2.27E-05	1.21E-05	7.26E-06	4.40E-07	1.00E-05
8/12/2013	1.27E-04	7.72E-06	3.58E-05	3.69E-07	1.00E-05
8/11/2014	1.06E-05	3.07E-06	6.75E-06	7.99E-07	1.00E-05
8/10/2015	5.68E-06	7.72E-06	4.48E-06	4.00E-07	1.00E-05
8/8/2016	4.95E-06	2.12E-06	2.80E-06	3.08E-07	1.00E-05
8/10/2017	9.20E-06	5.11E-06	3.57E-06	1.87E-06	1.00E-05
8/13/2018	9.87E-06	4.34E-06	7.27E-06	2.05E-06	1.00E-05
8/11/2019	1.59E-06	8.08E-07	9.36E-07	1.35E-06	1.00E-05
8/9/2020	4.21E-06	1.89E-06	3.47E-05	3.05E-06	1.00E-05

HISTORICAL CONCENTRATIONS OF DIOXIN (TEQ) FOR WTP SAMPLES
(pg/L)

Sample Date	NHRT Effluent (NHRTEFF)	NCRT Effluent (NCRTEFF)	WTP Influent (IN)	WTP Effluent (EFF)	ROD Cleanup Level[a]
8/13/2001	0.46	0.92	2.03	0.24	10.00
2/4/2002	0.46	0.16	3.21	0.13	10.00
8/12/2002	0.55	1.19	1.53	0.21	10.00
2/3/2003	0.27	4.17	2.16	0.69	10.00
8/4/2003	0.23	2.16	1.57	0.30	10.00
2/2/2004	0.15	0.83	0.85	0.14	10.00
8/2/2004	0.22	3.09	1.40	0.56	10.00
8/8/2005	0.76	1.29	19.50	1.28	10.00
2/6/2006	0.21	0.85	2.78	1.00	10.00
8/21/2006	0.21	0.27	0.77	2.86	10.00
8/27/2007	0.09	0.81	0.00	0.31	10.00
8/26/2008	0.17	1.58	0.56	0.17	10.00
8/10/2009	0.62	3.92	1.80	0.18	10.00
8/16/2010	11.2	5.84	4.40	0.58	10.00
8/15/2011[b]	0.19	0.19	0.39	0.08	10.00
8/13/2012	22.7	12.1	7.26	0.44	10.00
8/12/2013	127	7.72	35.80	0.37	10.00
8/11/2014	10.6	3.07	6.75	0.80	10.00
8/10/2015	5.68	7.72	4.48	0.40	10.00
8/8/2016	4.95	2.12	2.80	0.31	10.00
8/10/2017	9.20	5.11	3.57	1.87	10.00
8/13/2018	9.87	4.34	7.27	2.05	10.00
8/11/2019	1.59	0.81	0.94	1.35	10.00
8/9/2020	4.21	1.89	34.73	3.05	10.00

Notes:
For this table, TEQs are calculated using the MPTP ROD Methodology.
See Appendix B-3 for TEQ values calculated using both the MPTP ROD Methodology and the DEQ-7 Methodology.

[a] Cleanup level applies to the WTP effluent sample, only.
[b] Data for this date appear to be anomalously low.
µg/L Micrograms per liter
pg/L Picograms per liter
MPTP Montana Pole and Treating Plant
NCRT Near creek recovery trench
NHRT Near highway recovery trench
ROD Record of Decision
TEF Toxicity equivalence factor
TEQ Toxicity equivalence quotient
WTP MPTP water treatment plant

TABLE 2.6
CONCENTRATIONS OF PAH, CHLOROPHENOLS, ANIONS, AND METALS FOR WTP SAMPLES

	NHRT Effluent (NHRTEFF)	Q	NCRT Effluent (NCRTEFF)	Q	WTP Influent (IN)	Q	WTP Effluent (EFF)	Q	ROD[b]
ANALYTES									
PAH (EPA Method SW8270C) (µg/L)									
ACENAPHTHENE	0.25	U	0.25	U	0.25	U	0.25	U	-
ACENAPHTHYLENE	0.25	U	0.25	U	0.25	U	0.25	U	-
ANTHRACENE	0.25	U	0.25	U	0.25	U	0.25	U	-
BENZO(A)ANTHRACENE	0.1	U	0.1	U	0.1	U	0.1	U	1
BENZO(A)PYRENE	0.1	U	0.1	U	0.1	U	0.1	U	0.2 (0.05/0.038) [c]
BENZO(B)FLUORANTHENE	0.25	U	0.25	U	0.25	U	0.25	U	0.2
BENZO(G,H,I)PERYLENE	0.5	U	0.5	U	0.5	U	0.5	U	1
BENZO(K)FLUORANTHENE	0.1	U	0.1	U	0.1	U	0.1	U	1
CHRYSENE	0.1	U	0.1	U	0.1	U	0.1	U	1
DIBENZO(A,H)ANTHRACENE	0.1	U	0.1	U	0.1	U	0.1	U	0.2
FLUORANTHENE	0.25	U	0.25	U	0.25	U	0.25	U	-
FLUORENE	0.25	U	0.25	U	0.25	U	0.25	U	-
INDENO(1,2,3-CD)PYRENE	0.1	U	0.1	U	0.1	U	0.1	U	1
NAPHTHALENE	0.718		0.25	U	0.29		0.25	U	-
PHENANTHRENE	0.25	U	0.25	U	0.25	U	0.25	U	-
PYRENE	0.33		0.25	U	0.25	U	0.25	U	-
TOTAL D PAHs	2.0		1.5		1.5		1.5		360
CHLOROPHENOLS (EPA Method SW8270C) (µg/L)									
2,3,4,6-TETRACHLOROPHENOL	0.5	U	0.5	U	1.9		0.5	U	-
2,4,5-TRICHLOROPHENOL	1	U	1	U	1	U	1	U	-
2,4,6-TRICHLOROPHENOL	0.5	U	0.5	U	0.5	U	0.5	U	-
2,4-DICHLOROPHENOL	0.5	U	0.5	U	0.5	U	0.5	U	45
2-CHLOROPHENOL	0.5	U	0.5	U	0.5	U	0.5	U	27
4-CHLORO-3-METHYLPHENOL	0.5	U	0.5	U	0.5	U	0.5	U	6.5
PENTACHLOROPHENOL	138	D	2.64		34.9	D	0.215	U	1
ANIONS[a] (EPA Method 300) (mg/L)									
BROMIDE	244		238		227		227		-
CHLORIDE	57.8		64.2		61.6		62.3		-
FLUORIDE	0.31		0.49		0.47		0.41		-
NITRATE	1.27		8.68		6.72		6.84		-
NITRITE	0.01	U	0.01	U	0.01	U	0.01	U	-
PHOSPHATE	0.04	J	0.04	J	0.02	U	0.02	J	-
METALS, DISSOLVED[a] (EPA Method 200.8) (mg/L)									
ARSENIC	8.84		3.06		4.17		2.98		48
CADMIUM	0.25	U	0.25	U	0.25	U	0.25	U	1.1
CHROMIUM	0.71	J	0.72	J	0.75	J	0.68	J	11
COPPER	1.25	U	1.72	J	1.57	J	1.25	U	12
IRON	1.05		0.038	U	0.229		0.038	U	-
LEAD	0.15	U	0.15	U	0.15	U	0.15	U	3.2
MANGANESE	0.54		0.082	J	0.188		0.005	U	-
ZINC	1.25	U	17.9		14.1		6.78		110
METALS, TOTAL RECOVERABLE[a] (EPA Method 200.8) (mg/L)									
ARSENIC	7.71		2.75		3.76		3.04		48
CADMIUM	0.25	U	0.25	U	0.25	U	0.25	U	1.1 (0.8) [c]
CHROMIUM	0.52	J	0.25	U	0.25	U	0.25	U	11
COPPER	1.25	U	6.18		1.41	J	17.5	U	12
IRON	0.801		0.038	U	0.144		0.038	U	-
LEAD	0.15	U	0.15	U	0.15	U	0.15	U	3.2
MANGANESE	0.524		0.079	J	0.182		0.005	U	-
ZINC	1.25	U	18		18.9		15.6		110

Notes:
All units are in µg/L unless otherwise noted.

a Concentration units for anion constituents (other than bromide), as well as for the two metals iron and manganese, are mg/L.
b Cleanup level applies to the WTP effluent sample (station EFF), only.
c The water quality standards for cadmium and benzo(a)pyrene outlined in Circular DEQ-7 are lower than the cleanup levels for groundwater and surface water specified in the ROD tables; therefore, the lower DEQ-7 standards (in parentheses) currently take precedence over the ROD cleanup levels for these analytes.
The hardness-adjusted DEQ-7 Aquatic Life Standard for the chronic standard for cadmium is 0.8 µg/L.
The DEQ-7 standard for benzo(a)pyrene for groundwater is 0.05 µg/L; the DEQ-7 standard for benzo(a)pyrene for surface water is 0.038 µg/L
- No cleanup level specified in the ROD.

D PAH Sum of the acenaphthene, acenaphthylene, anthracene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene concentrations
DEQ Montana Department of Environmental Quality
EPA U.S. Environmental Protection Agency
J Detected above the MDL but less than the MRL
mg/L Milligrams per liter
MPTP Montana Pole and Treating Plant
NCRT Near creek recovery trench
NHRT Near highway recovery trench
PAH Polycyclic aromatic hydrocarbon
Q Data qualifier
ROD Record of Decision
µg/L Micrograms per liter
U Analyzed for but not detected above the method detection limit
WTP MPTP water treatment plant

TABLE 2.7
QUALITY CONTROL - SOURCE WATER BLANKS

Date Sampled	Sample ID	Analyte	EPA Method	Concentration	Q	Units
PENTACHLOROPHENOL (EPA Method 528)						
1/6/2020	OPOQVS010620	PENTACHLOROPHENOL	528	0.1	U	µg/L
1/27/2020	WTPVS012720	PENTACHLOROPHENOL	528	0.1	U	µg/L
1/31/2020	SW-07013120	PENTACHLOROPHENOL	528	0.1	U	µg/L
1/31/2020	MW-E-98013120	PENTACHLOROPHENOL	528	0.1	U	µg/L
2/1/2020	MW-21020120	PENTACHLOROPHENOL	528	0.1	U	µg/L
2/1/2020	MW-21020120	PENTACHLOROPHENOL	528	0.1	U	µg/L
2/1/2020	MW-G-98020120	PENTACHLOROPHENOL	528	0.1	U	µg/L
2/10/2020	OPOQVS021020	PENTACHLOROPHENOL	528	0.1	U	µg/L
2/24/2020	OPOQVS022420	PENTACHLOROPHENOL	528	0.1	U	µg/L
3/16/2020	WTPVS031620	PENTACHLOROPHENOL	528	0.1	U	µg/L
3/23/2020	OPOQVS032320	PENTACHLOROPHENOL	528	0.1	U	µg/L
4/13/2020	WTPVS041320	PENTACHLOROPHENOL	528	0.1	U	µg/L
4/27/2020	WTPVS042720	PENTACHLOROPHENOL	528	0.1	U	µg/L
5/4/2020	OPOQVS050420	PENTACHLOROPHENOL	528	0.1	U	µg/L
5/18/2020	OPOQVS051820	PENTACHLOROPHENOL	528	0.1	U	µg/L
6/8/2020	WTPVS060820	PENTACHLOROPHENOL	528	0.1	U	µg/L
6/15/2020	OPOQVS061520	PENTACHLOROPHENOL	528	0.1	U	µg/L
7/6/2020	WTPVS070620	PENTACHLOROPHENOL	528	0.1	U	µg/L
7/13/2020	OPOQVS071320	PENTACHLOROPHENOL	528	0.1	U	µg/L
8/3/2020	WTPVS080320	PENTACHLOROPHENOL	528	0.1	U	µg/L
8/3/2020	MW-E-98080320	PENTACHLOROPHENOL	528	0.1	U	µg/L
8/5/2020	MW-19080520	PENTACHLOROPHENOL	528	0.1	U	µg/L
8/9/2020	SW-07080920	PENTACHLOROPHENOL	528	0.1	U	µg/L
8/24/2020	WTPVS082420	PENTACHLOROPHENOL	528	0.1	U	µg/L
8/31/2020	OPOQVS083120	PENTACHLOROPHENOL	528	0.1	U	µg/L
9/14/2020	OPOQVS091420	PENTACHLOROPHENOL	528	0.1	U	µg/L
10/19/2020	WTPVS101920	PENTACHLOROPHENOL	528	0.1	U	µg/L
11/2/2020	WTPVS110220	PENTACHLOROPHENOL	528	0.1	U	µg/L
11/9/2020	OPOQVS110920	PENTACHLOROPHENOL	528	0.1	U	µg/L
11/23/2020	OPOQVS112320	PENTACHLOROPHENOL	528	0.1	U	µg/L
12/14/2020	WTPVS121420	PENTACHLOROPHENOL	528	0.1	U	µg/L
PAH (EPA Method 8270)						
8/9/2020	SW-07080920	ACENAPHTHENE	8270	0.25	U	µg/L
8/9/2020	SW-07080920	ACENAPHTHYLENE	8270	0.25	U	µg/L
8/9/2020	SW-07080920	ANTHRACENE	8270	0.25	U	µg/L
8/9/2020	SW-07080920	BENZO(A)ANTHRACENE	8270	0.1	U	µg/L
8/9/2020	SW-07080920	BENZO(A)PYRENE	8270	0.1	U	µg/L
8/9/2020	SW-07080920	BENZO(B)FLUORANTHENE	8270	0.25	U	µg/L
8/9/2020	SW-07080920	BENZO(G,H,I)PERYLENE	8270	0.5	U	µg/L
8/9/2020	SW-07080920	BENZO(K)FLUORANTHENE	8270	0.1	U	µg/L
8/9/2020	SW-07080920	CHRYSENE	8270	0.1	U	µg/L
8/9/2020	SW-07080920	DIBENZO(A,H)ANTHRACENE	8270	0.1	U	µg/L
8/9/2020	SW-07080920	FLUORANTHENE	8270	0.25	U	µg/L
8/9/2020	SW-07080920	FLUORENE	8270	0.25	U	µg/L
8/9/2020	SW-07080920	INDENO(1,2,3-CD)PYRENE	8270	0.1	U	µg/L
8/9/2020	SW-07080920	NAPHTHALENE	8270	0.25	U	µg/L
8/9/2020	SW-07080920	PHENANTHRENE	8270	0.25	U	µg/L
8/9/2020	SW-07080920	PYRENE	8270	0.25	U	µg/L

TABLE 2.7
QUALITY CONTROL - SOURCE WATER BLANKS

Date Sampled	Sample ID	Analyte	EPA Method	Concentration	Q	Units
SVOC (EPA Method 8270)						
8/9/2020	SW-07080920	2,3,4,6-TETRACHLOROPHENOL	8270	0.5	U	µg/L
8/9/2020	SW-07080920	2,4,5-TRICHLOROPHENOL	8270	1	U	µg/L
8/9/2020	SW-07080920	2,4,6-TRICHLOROPHENOL	8270	0.5	U	µg/L
8/9/2020	SW-07080920	2,4-DICHLOROPHENOL	8270	0.5	U	µg/L
8/9/2020	SW-07080920	2-CHLOROPHENOL	8270	0.5	U	µg/L
8/9/2020	SW-07080920	4-CHLORO-3-METHYLPHENOL	8270	0.5	U	µg/L
DIOXIN (TEQ) (EPA Method 8290)						
8/11/2019	DFBLKAM	DIOXIN (TEQ)	8290	**1.4**		pg/L
ANIONS (EPA Method 300.1)						
8/9/2020	SW-07080920	BROMIDE	300.1	10	U	µg/L
8/9/2020	SW-07080920	CHLORIDE	300.1	0.1	U	mg/L
8/9/2020	SW-07080920	FLUORIDE	300.1	0.01	U	mg/L
8/9/2020	SW-07080920	NITRATE	300.1	0.01	U	mg/L
8/9/2020	SW-07080920	NITRITE	300.1	0.01	U	mg/L
8/9/2020	SW-07080920	PHOSPHATE	300.1	0.01	U	mg/L
METALS - TOTAL RECOVERABLE (EPA Method 200.8)						
8/9/2020	SW-07080920	ARSENIC	200.8	0.25	U	µg/L
8/9/2020	SW-07080920	CADMIUM	200.8	0.25	U	µg/L
8/9/2020	SW-07080920	CHROMIUM	200.8	**0.77**		µg/L
8/9/2020	SW-07080920	COPPER	200.8	1.25	U	µg/L
8/9/2020	SW-07080920	IRON	200.8	0.038	U	mg/L
8/9/2020	SW-07080920	LEAD	200.8	0.038	U	µg/L
8/9/2020	SW-07080920	MANGANESE	200.8	0.005	U	mg/L
8/9/2020	SW-07080920	ZINC	200.8	1.25	J	µg/L
METALS - DISSOLVED (EPA Method 200.8)						
8/9/2020	SW-07080920	ARSENIC	200.8	0.1	U	µg/L
8/9/2020	SW-07080920	CADMIUM	200.8	0.1	U	µg/L
8/9/2020	SW-07080920	CHROMIUM	200.8	0.1	U	µg/L
8/9/2020	SW-07080920	COPPER	200.8	0.61	U	µg/L
8/9/2020	SW-07080920	IRON	200.8	0.015	U	mg/L
8/9/2020	SW-07080920	LEAD	200.8	0.06	U	µg/L
8/9/2020	SW-07080920	MANGANESE	200.8	0.002	U	mg/L
8/9/2020	SW-07080920	ZINC	200.8	0.5		µg/L

Notes
Dioxin (TEQ) calculated using 0 for values qualified as "U" and ROD TEFs (MPTP ROD methodology).

µg/L	Micrograms per liter
pg/L	Picograms per liter
Bold	Analyte detected in source water blank
Dioxin	Polychlorinated dibenzo-p-dioxins
EPA	U.S. Environmental Protection Agency
ID	Identification
J	Estimated
mg/L	Milligrams per liter
MPTP	Montana Pole and Treating Plant
PAH	Polycyclic aromatic hydrocarbon
Q	Laboratory data qualifier
ROD	Record of Decision
SVOC	Semivolatile organic compound
TEF	Toxicity equivalence factor
TEQ	Toxicity equivalence quotient
U	Analyzed for but not detected above the method detection limit

TABLE 2.8
QUALITY CONTROL - FIELD DUPLICATES

Sample Date	Original Sample ID	Analyte	Original Concentration	Q	Original Sample RL	Duplicate Sample ID	Duplicate Concentration	Q	Duplicate Sample RL	Units	RPD[a]
PENTACHLOROPHENOL (EPA Method 528)											
1/13/2020	NCRTEFF011320	PENTACHLOROPHENOL	4.97		0.1	WTPVS011320	4.81		0.1	µg/L	3.3
1/20/2020	EFF012020	PENTACHLOROPHENOL	0.19		0.1	OPOQVS012020	0.16		0.1	µg/L	**17.1**
1/31/2020	SW-05013120	PENTACHLOROPHENOL	0.1	U	0.1	MW-20013120	0.1	U	0.1	µg/L	0.0
1/31/2020	GS-34-D013120	PENTACHLOROPHENOL	0.624		0.1	MW-18013120	0.568		0.1	µg/L	9.4
2/1/2020	PZ-S2-02020120	PENTACHLOROPHENOL	0.245		0.1	MW-C-99020120	0.236		0.1	µg/L	**3.7**
2/1/2020	PZ-S2-02020120	PENTACHLOROPHENOL	0.245		0.1	MW-C-99020120	0.236		0.1	µg/L	3.7
2/1/2020	INF-10020120	PENTACHLOROPHENOL	61	D	0.1	MW-19020120	58.4	D	0.1	µg/L	4.4
2/17/2020	IN021720	PENTACHLOROPHENOL	31.3	D	0.1	WTPVS021720	32.7	D	0.1	µg/L	**4.4**
3/2/2020	NHRTEFF030220	PENTACHLOROPHENOL	4.55		0.1	WTPVS030220	152	D	0.1	µg/L	188.4
3/9/2020	BABB030920	PENTACHLOROPHENOL	0.909		0.1	OPOQVS030920	0.452		0.1	µg/L	67.2
3/30/2020	EFF033020	PENTACHLOROPHENOL	0.536		0.1	WTPVS033020	0.747		0.1	µg/L	32.9
4/6/2020	NCRTEFF040620	PENTACHLOROPHENOL	4.2		0.1	OPOQVS040620	3.81		0.1	µg/L	9.7
4/20/2020	BABB042020	PENTACHLOROPHENOL	0.154		0.1	OPOQVS042020	0.134		0.1	µg/L	13.9
5/11/2020	IN051120	PENTACHLOROPHENOL	42.7	D	0.1	WTPVS051120	41.1	D	0.1	µg/L	3.8
5/26/2020	EFF052620	PENTACHLOROPHENOL	0.152		0.1	WTPVS052620	0.133		0.1	µg/L	13.3
6/1/2020	NHRTEFF060120	PENTACHLOROPHENOL	3.28		0.1	OPOQVS060120	192	D	0.1	µg/L	193.3
6/22/2020	IN062220	PENTACHLOROPHENOL	37.8	D	0.1	WTPVS062220	34.9	D	0.1	µg/L	8.0
6/29/2020	BABB070620	PENTACHLOROPHENOL	0.185		0.1	OPOQVS062920	0.164		0.1	µg/L	12.0
7/20/2020	BABB072020	PENTACHLOROPHENOL	0.131		0.1	WTPVS072020	0.1	U	0.1	µg/L	**26.8**
8/3/2020	MW-87-03080320	PENTACHLOROPHENOL	0.621		0.1	OPOQVS080320	0.647		0.1	µg/L	**4.1**
8/3/2020	MW-I-01080320	PENTACHLOROPHENOL	187	D	0.1	MW-18080320	193	D	0.1	µg/L	3.2
8/4/2020	MW-J-96080420	PENTACHLOROPHENOL	0.523		0.1	MW-21080420	0.798		0.1	µg/L	**41.6**
8/5/2020	MW-11-03080520	PENTACHLOROPHENOL	14.8		0.1	MW-G-98080520	14.1		0.1	µg/L	**4.8**
8/9/2020	EFF080920	PENTACHLOROPHENOL	0.215	U	0.1	MW-20080920	0.1	U	0.1	µg/L	73.0
8/17/2020	BABB081720	PENTACHLOROPHENOL	0.263		0.1	OPOQVS081720	0.242		0.1	µg/L	8.3
9/8/2020	NCRTEFF090820	PENTACHLOROPHENOL	4.73		0.1	WTPVS090820	4.47		0.1	µg/L	**5.7**
9/21/2020	IN092120	PENTACHLOROPHENOL	42.2	D	0.1	WTPVS092120	41.6	D	0.1	µg/L	1.4
10/5/2020	WTPVS100520	PENTACHLOROPHENOL	180	D	0.1	NHRTEFF100520	180		0.1	µg/L	0.0
10/12/2020	OPOQVS101220	PENTACHLOROPHENOL	0.16		0.1	BABB101220	0.221		0.1	µg/L	32.0
10/26/2020	OPOQVS102620	PENTACHLOROPHENOL	0.1		0.1	EFF102620	0.16		0.1	µg/L	46.2
11/16/2020	WTPVS111620	PENTACHLOROPHENOL	45.8	D	0.1	IN111620	45.8		0.1	µg/L	0.0
11/30/2020	WTPVS113020	PENTACHLOROPHENOL	0.274		0.1	BABB113020	0.274		0.1	µg/L	0.0
12/7/2020	OPOQVS120720	PENTACHLOROPHENOL	2.88		0.1	NCRTEFF120720	2.88		0.1	µg/L	0.0
12/28/2021	EFF122820	PENTACHLOROPHENOL	0.252		0.1	WTPVS122820	0.204		0.1	µg/L	21.1

TABLE 2.8
QUALITY CONTROL - FIELD DUPLICATES

Sample Date	Original Sample ID	Analyte	Original Concentration	Q	Original Sample RL	Duplicate Sample ID	Duplicate Concentration	Q	Duplicate Sample RL	Units	RPD[a]
SVOC (EPA Method 8270)											
8/9/2020	EFF080920	2,3,4,6-TETRACHLOROPHENOL	0.5	U	0.5	MW-20080920	0.5	U	0.5	µg/L	0.0
8/9/2020	EFF080920	2,4,5-TRICHLOROPHENOL	1	U	1	MW-20080920	1	U	1	µg/L	0.0
8/9/2020	EFF080920	2,4,6-TRICHLOROPHENOL	0.5	U	0.5	MW-20080920	0.5	U	0.5	µg/L	0.0
8/9/2020	EFF080920	2,4-DICHLOROPHENOL	0.5	U	0.5	MW-20080920	0.5	U	0.5	µg/L	0.0
8/9/2020	EFF080920	2-CHLOROPHENOL	0.5	U	0.5	MW-20080920	0.5	U	0.5	µg/L	0.0
8/9/2020	EFF080920	4-CHLORO-3-METHYLPHENOL	0.5	U	0.5	MW-20080920	0.5	U	0.5	µg/L	0.0
(EPA Method 8270)											
8/9/2020	EFF080920	ACENAPHTHENE	0.25	U	0.25	MW-20080920	0.25	U	0.25	µg/L	0.0
8/9/2020	EFF080920	ACENAPHTHYLENE	0.25		0.25	MW-20080920	0.25	U	0.25	µg/L	**0.0**
8/9/2020	EFF080920	ANTHRACENE	0.25	U	0.25	MW-20080920	0.25	U	0.25	µg/L	0.0
8/9/2020	EFF080920	BENZO(A)ANTHRACENE	0.1	U	0.1	MW-20080920	0.1	U	0.1	µg/L	0.0
8/9/2020	EFF080920	BENZO(A)PYRENE	0.1	U	0.1	MW-20080920	0.1	U	0.1	µg/L	0.0
8/9/2020	EFF080920	BENZO(B)FLUORANTHENE	0.25	U	0.25	MW-20080920	0.25	U	0.25	µg/L	0.0
8/9/2020	EFF080920	BENZO(G,H,I)PERYLENE	0.5	U	0.5	MW-20080920	0.5	U	0.5	µg/L	0.0
8/9/2020	EFF080920	BENZO(K)FLUORANTHENE	0.1	U	0.1	MW-20080920	0.1	U	0.1	µg/L	0.0
8/9/2020	EFF080920	CHRYSENE	0.1	U	0.1	MW-20080920	0.1	U	0.1	µg/L	0.0
8/9/2020	EFF080920	DIBENZO(A,H)ANTHRACENE	0.1	U	0.1	MW-20080920	0.1	U	0.1	µg/L	0.0
8/9/2020	EFF080920	FLUORANTHENE	0.25	U	0.25	MW-20080920	0.25		0.25	µg/L	**0.0**
8/9/2020	EFF080920	FLUORENE	0.25	U	0.25	MW-20080920	0.25	U	0.25	µg/L	0.0
8/9/2020	EFF080920	INDENO(1,2,3-CD)PYRENE	0.1	U	0.1	MW-20080920	0.1	U	0.1	µg/L	0.0
8/9/2020	EFF080920	NAPHTHALENE	0.25	U	0.25	MW-20080920	0.25	U	0.25	µg/L	0.0
8/9/2020	EFF080920	PHENANTHRENE	0.25	U	0.25	MW-20080920	0.25	U	0.25	µg/L	0.0
8/9/2020	EFF080920	PYRENE	0.25	U	0.25	MW-20080920	0.25	U	0.25	µg/L	0.0

TABLE 2.8
QUALITY CONTROL - FIELD DUPLICATES

Sample Date	Original Sample ID	Analyte	Original Concentration	Q	Original Sample RL	Duplicate Sample ID	Duplicate Concentration	Q	Duplicate Sample RL	Units	RPD[a]
DIOXINS AND FURANS (TEQ) (EPA Method SW8290)											
8/11/2019	HCA-21081119	Dioxin TEQ	8.41			MW-20081119	1.69			pg/L	**133.1**
ANIONS (EPA Method 300.1)											
8/9/2020	EFF080920	BROMIDE	227		10	MW-F-99080920	223		10	UG/L	**1.8**
8/9/2020	EFF080920	CHLORIDE	62.3		0.1	MW-F-99080920	61.8		0.1	MG/L	**0.8**
8/9/2020	EFF080920	FLUORIDE	0.41		0.01	MW-F-99080920	0.4		0.01	MG/L	**2.5**
8/9/2020	EFF080920	NITRATE	0.02	J	0.01	MW-F-99080920	6.73		0.01	MG/L	**198.8**
8/9/2020	EFF080920	NITRITE	6.84		0.01	MW-F-99080920	0.01	U	0.01	MG/L	199.4
8/9/2020	EFF080920	PHOSPHATE	0.01	U	0.02	MW-F-99080920	0.02	U	0.02	MG/L	**66.7**
METALS - TOTAL RECOVERABLE (EPA Method 200.8)											
8/9/2020	EFF080920	ARSENIC	2.98		0.1	MW-F-99080920	3.25		0.1	µg/L	8.7
8/9/2020	EFF080920	CADMIUM	0.25	U	0.25	MW-F-99080920	0.25	U	0.25	µg/L	0.0
8/9/2020	EFF080920	CHROMIUM	0.68	J	0.25	MW-F-99080920	0.64	J	0.25	µg/L	**6.1**
8/9/2020	EFF080920	COPPER	1.25	U	1.25	MW-F-99080920	1.25	U	1.25	µg/L	0.0
8/9/2020	EFF080920	IRON	0.038	U	1.25	MW-F-99080920	0.038	U	1.25	mg/L	0.0
8/9/2020	EFF080920	LEAD	0.15	U	0.02	MW-F-99080920	0.15	U	0.02	µg/L	0.0
8/9/2020	EFF080920	MANGANESE	0.005	U	0.06	MW-F-99080920	0.005	U	0.06	mg/L	0.0
8/9/2020	EFF080920	ZINC	6.78		0.015	MW-F-99080920	6.58		0.015	µg/L	3.0
METALS - DISSOLVED (EPA Method 200.8)											
8/9/2020	EFF080920	ARSENIC	3.04		0.1	MW-F-99080920	2.99		0.1	µg/L	1.7
8/9/2020	EFF080920	CADMIUM	0.25	U	0.015	MW-F-99080920	0.25	U	0.015	µg/L	0.0
8/9/2020	EFF080920	CHROMIUM	0.25	U	0.1	MW-F-99080920	0.25	U	0.1	µg/L	0.0
8/9/2020	EFF080920	COPPER	17.5	U	0.5	MW-F-99080920	13.2		0.5	µg/L	28.0
8/9/2020	EFF080920	IRON	0.038	U	0.015	MW-F-99080920	0.038	U	0.015	mg/L	0.0
8/9/2020	EFF080920	LEAD	0.15	U	0.1	MW-F-99080920	0.15	U	0.1	µg/L	0.0
8/9/2020	EFF080920	MANGANESE	0.005	U	0.02	MW-F-99080920	0.005	U	0.02	mg/L	0.0
8/9/2020	EFF080920	ZINC	15.6		0.5	MW-F-99080920	11.9		0.5	µg/L	26.9
									Average RPD:		19.4

Notes:

[a] If one concentration is "U" and the other is detected, the RL is used as the value for the "U" result

µg/L Micrograms per liter

pg/L Picograms per liter

Bold RPD exceeds the 35 percent project goal for precision

D Dilution

TABLE 2.8
QUALITY CONTROL - FIELD DUPLICATES

Sample Date	Original Sample ID	Analyte	Original Concentration	Q	Original Sample RL	Duplicate Sample ID	Duplicate Concentration	Q	Duplicate Sample RL	Units	RPD[a]

EPA U.S. Environmental Protection Agency
ID Identification
J Estimated
mg/L Milligrams per liter
PAH Polycyclic aromatic hydrocarbon
Q Laboratory data qualifier
RL Laboratory reporting limit
RPD Relative percent difference
SVOC Semivolatile organic compound
TEQ Toxicity equivalence quotient
U Analyzed for but not detected above the method detection limit

TABLE 3.1
HISTORICAL LTU WATER APPLICATION

Year	LTU Water Application (gallons)
1999	710,700
2000	425,250
2001	3,188,700
2002	2,321,700
2003	7,395,500
2004	5,034,300
2005	1,921,600
2006	7,007,600
2007	3,042,800
2008	5,784,800
2009	3,758,000
2010	3,169,400
2011	2,141,200
2012	1,171,900
2013	884,700
2014	0
2015	0
2016	0
2017	0
2018*	0
2019	0
2020	0
Total Volume Applied:	**47,958,150**

Notes:

LTU Land treatment unit

TABLE 3.2
LTU SOIL SAMPLING RESULTS (2007 - 2013)

	2-Oct-07		2-Jul-08	2-Oct-08	8-Jul-09	14-Oct-10	19-Sep-11	26-Sep-12		1-Oct-13	
Sample	PCP	Dioxin TEQ	PCP	PCP	PCP	PCP	PCP	PCP	Dioxin TEQ	PCP	Dioxin TEQ
Cleanup levels	34 mg/kg	0.2 µg/kg	34 mg/kg	34 mg/kg	34 mg/kg	34 mg/kg	34 mg/kg	34 mg/kg	0.2 µg/kg	34 mg/kg	0.2 µg/kg
Units	mg/kg	µg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	µg/kg	mg/kg	µg/kg
Laboratory	MBMG	TAL	MBMG	MBMG	MBMG	MBMG	MBMG	MBMG	Pace	MBMG	Pace
Method	8270	8290	8270	8270	8270	8270	8270	8270	8290	8270	8290
LTUZ01 0-24"	20.7	--	**82.10**	**61.9**	**42**	22.2	18.6	13.9	--	--	--
LTUZ01 24-36"	17.5	--	**69.10**	**52.2**	**41.2**	20.8	10.3	1.3	--	--	--
LTUZ01 Comp	--	**1.9**		--	--	--	--	--	**3.6**	--	**2.5**
LTUZ02 0-24"	28.4	--	**109**	**75.7**	**81.1**	**67.3**	**34.9**	32.6	--	20.3	--
LTUZ02 24-36"	**87.6**	--	**124**	**160**	**162**	**64.4**	**47.6**	**36.2**	--	18.6	--
LTUZ02 Comp	--	**9.1**		--	--		--	--	**2.8**	--	**4.2**
LTUZ03 0-24"	**55.9**	--	**187**	**79.5**	21.5	14.5	**97.9**	**91.7**	--	**39.1**	--
LTUZ03 24-36"	**153**	--	**343**	--	**149**	16.6	**96.1**	**77.7**	--	**39.3**	--
LTUZ03 Comp	--	**2.6**		--	--	--	--	--	**1.8**	--	**2.3**
LTUZ04 0-24"	15.9	--	**156**	**36.2**	**46.9**	14.6	**49.9**	12.2	--	**45.7**	--
LTUZ04 24-36"	13.4	--	**246**	**256**	**37.2**	14.5	**50.9**	13.1	--	**40.9**	--
LTUZ04 Comp	--	**1.6**		--	--	--	--	--	**2.8**	--	**1.9**
LTUZ05 0-24"	18.3	--	**49.1**	**63.3**	**42.6**	**34.0**	**51.8**	**37.2**	--	13.9	--
LTUZ05 24-36"	15.5	--	**64.2**	**147**	**50.1**	**50.7**	**41.9**	**34.2**	--	12.2	--
LTUZ05 Comp	--	**1.2**		--	--	--	--	--	**3.7**	--	**1.0**
LTUZ06 0-24"	21.8	--	**40.6**	**50.5**	**63.9**	28.5	33.4	**41.3**	--	19.3	--
LTUZ06 24-36"	16.7	--	32.1	**93.3**	**79**	31.6	32.8	**46.2**	--	19.1	--
LTUZ06 Comp	--	**1.9**		--	--	--	--	--	**2.5**	--	**2.7**
LTUZ07 0-24"	18.9	--	3.6	--	--	--	20.2	20.1	--	--	--
LTUZ07 24-36"	13.0	--	32.6	--	--	--	20.3	22.4	--	--	--
LTUZ07 Comp	--	**1.1**	--	--	--	--	--	--	**6.0**	--	**3.7**
LTUZ08 0-24"	13.1	--	1.9	--	--	--	27.6	18.6	--	--	--
LTUZ08 24-36"	33.7	--	4.7	--	--	--	28.2	15.7	--	--	--
LTUZ08 Comp	--	**1.3**	--	--	--	--	--	--	**1.9**	--	**3.2**
LTUZ09 0-24"	9.26	--	2.74	--	--	--	16.3	6.2	--	--	--
LTUZ09 24-36"	32.0	--	2.3	--	--	--	22.8	5.8	--	--	--
LTUZ09 Comp	--	**1.1**	--	--	--	--	--	--	**1.0**	--	**2.0**
LTUZ10 0-24"	15.4	--	4.1	--	--	--	32.0	1.4	--	--	--
LTUZ10 24-36"	15.0	--	4.1	--	--	--	**35.8**	6.5	--	--	--
LTUZ10 Comp	--	**0.9**	--	--	--	--	--	--	**1.6**	--	**2.2**
Average	30.7	**2.3**	77.9	97.8	68.0	31.6	38.5	26.7	**2.8**	26.8	**2.6**

Notes:
October 2007 sampling was conducted after the 2007 LTU offload, and after addition of SSP soils for final treatment.
For this table, dioxin (TEQ) was calculated using the MPTP ROD Methodology. Also see Appendix B for TEQs calculated using the DEQ-7 Methodology, where available.
Soil samples were not collected from the LTU in 2014, 2015, or in 2016 as part of site operations.
Soil samples were collected from the LTU in 2017. Refer to the Final Soil and Surface Water Data Gap Investigation for details (Tetra Tech 2017).

--	Not analyzed	Pace	Pace Analytical
µg/kg	Micrograms per kilogram	PCP	Pentachlorophenol
Bold	Concentration greater than cleanup level	ROD	Record of Decision
Comp	Composite	SSP	Soil salvage piles
LTU	Land treatment unit	TAL	Test America Laboratories / Severn Trent Laboratories, Inc.
MBMG	Montana Bureau of Mines and Geology Laboratory	TEF	Toxicity equivalency factor
mg/kg	Milligrams per kilogram	TEQ	Toxicity equivalence quotient
MPTP	Montana Pole and Treating Plant		

TABLE 4.1
HISTORICAL CONCENTRATIONS OF PCP FOR SURFACE WATER SAMPLES

Surface Water Station:	**SW-05**	**SS-06A**	**SW-09**	ROD
Analyte:	PCP	PCP	PCP	
Units:	(µg/L)	(µg/L)	(µg/L)	
Laboratory:	MBMG	MBMG	MBMG	
EPA Method:	8270/528[a]	8270/528[a]	8270/528[a]	Cleanup Level (µg/L)
2001 Range	0.071 - **1.8**	--	--	1.0
2002 Range	0.423 - **2.36**	--	--	1.0
2003 Range	0.058 - 0.15	--	--	1.0
2004 Range	--	--	--	1.0
2005 Range	0.45 - 0.071	--	--	1.0
2006 Range	0.038 - **1.03**	--	0.6	1.0
2007 Range	0.1U - 0.349	--	0.1U - 0.246	1.0
2008 Range	0.1U - 0.349	--	0.1U - 0.246	1.0
2009 Range	0.061 - 0.188	--	0.064 - 0.454	1.0
2010 Range	0.2U - 0.186	0.2U	0.2U	1.0
2011 Range	0.2U - 0.281	0.2U	0.2U	1.0
2012 Range	0.2U - 0.670	0.2U	0.2U	1.0
2013 Range	0.2U	0.2U - 0.214	0.2U	1.0
2014 Range	0.2U	0.2U	0.2U	1.0
2015 Range	0.2U	0.2U	0.2U	1.0
2016 Range	0.1U - 0.2U	0.1U - 0.2U	0.1U - 0.2U	1.0
2017 Range	0.195 - 0.1U	0.1U	0.1U	1.0
2018 Range	0.1U	0.1U - 0.241	0.1U	1.0
2019 Range	0.1U - 0.106	0.1U	0.1U	1.0
2020 Range	0.1U	0.1U	0.1U	1.0
February 2, 2020 (semi-annual sampling event)	0.1U	0.1U	0.1U	1.0
August 6, 2020 (annual sampling event)	0.1U	0.1U	0.1U	1.0

Notes:

[a] U.S. EPA Method 8270 was used prior to 2011; U.S. EPA Method 528 was used beginning in 2011.

-- Not sampled
µg/L Micrograms per liter
Bold Concentration exceeds ROD surface water cleanup level (1.0 µg/L)

Surface Water Station:	**SW-05**	**SS-06A**	**SW-09**	
Analyte:	PCP	PCP	PCP	
Units:	(µg/L)	(µg/L)	(µg/L)	
Laboratory:	MBMG	MBMG	MBMG	ROD
EPA Method:	8270/528[a]	8270/528[a]	8270/528[a]	Cleanup Level (µg/L)

EPA	U.S. Environmental Protection Agency
MBMG	Montana Bureau of Mines and Geology laboratory
PCP	Pentachlorophenol
ROD	Record of Decision
U	Analyzed for but not detected above the method detection limit

Data prior to October 2010 have not been back-checked against original laboratory data sheets.

TABLE 4.2

HISTORICAL CONCENTRATIONS OF DIOXIN (TEQ) FOR SURFACE WATER SAMPLES
(µg/L)

Sample Date	SS-06A	SW-05	SW-09	ROD Cleanup Level
8/21/2006	--	0	0	1.00E-05
8/26/2007	--	7.70E-07	--	1.00E-05
8/25/2008	--	0	5.10E-08	1.00E-05
8/10/2009	--	0	0	1.00E-05
8/16/2010	--	0	0	1.00E-05
8/15/2011	1.09E-07	8.10E-08	1.70E-08	1.00E-05
8/13/2012	4.10E-08	3.47E-07	3.40E-08	1.00E-05
8/13/2013[a]	1.90E-07	4.56E-07	1.86E-06	1.00E-05
8/11/2014	4.13E-08	5.84E-08	1.90E-08	1.00E-05
8/10/2015	3.94E-08	2.30E-08	5.14E-08	1.00E-05
8/8/2016	2.17E-07	2.15E-07	7.88E-08	1.00E-05
8/7/2017	1.90E-08	1.40E-07	1.20E-08	1.00E-05
8/12/2018	1.70E-08	5.90E-08	4.53E-08	1.00E-05
8/11/2019	1.73E-07	4.20E-07	3.84E-08	1.00E-05
8/9/2020	6.35E-07	1.21E-06	8.58E-07	1.00E-05

HISTORICAL CONCENTRATIONS OF DIOXIN (TEQ) FOR SURFACE WATER SAMPLES
(pg/L)

Sample Date	SS-06A	SW-05	SW-09	ROD Cleanup Level
8/21/2006	--	0	0	10.00
8/26/2007	--	0.77	--	10.00
8/25/2008	--	0	0.05	10.00
8/10/2009	--	0	0	10.00
8/16/2010	--	0	0	10.00
8/15/2011	0.11	0.08	0.02	10.00
8/13/2012	0.04	0.35	0.03	10.00
8/12/2013[a]	0.19	0.46	1.86	10.00
8/11/2014	0.04	0.06	0.02	10.00
8/10/2015	0.04	0.02	0.05	10.00
8/8/2016	0.22	0.22	0.08	10.00
8/7/2017	0.02	0.14	0.01	10.00
8/12/2018	0.02	0.06	0.05	10.00
8/11/2019	0.17	0.42	0.04	10.00
8/9/2020	0.64	1.21	0.86	10.00

Notes:
For this table, TEQs are calculated using the MPTP ROD Methodology.
See Appendix B-3 for dioxin (TEQ) values calculated using both the MPTP ROD Methodology and the DEQ-7 Methodology.

[a]	Significant rain event on August 1, 2013 (0.6 inch)
0	All dioxin congeners were below the reporting limit and set to 0 for the calculation of TEQ, resulting in a TEQ value equal to 0.
--	Not sampled
µg/L	Micrograms per liter
pg/L	Picograms per liter
MPTP	Montana Pole and Treating Plant
ROD	Record of Decision
TEQ	Toxicity equivalence quotient

TABLE 4.3
CONCENTRATIONS OF PAH AND CHLOROPHENOLS FOR SURFACE WATER SAMPLES

Surface Water Station:	SS-06A		SW-05		SW-09		
Sample Date:	8/11/2020		8/11/2020		8/11/2020		ROD
Laboratory:	MBMG		MBMG		MBMG		Cleanup Level
Units:	(µg/L)	Q	(µg/L)	Q	(µg/L)	Q	(µg/L)
ANALYTES							
PAH (EPA Method 8270)							
ACENAPHTHENE	0.25	U	0.25	U	0.25	U	-
ACENAPHTHYLENE	0.332		0.25	U	0.25	U	-
ANTHRACENE	0.25	U	0.25	U	0.25	U	-
BENZO(A)ANTHRACENE	0.1	U	0.1	U	0.1	U	1
BENZO(A)PYRENE	0.1	U	0.1	U	0.1	U	0.2/0.038[a]
BENZO(B)FLUORANTHENE	0.25	U	0.25	U	0.25	U	0.2
BENZO(G,H,I)PERYLENE	0.5	U	0.5	U	0.5	U	1
BENZO(K)FLUORANTHENE	0.1	U	0.1	U	0.1	U	1
CHRYSENE	0.1	U	0.1	U	0.1	U	1
DIBENZO(A,H)ANTHRACENE	0.1	U	0.1	U	0.1	U	0.2
FLUORANTHENE	0.684		0.412		0.25	U	-
FLUORENE	0.25	U	0.25	U	0.25	U	-
INDENO(1,2,3-CD)PYRENE	0.1	U	0.1	U	0.1	U	1
NAPHTHALENE	0.471		0.25	U	0.25	U	-
PHENANTHRENE	0.25	U	0.25	U	0.25	U	-
PYRENE	0.25	U	0.25	U	0.25	U	-
Total D PAH	2.24		1.66		1.50		360
CHLOROPHENOLS (EPA Method 8270)							
2,3,4,6-TETRACHLOROPHENOL	0.5	U	0.5	U	0.5	U	-
2,4,5-TRICHLOROPHENOL	1	U	1	U	1	U	-
2,4,6-TRICHLOROPHENOL	0.5	U	0.5	U	0.5	U	6.5
2,4-DICHLOROPHENOL	0.5	U	0.5	U	0.5	U	27
2-CHLOROPHENOL	0.5	U	0.5	U	0.5	U	45
4-CHLORO-3-METHYLPHENOL	0.5	U	0.5	U	0.5	U	-
PENTACHLOROPHENOL	0.1	U	0.1	U	0.1	U	1.0

Notes:

[a] The water quality standard for benzo(a)pyrene outlined in Circular DEQ-7 is lower than the cleanup levels specified in the ROD tables; therefore, the lower DEQ-7 standard (in parentheses) currently takes precedence over the ROD cleanup level for this analyte. The DEQ-7 standard for benzo(a)pyrene for surface water is 0.038 µg/L.

- No cleanup level specified in ROD
µg/L Micrograms per liter
D PAH Sum of the acenaphthene, acenaphthylene, anthracene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene concentrations
DEQ Montana Department of Environmental Quality
EPA U.S. Environmental Protection Agency
MBMG Montana Bureau of Mines and Geology
PAH Polycyclic aromatic hydrocarbons
Q Data qualifier
ROD Record of Decision
U Analyzed for but not detected above the method detection limit

TABLE 4.4
HISTORICAL CONCENTRATIONS OF PCP FOR SELECTED GROUNDWATER SAMPLES

Monitoring Well:	10-12	BMW-01A	BMW-01B	GW-14R-98	HCA-21	INF-04	MW-11-04	ROD Cleanup Level (µg/L)
Units:	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	
Laboratory:	MBMG	MBMG	MBMG	MBMG	MBMG	MBMG	MBMG	
EPA Method:	8270/528[a]	8270/528[a]	8270/528[a]	8270/528[a]	8270/528[a]	8270/528[a]	8270/528[a]	
2000 Range	NI	--	--	**9.02 - 34.5**	**265**	**787 - 1,500**	NI	1.0
2001 Range	NI	--	--	**2.1 - 38.9**	**253**	**14 - 663**	NI	1.0
2002 Range	NI	--	--	**1.6 - 37.5**	**165 - 201**	**5.4 - 72.3**	NI	1.0
2003 Range	NI	--	--	**1.8 - 28**	**171**	**12 - 151**	NI	1.0
2004 Range	NI	--	--	**1.3 - 4.6**	**84**	**13 - 17**	NI	1.0
2005 Range	NI	--	--	**1.1 - 37.5**	**57**	**28 - 35**	NI	1.0
2006 Range	NI	--	--	**17.5 - 72.7**	**1.11 - 39.2**	**18 - 205**	NI	1.0
2007 Range	NI	--	--	**2.25 - 15.2**	**20.2 - 20.6**	**119 - 199**	NI	1.0
2008 Range	NI	--	--	**1.1 - 4.41**	**13.7 - 26.3**	**102 - 124**	NI	1.0
2009 Range	NI	0.2U	0.2U	0.2U - **2.6**	**3.69 - 28.9**	**44.2 - 79.3**	NI	1.0
2010 Range	0.605 - **1.03**	0.186	0.164	0.806 - **3.45**	0.873 - **7.67**	**80.0 - 81.3**	NI	1.0
2011 Range	0.618 - **1.51**	NS	NS	0.60 - **1.45**	**6.18 - 16.9**	**31.7 - 56.3**	**3,490**	1.0
2012 Range	0.2U - 0.351	0.2U	0.2U	**1.05**	**1.16 - 9.35**	**1.61 - 67.7**	**1,440 - 1,450**	1.0
2013 Range	0.213 - 0.305	0.2U - 0.251	0.2U	0.297	0.49	**21.5 - 43.2**	**1,536 - 7,400**[b]	1.0
2014 Range	0.2U - 0.626	0.2U	0.2U	0.2U	0.34	**10.3 - 105**	**668 - 1197**	1.0
2015 Range	0.2U	0.2U	0.2U	0.2U - 1.32	0.2U - 0.37	**47.7 - 53.4**	**340 - 1,022**	1.0
2016 Range	0.1U - 0.2U	0.1U - 0.2U	0.1U - 0.2U	0.903 - 1.28	0.212 - 0.646	**83 - 109**	**1,220 - 1,606**	1.0
2017 Range	0.158	0.1U - 0.103	0.109 - 0.422	0.576	0.544 - 0.699	**62.8 - 149**	**1,560 - 3,305**	1.0
2018 Range	--	0.1U	0.1U - 0.207	--	0.867 - 1.680	**72 - 159**	**2,680 - 24,700**	1.0
2019 Range	--	0.1U	0.1U	--	0.444 - 0.589	**107 - 164**	**722 - 967**	1.0
2020 Range	--	0.1U	0.1U	--	0.1U-0.291	**90.4-130**	**731 - 757**	1.0
February 2, 2019 (semi-annual monitoring event)	--	0.1U	0.1U	--	0.589	**107.0**	**722**	1.0
August 11, 2019 (annual monitoring event)	--	0.1U	0.1U	--	0.444	**164**	**967**	1.0

Notes:

[a] EPA Method 8270 was used prior to 2011; EPA Method 528 was used in 2011 and thereafter

[b] Insufficient water to fully bail well before sample was collected; concentration biased high

-- Not sampled
µg/L Micrograms per liter
Bold Concentration exceeds ROD groundwater cleanup level
EPA U.S. Environmental Protection Agency
MBMG Montana Bureau of Mines and Geology
NI Monitoring well was not yet installed
NS Not sampled
PCP Pentachlorophenol
ROD Record of Decision
U Analyzed for but not detected above the method detection limit

TABLE 4.5
HISTORICAL CONCENTRATIONS OF DIOXIN (TEQ) FOR GROUNDWATER SAMPLES
(µg/L)

Sample Date	12-Oct	BMW-01A	BMW-01B	GW-12	GW-14R-98	HCA-21	INF-04	INF-05	INF-06	MW-11-04	MW-B-98	MW-D-96	MW-E-01	MW-L-96	MW-U-01	MW-V-01	NWW	ROD Cleanup Level
8/13/2001	--	--	--	--	--	--	--	--	3.83E-06	--	--	--	7.70E-08	2.10E-08	--	--	--	3.00E-05
8/12/2002	--	--	--	--	--	--	--	--	2.00E-07	--	--	--	2.10E-07	1.70E-07	--	--	--	3.00E-05
8/4/2003	--	--	--	--	--	--	--	--	4.90E-08	--	--	--	1.10E-07	0	--	--	--	3.00E-05
8/2/2004	--	--	--	--	--	--	--	--	7.00E-07	--	--	--	**4.35E-05**	0	--	--	--	3.00E-05
8/1/2005	--	--	--	--	--	--	--	--	9.20E-08	--	--	--	2.70E-06	5.30E-07	--	--	--	3.00E-05
8/21/2006	--	--	--	7.90E-08	--	--	1.29E-05	0	7.20E-08	--	7.80E-08	9.20E-08	**5.96E-05**	0	--	--	--	3.00E-05
8/27/2007	--	--	--	2.80E-07	--	--	6.90E-07	7.00E-08	0.00E+00	--	0	0	1.00E-07	0	--	--	--	3.00E-05
8/25/2008	--	--	--	0	--	--	1.26E-05	8.00E-08	0.00E+00	--	0	6.50E-07	1.30E-07	0	--	--	--	3.00E-05
8/10/2009	--	--	--	--	0	--	1.40E-07	--	--	--	0	--	--	--	0	--	--	3.00E-05
8/16/2010	--	--	--	--	0	--	**4.50E-05**	--	--	--	0	--	--	--	0	--	--	3.00E-05
8/15/2011	--	--	--	--	1.05E-06	--	4.09E-06	--	--	--	9.30E-09	--	--	--	--	2.82E-08	1.70E-08	3.00E-05
8/13/2012	--	--	--	--	1.18E-07	--	2.75E-05	--	--	--	1.04E-07	--	--	--	--	3.30E-08	7.40E-08	3.00E-05
8/13/2013	4.50E-08	8.81E-08	1.12E-07	--	6.70E-07	8.04E-08	5.59E-06	--	--	9.91E-06	--	--	--	--	--	--	--	3.00E-05
8/11/2014	2.70E-08	2.08E-08	1.83E-08	--	1.42E-07	7.77E-07	**1.38E-04**	--	--	7.15E-06	--	--	--	--	--	--	--	3.00E-05
8/10/2015	1.04E-07	7.50E-09	2.70E-08	--	9.03E-06	4.23E-07	6.31E-07	--	--	6.46E-06	--	--	--	--	--	--	--	3.00E-05
8/8/2016	2.30E-08	4.40E-08	1.94E-08	--	4.13E-07	2.02E-07	7.76E-07	--	--	1.56E-05	--	--	--	--	--	--	--	3.00E-05
8/10/2017	--	1.44E-08	8.50E-08	--	--	3.60E-08	8.41E-05	--	--	3.72E-04	--	--	--	--	--	--	--	3.00E-05
8/13/2018	--	2.20E-08	2.81E-08	--	--	2.10E-09	**5.10E-04**	--	--	**5.62E-05**	--	--	--	--	--	--	--	3.00E-05
8/11/2019	--	3.64E-08	1.27E-07	--	--	1.27E-06	**9.21E-05**	--	--	**8.90E-05**	--	--	--	--	--	--	--	3.00E-05
8/9/2020	--	8.44E-07	1.14E-06	--	--	8.15E-07	**1.48E-04**	--	--	**3.36E-05**	--	--	--	--	--	--	--	3.00E-05

HISTORICAL CONCENTRATIONS OF DIOXIN (TEQ) FOR GROUNDWATER SAMPLES
(pg/L)

Sample Date	12-Oct	BMW-01A	BMW-01B	GW-12	GW-14R-98	HCA-21	INF-04	INF-05	INF-06	MW-11-04	MW-B-98	MW-D-96	MW-E-01	MW-L-96	MW-U-01	MW-V-01	NWW	ROD Cleanup Level
8/13/2001	--	--	--	--	--	--	--	--	3.83	--	--	--	0.077	0.021	--	--	--	30.0
8/12/2002	--	--	--	--	--	--	--	--	0.20	--	--	--	0.21	0.17	--	--	--	30.0
8/4/2003	--	--	--	--	--	--	--	--	0.049	--	--	--	0.11	0.00	--	--	--	30.0
8/2/2004	--	--	--	--	--	--	--	--	0.70	--	--	--	**43.45**	0.00	--	--	--	30.0
8/1/2005	--	--	--	--	--	--	--	--	0.092	--	--	--	2.695	0.53	--	--	--	30.0
8/21/2006	--	--	--	0.079	--	--	12.92	0	0.072	--	0.078	0.092	**59.63**	0.00	--	--	--	30.0
8/26/2007	--	--	--	0.28	--	--	0.69	0.07	0	--	0	0	0.10	0	--	--	--	30.0
8/25/2008	--	--	--	0	--	--	12.64	0.08	0	--	0	0.650	0.13	0	--	--	--	30.0
8/10/2009	--	--	--	--	0	--	0.14	--	--	--	0	--	--	--	0	--	--	30.0
8/16/2010	--	--	--	--	0	--	**45.0**	--	--	--	0	--	--	--	0	--	--	30.0
8/15/2011	--	--	--	--	1.05	--	4.09	--	--	--	0.009	--	--	--	--	0.028	0.017	30.0
8/13/2012	--	--	--	--	0.12	--	27.50	--	--	--	0.104	--	--	--	--	0.033	0.074	30.0
8/12/2013	0.05	0.09	0.11	--	0.67	0.08	5.59	--	--	9.91	--	--	--	--	--	--	--	30.0
8/11/2014	0.03	0.02	0.02	--	0.14	0.78	**138**	--	--	7.15	--	--	--	--	--	--	--	30.0
8/10/2015	0.10	0.01	0.03	--	9.03	0.42	0.63	--	--	6.46	--	--	--	--	--	--	--	30.0
8/8/2016	0.02	0.04	0.02	--	0.41	0.20	0.78	--	--	15.60	--	--	--	--	--	--	--	30.0
8/10/2017	--	0.01	0.09	--	--	0.04	**84.05**	--	--	**372.40**	--	--	--	--	--	--	--	30.0
8/13/2018	--	0.02	0.03	--	--	0.00	**509.81**	--	--	**56.23**	--	--	--	--	--	--	--	30.0
8/11/2019	--	0.04	0.13	--	--	1.27	**92.10**	--	--	**88.97**	--	--	--	--	--	--	--	31.0
8/9/2020	--	0.84	1.14	--	--	0.82	**148.17**	--	--	**33.61**	--	--	--	--	--	--	--	32.0

Notes:
For this table, TEQs are calculated using the MPTP ROD Methodology.
See Appendix B-3 for dioxin (TEQ) values calculated using both the MPTP ROD Methodology and the DEQ-7 Methodology.

0	Dioxin congeners were below the reporting limit and set to 0 for the calculation of TEQ, resulting in a TEQ equal to 0.
--	Monitoring well did not exist or was not sampled on this date
µg/L	Micrograms per liter
Bold	Concentration exceeds the ROD groundwater cleanup level
pg/L	Picograms per liter
MPTP	Montana Pole and Treating Plant
ND	Not detected
NS	Not sampled
ROD	Record of Decision
TEQ	Toxicity equivalence quotient

TABLE 4.6
CONCENTRATIONS OF PAH AND CHLOROPHENOLS FOR GROUNDWATER SAMPLES

Monitoring Well:	10-12		BMW-01A		BMW-01B		GW-14R-98		HCA-21		INF-04		MW-11-04		ROD
Sample Date:	NS		8/9/2020		8/9/2020		NS		8/9/2020		8/9/2020		8/9/2020		Cleanup Level
Laboratory:	MBMG		MBMG		MBMG		MBMG		MBMG		MBMG		MBMG		
Units:	(µg/L)	Q	(µg/L)	Q	(µg/L)	Q	(µg/L)	Q	(µg/L)	Q	(µg/L)	Q	(µg/L)	Q	(µg/L)
ANALYTE															
PAH (EPA Method 8270)															
ACENAPHTHENE	NS		0.25	U	0.25	U	NS		0.25	U	0.25	U	0.25	U	-
ACENAPHTHYLENE	NS		0.25	U	0.25	U	NS		0.328		0.25	U	0.25	U	-
ANTHRACENE	NS		0.25	U	0.25	U	NS		0.25	U	0.25	U	0.25	U	-
BENZO(A)ANTHRACENE	NS		0.1	U	0.1	U	NS		0.1	U	0.1	U	0.1	U	1
BENZO(A)PYRENE	NS		0.1	U	0.1	U	NS		0.1	U	0.1	U	0.1	U	0.2/0.05[a]
BENZO(B)FLUORANTHENE	NS		0.25	U	0.25	U	NS		0.25	U	0.25	U	0.25	U	0.2
BENZO(G,H,I)PERYLENE	NS		0.5	U	0.5	U	NS		0.5	U	0.5	U	0.5	U	1
BENZO(K)FLUORANTHENE	NS		0.1	U	0.1	U	NS		0.1	U	0.1	U	0.1	U	1
CHRYSENE	NS		0.1	U	0.1	U	NS		0.1	U	0.1	U	0.1	U	1
DIBENZO(A,H)ANTHRACENE	NS		0.1	U	0.471		NS		0.1	U	0.1	U	0.1	U	0.2
FLUORANTHENE	NS		0.25	U	0.25	U	NS		0.25	U	0.25	U	0.25	U	-
FLUORENE	NS		0.25	U	0.25	U	NS		0.25	U	0.25	U	9.53		-
INDENO(1,2,3-CD)PYRENE	NS		0.1	U	0.1	U	NS		0.1	U	0.1	U	0.1	U	1
NAPHTHALENE	NS		0.25	U	0.25	U	NS		0.25	U	0.25	U	29.1		-
PHENANTHRENE	NS		0.25	U	0.25	U	NS		0.25	U	0.25	U	0.25	U	-
PYRENE	NS		0.25	U	0.25	U	NS		0.25	U	0.25	U	0.52		-
Total D PAH	NS		1.50		1.50		NS		1.58		1.50		39.63		360
CHLOROPHENOLS (EPA Method 8270)															
2,3,4,6-TETRACHLOROPHENOL	NS		0.5	U	0.5	U	NS		0.5	U	10.8		46.5	D	-
2,4,5-TRICHLOROPHENOL	NS		1	U	1	U	NS		1	U	6.2	D	6.2	D	-
2,4,6-TRICHLOROPHENOL	NS		0.5	U	0.5	U	NS		0.5	U	0.5	U	0.5	U	6.5
2,4-DICHLOROPHENOL	NS		0.5	U	0.5	U	NS		0.5	U	0.5	U	0.5	U	27
2-CHLOROPHENOL	NS		0.5	U	0.5	U	NS		0.5	U	0.5	U	0.5	U	45
4-CHLORO-3-METHYLPHENOL	NS		0.5	U	0.5	U	NS		0.5	U	0.5	U	64.8	D	-
PENTACHLOROPHENOL	NS		0.1	U	0.1	U	NS		0.1	U	90.4	D	731	D	1.0

Notes:

[a] The water quality standard for benzo(a)pyrene outlined in Circular DEQ-7 is lower than the cleanup levels specified in the ROD tables; therefore, the lower DEQ-7 standard (in parentheses) currently takes precedence over the ROD cleanup level for this COC. The DEQ-7 standard for benzo(a)pyrene is 0.05 µg/L.

- No cleanup level specified in ROD
µg/L Micrograms per liter
Bold Concentration exceeds ROD groundwater cleanup level
COC Contaminant of concern
D PAH Sum of the acenaphthene, acenaphthylene, anthracene, fluoranthene, fluorene, naphthalene, phenanthrene, and pyrene concentrations
DEQ Montana Department of Environmental Quality
EPA U.S. Environmental Protection Agency
MBMG Montana Bureau of Mines and Geology
NS Not sampled
PAH Polycyclic aromatic hydrocarbons
Q Laboratory data qualifier
ROD Record of Decision
U Analyzed for but not detected above the method detection limit

TABLE 4.7
DATA EVALUATION AND PROGRESS OF REMEDIATION

Criterion Number	Criterion	Data Used	Type of Analysis	Results from Analysis	Documentation of Results (refer to)	Comments	Compliance with ROD?
1	The WTP effluent (station EFF) must meet the 1 µg/L discharge to surface water cleanup level for PCP (and specified cleanup levels for other contaminants listed in the ROD, where established).	Data from WTP station EFF (treated groundwater) were evaluated to determine if this criterion was met.	Comparisons of the concentrations of contaminants at WTP station EFF to the ROD discharge to surface water cleanup levels.	92 percent of results from weekly PCP analyses (49 of 53 samples) were below the PCP 1.0 µg/L ROD discharge to surface water cleanup level. The concentrations of dioxins, PAH, and chlorophenols were below the ROD discharge to surface water cleanup levels, where established.	Table 2.4 (PCP) Table 2.5 (dioxins) Table 2.6 (PAH and chlorophenols) Appendix A	-	Criterion 1 was mostly satisfied. Four samples (collected on July 2, 16, and 23, and December 3, 2018) exceeded the ROD surface water screening level for PCP.
2	Surface water in Silver Bow Creek must meet the 1 µg/L surface water cleanup level for PCP (and specified cleanup levels for other contaminants listed in the ROD).	Data from surface water stations SW-05 (downstream from the site), SS-06A (adjacent to the site), and SW-09 (upstream of the site) located on Silver Bow Creek were evaluated.	Comparisons of the concentrations of contaminants at surface water stations SW-05, SS-06A, and SW-09 to the ROD surface water cleanup levels, where established.	The concentrations of PCP, dioxins, PAH, and chlorophenols were below the respective ROD surface water cleanup levels (where established).	Table 4.1 (PCP) Table 4.2 (dioxins) Table 4.3 (PAH and chlorophenols) Appendix A	-	Yes
3	The PCP plume must remain on site. This criterion is assumed to be met if the concentration of PCP in groundwater in downgradient sentinel monitoring wells continue to meet the groundwater cleanup level for PCP.	Data from downgradient sentinel monitoring wells (stations BMW 01A and BMW-01B) were evaluated to determine if the ROD groundwater cleanup level for PCP (1 µg/L) continued to be met at these locations.	Comparison of the concentrations of PCP in downgradient sentinel monitoring wells (BMW-01A and BMW-01B) to the 1 µg/L ROD groundwater cleanup level.	The concentrations of PCP were below the 1 µg/L ROD groundwater cleanup level at downgradient sentinel monitoring wells BMW-01A, and BMW-01B.	Table 4.4 (PCP) Appendix A	-	Yes
4	The concentrations of dioxins, PAH, and chlorophenols in groundwater at representative monitoring wells along the south bank of Silver Bow Creek must meet the specified ROD groundwater cleanup levels, where established.	Data from monitoring ell BMW-01A, BMW-01B, and HCA-21 are evaluated to determine if this criterion was met.	Comparisons of the concentrations of dioxins, PAH, and chlorophenols at groundwater monitoring wells s BMW-01A, BMW-01B, and HCA-21 to the ROD groundwater cleanup levels.	The concentrations of dioxins, PAH, and chlorophenols were below the respective cleanup levels in the wells that were sampled.	Table 4.5 (dioxins) Table 4.6 (PAH and chlorophenols) Appendix A	-	Yes
5	The long-term trend in the concentrations of PCP in groundwater over time should be decreasing, suggesting that groundwater quality will eventually meet the 1 µg/L groundwater cleanup level for PCP.	Data from groundwater monitoring wells with a long-term period of record (2004 to 2018) located along the south bank of Silver Bow Creek, and within the PCP plume footprint were evaluated to determine if this criterion was met.	Mann-Kendall statistical test for trends (90 percent confidence interval)	The trend in the concentration of PCP over time in monitoring well HCA-21 is decreasing at greater than the 90 percent confidence level. The concentrations of PCP in monitoring wells HCA-21 (0.699 µg/L)) during the August 2017 sampling event suggests that groundwater quality will eventually meet the ROD 1 µg/L groundwater cleanup level for PCP.	Appendix A Appendix F	-	Yes
6	The long-term trend in the area of the PCP plume must be stable or shrinking, showing that ongoing remedial action is effectively preventing the spread of contamination.	The long-term trend (since 1993) in the digitized area of the PCP plume was evaluated using all available monitoring well data to construct the 1 µg/L PCP isocontour for each year that data were available.	Direct comparison of PCP plume area after the ROD was signed (1993) to the current area of the PCP plume (August 1, 2017).	Over the past 24 years, the total area of the PCP plume on the south side of Silver Bow Creek (based on the 1 µg/L isocontour line) has decreased from 41.7 acres in 1993 to 16.7 acres on August 1, 2017. This decrease represents a 60 percent reduction in the area of the PCP plume.	Figure 4.8 Appendix F Appendix G	-	Yes
7	The short-term trend (previous 5 years) in the area of the PCP plume must be stable or shrinking, showing that ongoing remedial action is effectively preventing the spread of contamination.	The short-term trend (previous 5 years) in the digitized area of the PCP plume using the 1 µg/L isocontour was evaluated to determine if this criterion was met.	Mann-Kendall statistical test for trends (90 percent confidence interval)	Over the past 5 years, no particular trend is exhibited. However, the vast majority (64 percent) of detections of PCP have been below the 1.0 µg/L groundwater cleanup level; the highest recorded concentration being 1.32 µg/L in monitoring well GW-14R-98 on August 10, 2015. This analysis supports a conclusion that the downgradient edge of the plume may be stable.	Appendix F Appendix G	-	Yes

Notes:

-	No comment
µg/L	Micrograms per liter
BSB	Butte-Silver Bow
Dioxins	Polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans
EFF	WTP effluent station EFF
GAC	Granulated activated carbon
MK Tests	Mann-Kendall statistical tests for trends
MPTP	Montana Pole and Treating Plant
PAH	Polycyclic aromatic hydrocarbons
PCP	Pentachlorophenol
ROD	Record of Decision
U	Analyzed for but not detected above the method detection limit
WTP	MPTP water treatment plant
WWTP	Wastewater treatment plant

TABLE 4.8
HISTORICAL VOLUME OF LNAPL RECOVERED

Year	LNAPL Recovered (gallons)
2000	967
2001	1,367
2002	2,104
2003	570
2004	523
2005	511
2006	461
2007	3
2008	46
2009	6
2010	0
2011	0
2012	0
2013	0
2014	0[a,e]
2015	0[b,e]
2016	0[c,e]
2017	0[d,e]
2018	0[e]
2019	0[e]
2020	0[e]
Total	6,558

Notes:

[a] An oil sheen was noted in the NHRT from October 20, 2014, to October 23, 2014; adsorbent pads were emplaced.

[b] An oil sheen was noted in the NHRT on May 22, 2015, November 24, 2015, and December 22, 2015; adsorbent pads were emplaced.

[c] An oil sheen was noted in the NHRT July through December; adsorbent pads were emplaced.

[d] Less than 0.02 feet of product was detected in the NHRT during January and February, 2017. A sheen was noted in March, 2017. No product was detected the remainder of the year.

[e] Some residual oils are still present near the NHRT, primarily below the interstate highway and WTP

BSB Butte-Silver Bow
LNAPL Light non-aqueous phase liquid
MPTP Montana Pole and Treating Plant
NHRT Near-highway recovery trench

WTP	MPTP water treatment plant

TABLE 5.1

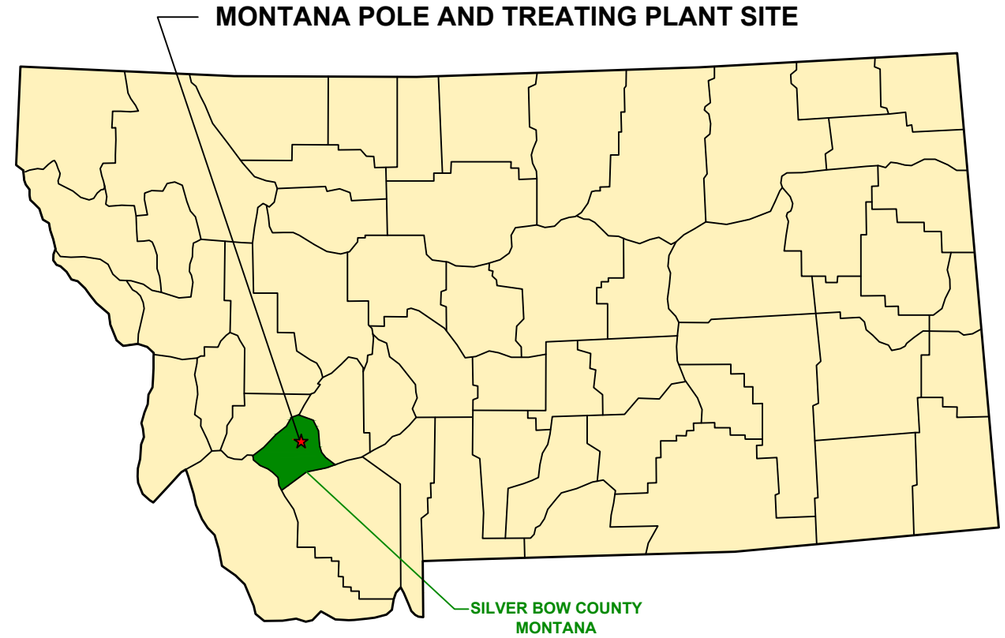
HISTORICAL CONCENTRATIONS OF PCP FOR RESIDENTIAL WELL SAMPLES

Domestic Well Name:			Wayrynen	Town Pump #1	Bowler	Hendrickson	Dixon (Rongstad)	ROD Cleanup Level
Location:			Upgradient Business Well - South of Contaminant Plume	Upgradient Business Well - East of Land Treatment Unit	Domestic Irrigation Well - North of Contaminant Plume	Domestic Potable Water well -South East of Contaminant Plume	Domestic Irrigation Well - North of Land Treatment Unit	
Analyte:			PCP	PCP	PCP	PCP	PCP	
Units:			(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)	(µg/L)
Year	Laboratory	EPA Method						
2001	Energy	8151A	0.13	0.14	0.12	0.11	0.1	1.0
2002	Energy	E515.1	0.2U	0.2U	0.2U	0.2U	0.2U	1.0
2002	Energy	E515.1	0.1U	0.1U	0.1U	0.1U	0.1U	1.0
2003	Energy	E515.1	0.040U	0.040U	0.040U	0.040U	0.071	1.0
2004	Energy	E515.1	0.040U	0.040U	0.040U	0.040U	0.040U	1.0
2005	Energy	E515.1	0.040U	0.040U	0.040U	0.040U	0.040U	1.0
2006	MBMG	8041A	0.1U	0.1U	0.1U	0.1U	0.1U	1.0
2007	MBMG	8041A	0.101	0.057	0.467	0.056	0.096	1.0
2008	MBMG	8041A	0.131	0.073	0.083	0.102	0.115	1.0
2009	--	--	--	--	0.2	--	--	1.0
2010	--	--	--	--	--	--	--	1.0
2011	--	--	--	--	--	--	--	1.0
2012	--	--	--	--	--	--	--	1.0
2013	--	--	--	--	--	--	--	1.0
2014	--	--	--	--	--	--	--	1.0
2015	--	--	--	--	--	--	--	1.0
2016	--	--	--	--	--	--	--	1.0
2017	--	--	--	--	--	--	--	1.0
2018	--	--	--	--	--	--	--	1.0
2019	--	--	--	--	--	--	--	1.0
2020	--	--	--	--	--	--	--	1.0

Notes:

--	Not sampled
µg/L	Micrograms per liter
Energy	Energy Laboratories Inc.
EPA	U.S. Environmental Protection Agency
MBMG	Montana Bureau of Mines and Geology
PCP	Pentachlorophenol
ROD	Record of Decision
U	Analyzed for but not detected above the method detection limit

FIGURES



AERIAL IMAGERY SOURCE:
ESRI/WORLD IMAGERY (2019) and DRONE FLIGHT (JULY 2020)

120 0 120 240

SCALE IN FEET

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE 1.1
SITE MAP

TETRA TECH

Figure 1.1_Site Map.dwg - DWH - 03/02/2021

LEGEND

APPROXIMATE LOCATION OF INFILTRATION CELLS

AERIAL IMAGERY SOURCE: DRONE FLIGHT (JULY 2020)

120 0 60 120

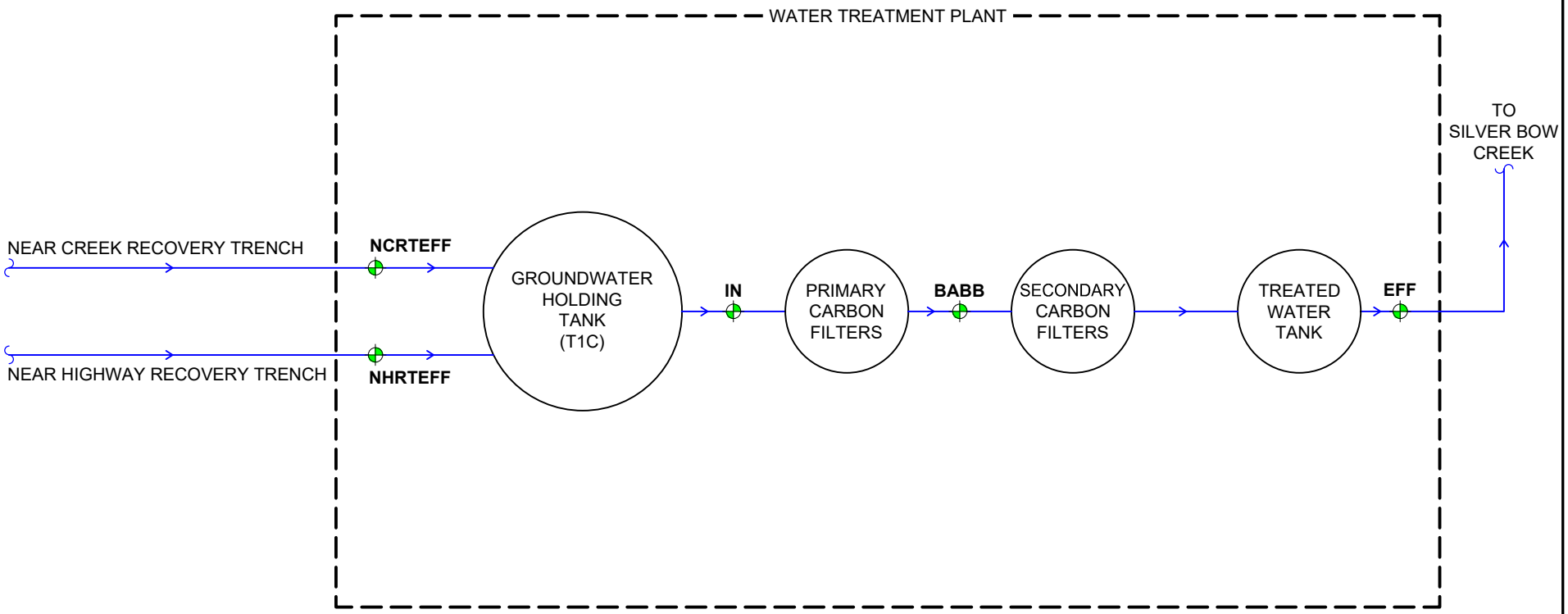
SCALE IN FEET

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE 2.1
SOUTH INFILTRATION CELLS

TETRA TECH

Figure 2.1_South Infiltration Cells.dwg - DWH - 03/02/2021



LEGEND

- MPTP WATER TREATMENT PLANT SAMPLE STATION
- PIPING
- MPTP MONTANA POLE AND TREATING PLANT

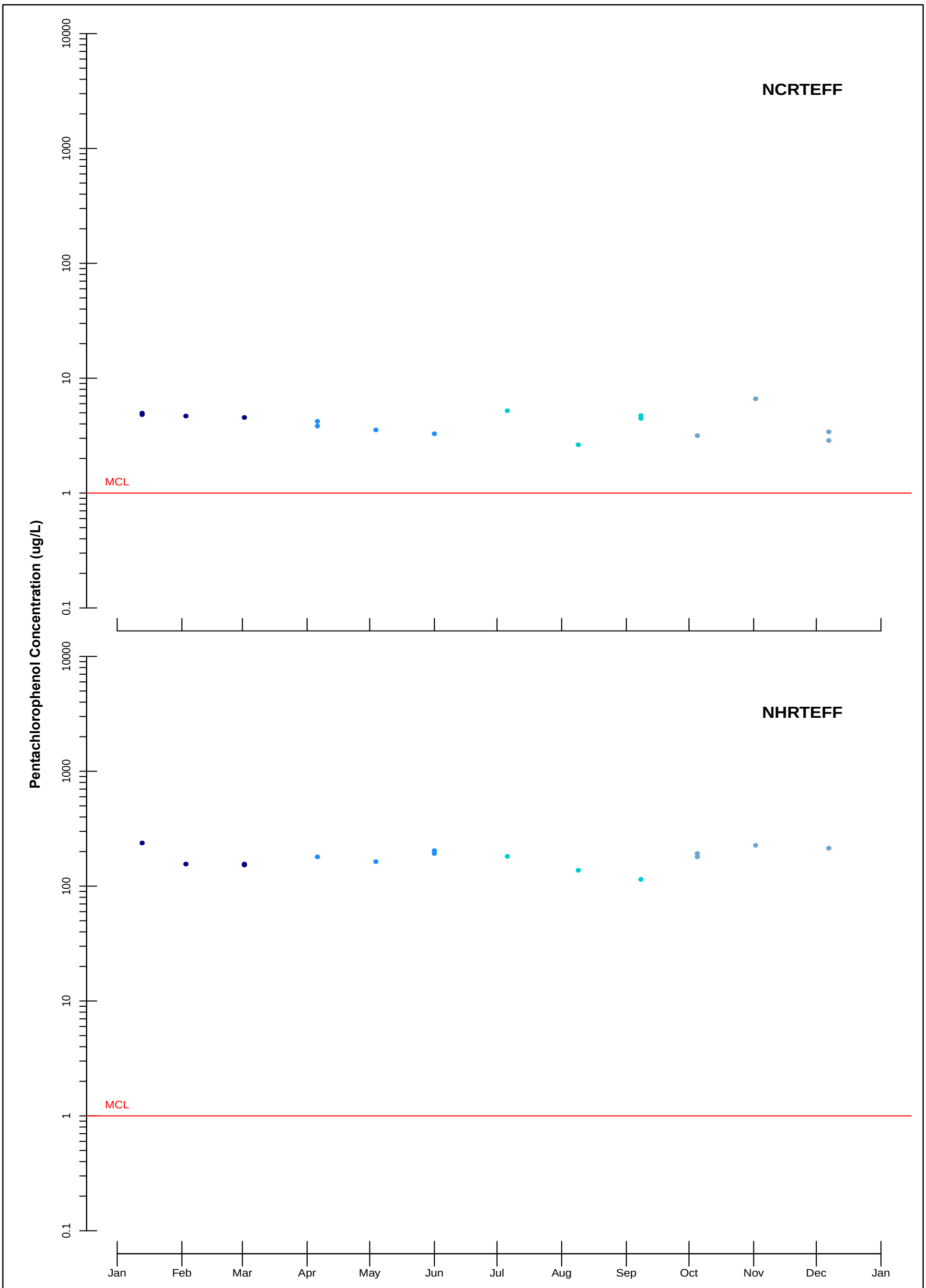
NO SCALE

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE 2.3
LOCATION OF
MPTP WATER TREATMENT PLANT
SAMPLE STATIONS

TETRA TECH

Figure 2.3_Plant Sample Stations.dwg - DWH - 03/02/2021

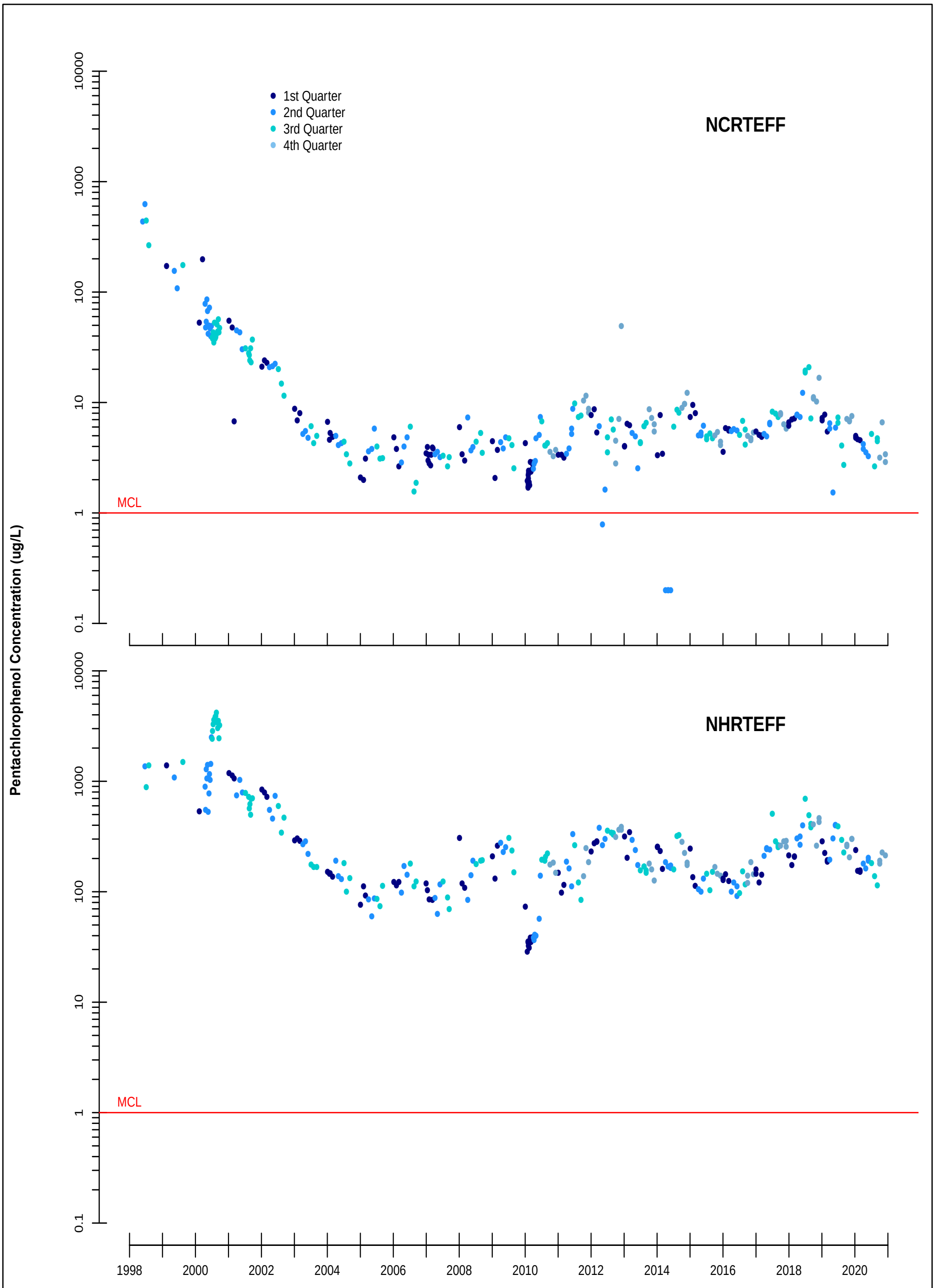


µg/L	Micrograms per liter
MPTP	Montana Pole and Treating Plant
MCL	ROD Maximum Contaminant Level for Groundwater
NCRTEFF	Near Creek Recovery Trench Effluent
NHRTEFF	Near Highway Recovery Trench Effluent
ROD	Montana Pole and Treating Plant Record of Decision

Montana Pole and Treating Plant
Butte - Silver Bow Montana

FIGURE 2.4a
NCRT AND NHRT EFFLUENT
PCP SAMPLE RESULTS 2020

TETRA TECH



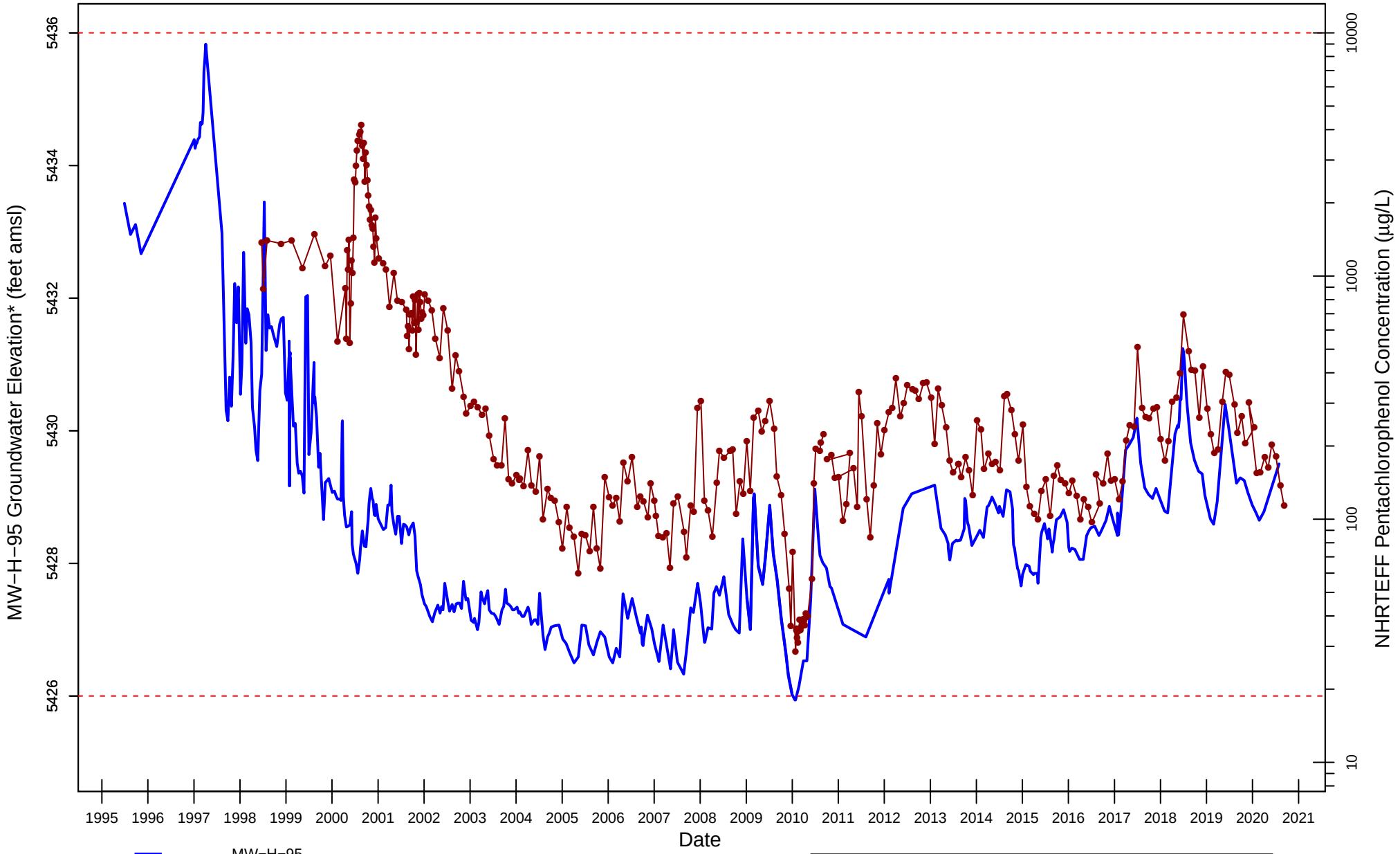
µg/L	Micrograms per liter
MPTP	Montana Pole and Treating Plant
MCL	ROD Maximum Contaminant Level for Groundwater
NCRTEFF	Near Creek Recovery Trench Effluent
NHRTEFF	Near Highway Recovery Trench Effluent
ROD	Montana Pole and Treating Plant Record of Decision

*Analytical results from samples collected before 2010 are not in the current database, and may not have undergone the same Quality Controls as samples collected post-2010.

Montana Pole and Treating Plant
Butte - Silver Bow Montana

FIGURE 2.4b
NCRT AND NHRT EFFLUENT
PCP SAMPLE RESULTS
1998 - CURRENT

TETRA TECH



MW−H−95
NHRTEFF
Estimated extent of Smear Zone (5426 to 5436 feet amsl)

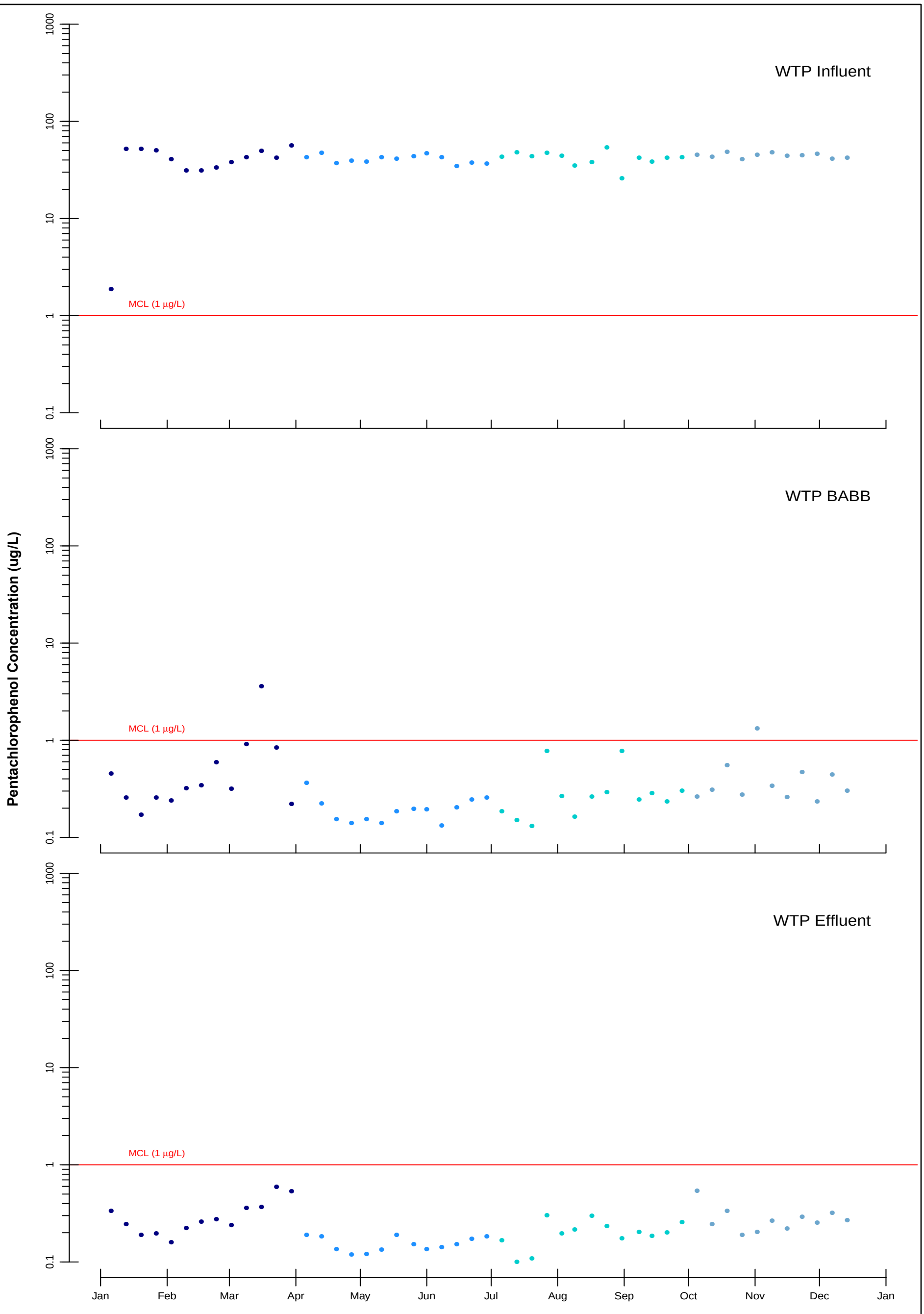
µg/L	micrograms per liter
amsl	above mean sea level
NHRTEFF	Near Highway Recovery Trench Effluent
PCP	Pentachlorophenol

*Groundwater Elevations prior to 2009 from Montana Bureau Mine and Geology

Montana Pole and Treating Plant
Butte−Silver Bow Montana

FIGURE 2.5
GROUNDWATER ELEVATION VS
PCP CONCENTRATION 1995−CURRENT

TETRA TECH

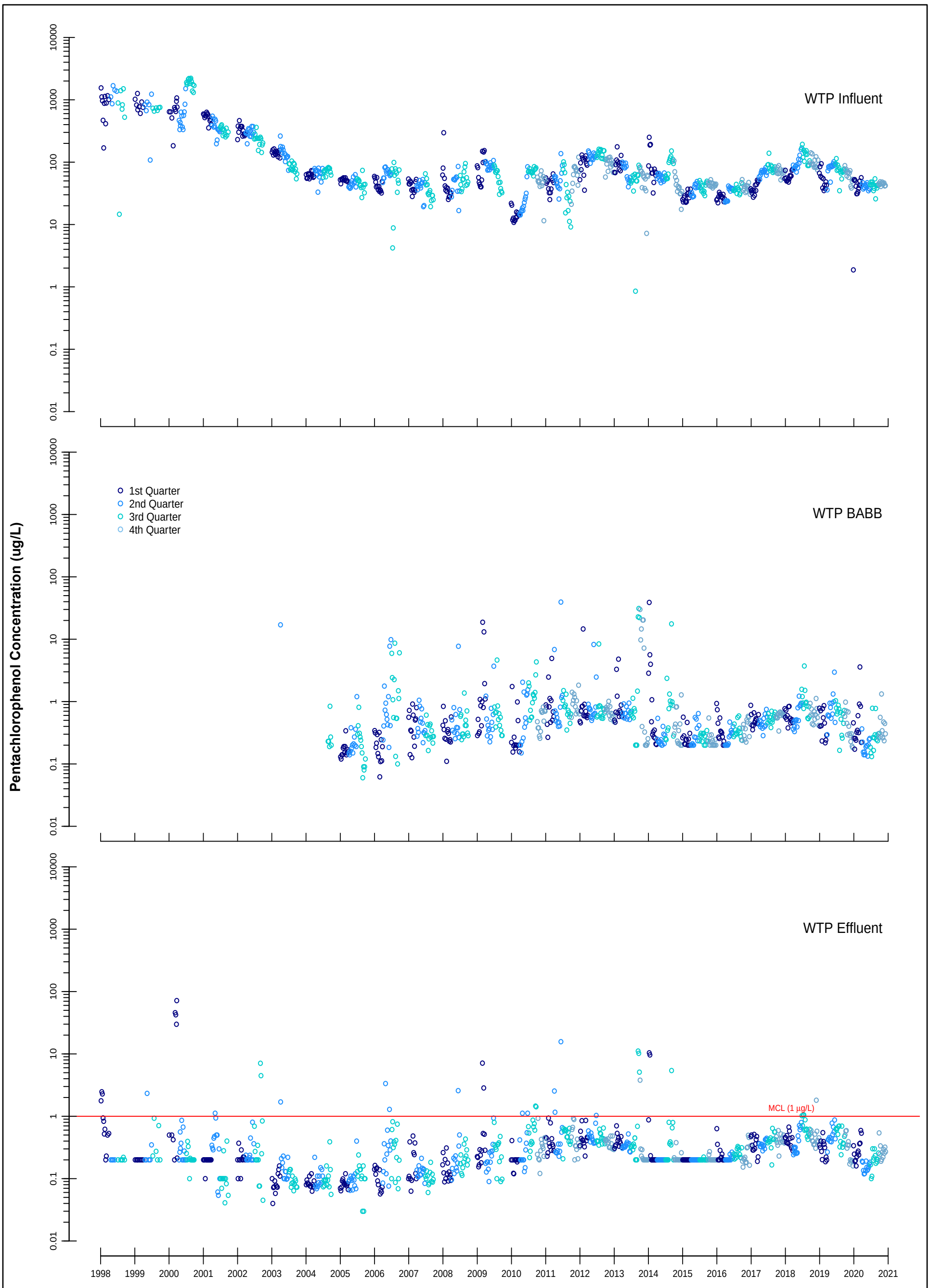


µg/L Micrograms per liter
MCL Maximum Contaminant Level for Discharge to Surface Water
PCP Pentachlorophenol
WTP Water Treatment Plant

Montana Pole and Treating Plant
Butte - Silver Bow Montana

FIGURE 2.6a
WATER TREATMENT PLANT
PCP SAMPLE RESULTS 2020

TETRA TECH



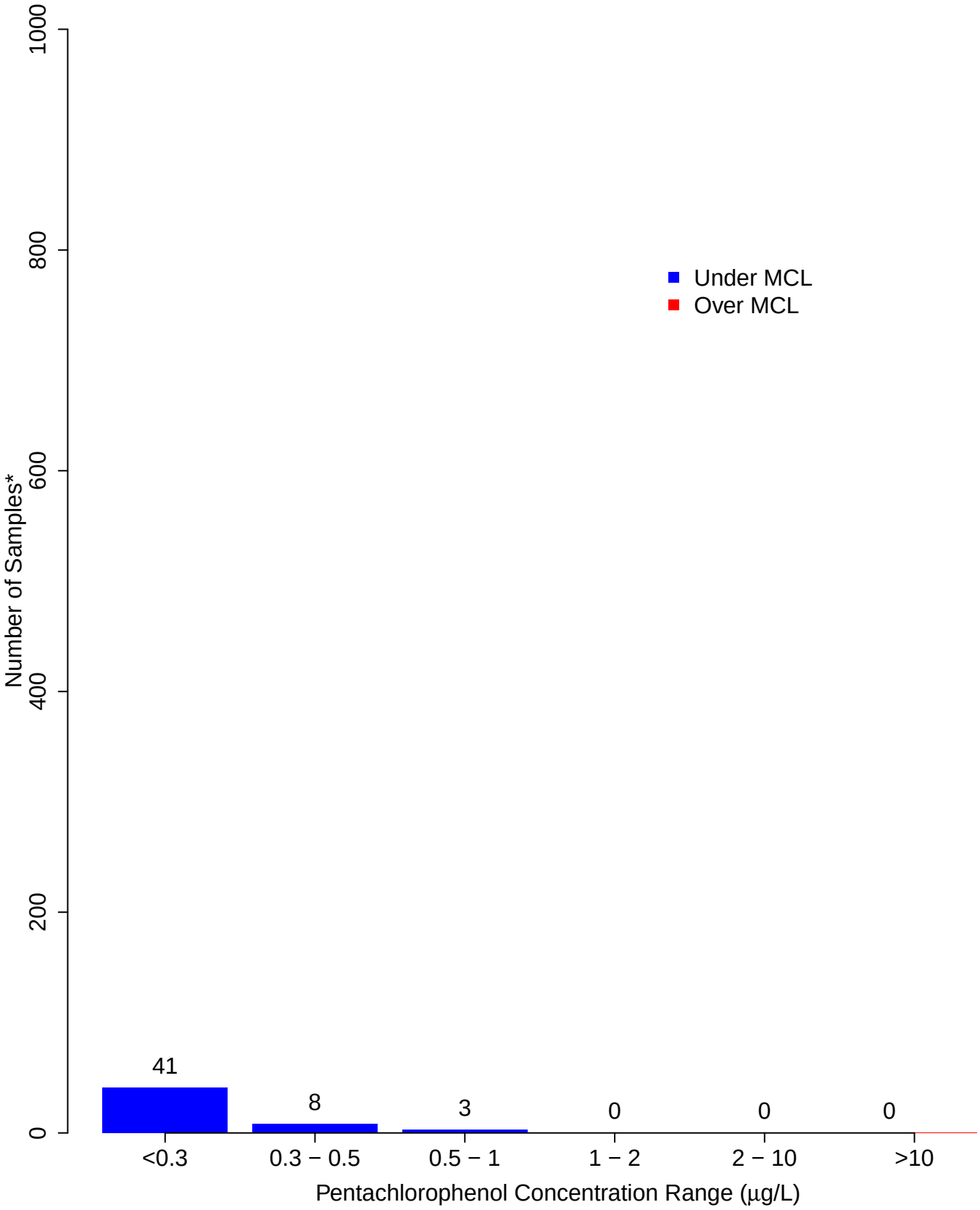
µg/L Micrograms per liter
MCL Maximum Contaminant Level for Discharge to Surface Water
PCP Pentachlorophenol
WTP Water Treatment Plant

*Analytical results from samples collected before 2010 are not in the current database, and may not have undergone the same Quality Controls as samples collected post-2010.

Montana Pole and Treating Plant
Butte - Silver Bow Montana

FIGURE 2.6b
WATER TREATMENT PLANT
PCP SAMPLE RESULTS
1998 - CURRENT

TETRA TECH



µg/L Micrograms per liter

PCP Pentachlorophenol

MCL Maximum Contaminant Level for Discharge to Surface Water (1 µg/L)

WTP Water Treatment Plant

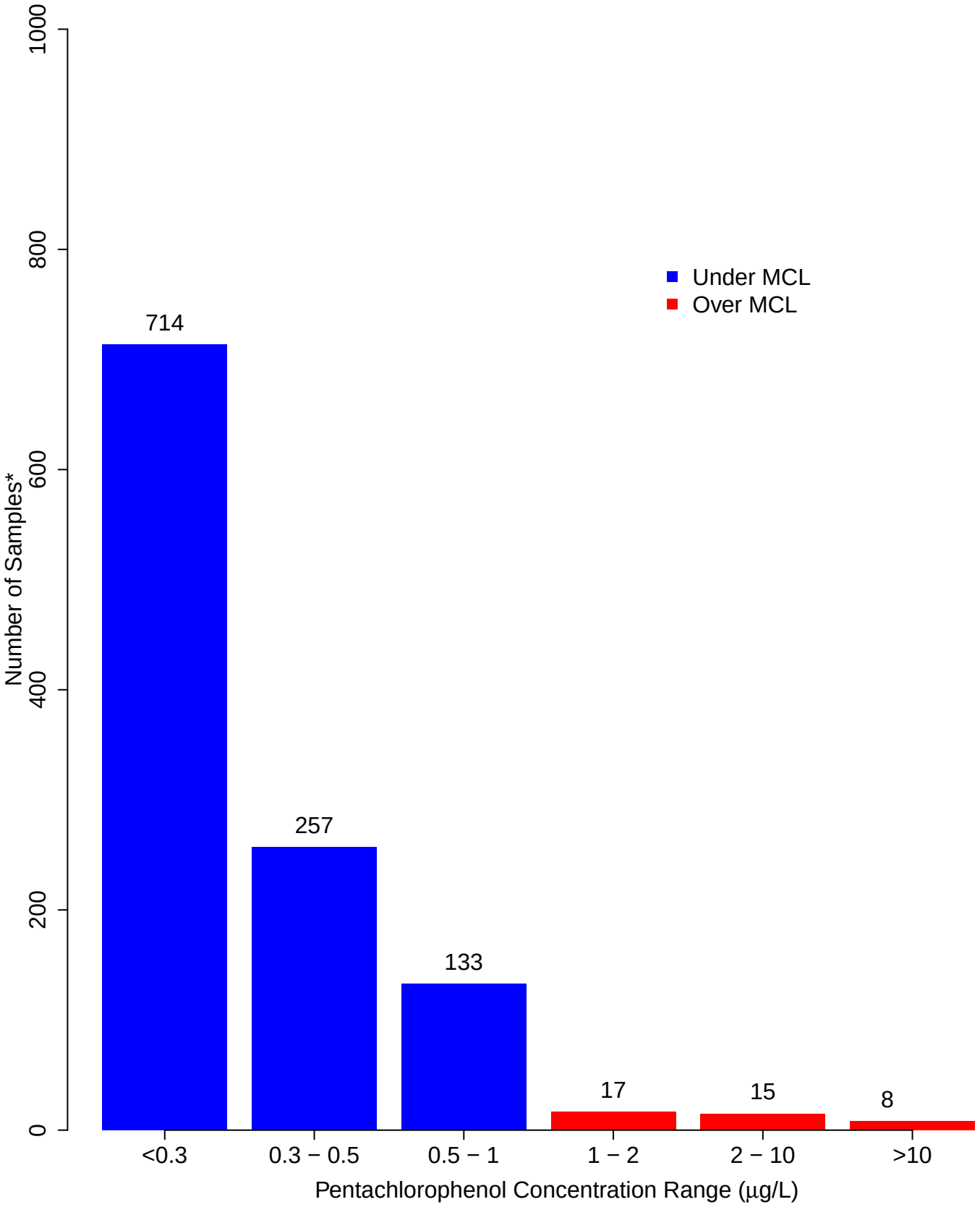
*Duplicate Samples Omitted From Analysis

Montana Pole and Treating Plant
Butte−Silver Bow Montana

FIGURE 2.7a
WTP EFFLUENT PCP HISTOGRAM
2020

TETRA TECH

CJK 20190315

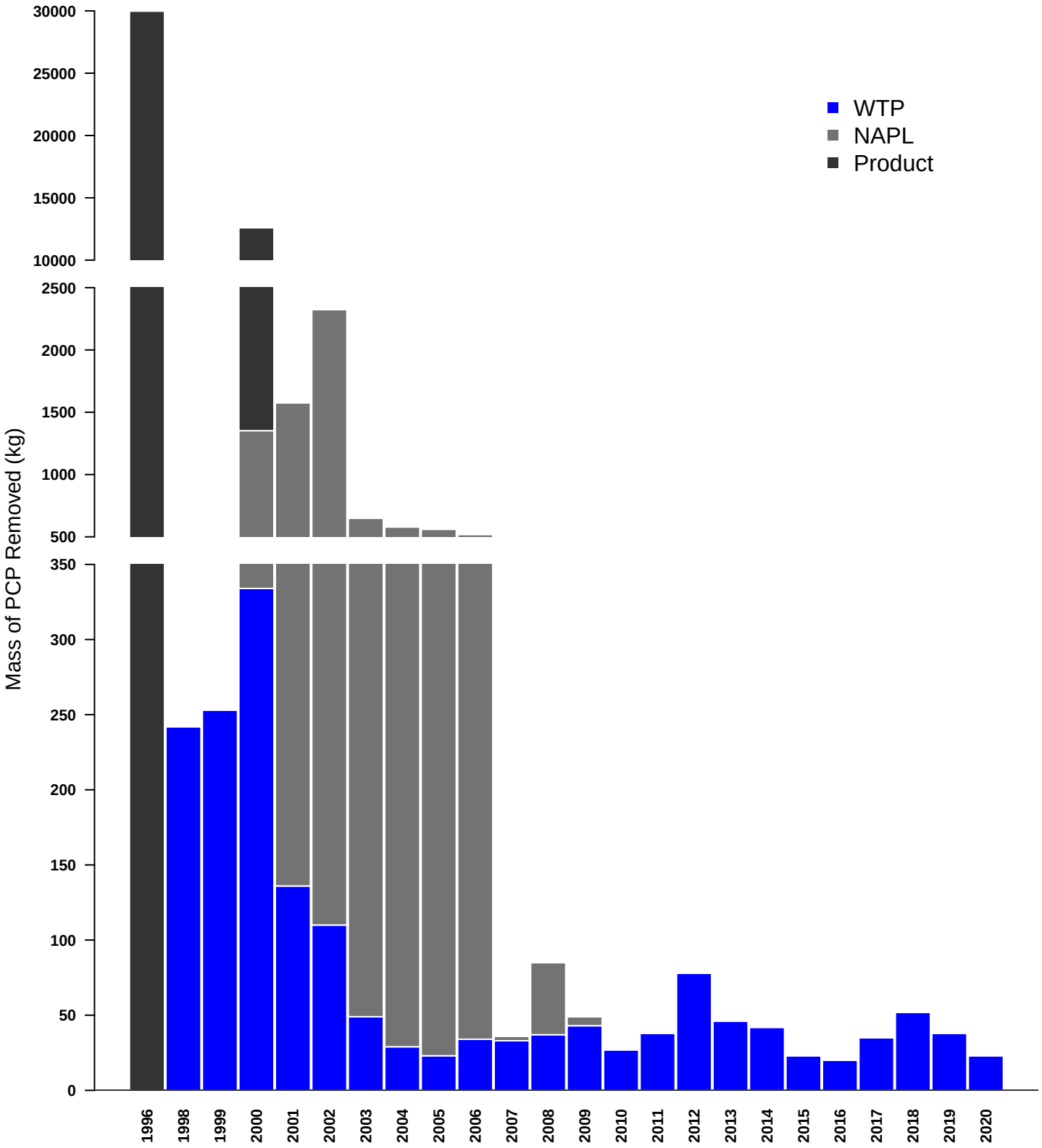


µg/L Micrograms per liter
PCP Pentachlorophenol
MCL Maximum Contaminant Level for Discharge to Surface Water (1 µg/L)
WTP Water Treatment Plant
*Duplicate Samples Omitted From Analysis

Montana Pole and Treating Plant
Butte−Silver Bow Montana

FIGURE 2.7b
WTP EFFLUENT PCP HISTOGRAM
1998−2020

TETRA TECH

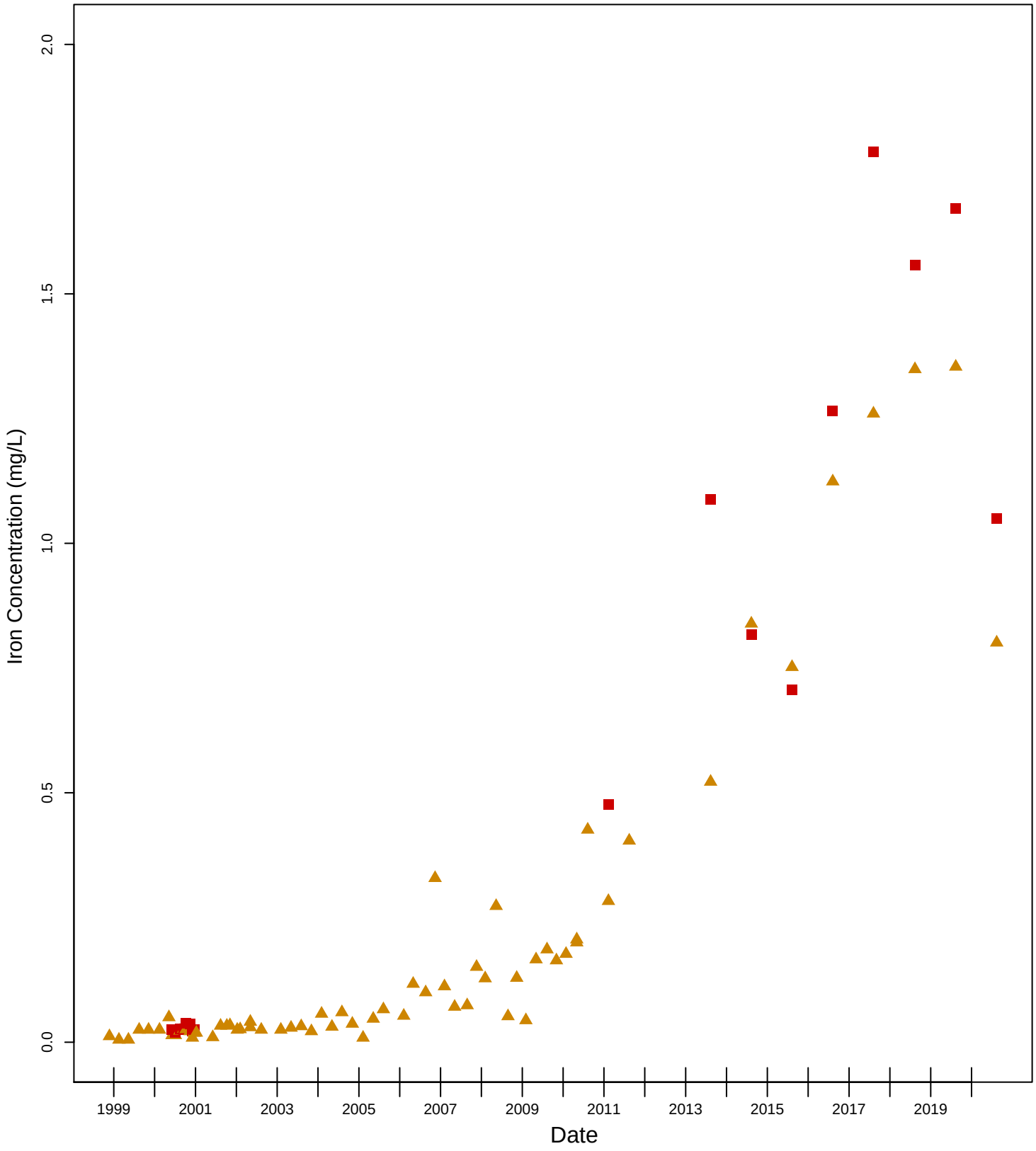


kg kilograms
NAPL non−aqueous phase liquid
PCP Pentachlorophenol
WTP Water Treatment Plant

Montana Pole and Treating Plant
Butte−Silver Bow Montana

FIGURE 2.8
MASS OF PENTACHLOROPHENOL REMOVED FROM SITE

TETRA TECH



Montana Pole and Treating Plant
Butte−Silver Bow Montana

FIGURE 2.9
NEAR HIGHWAY RECOVERY TRENCH
IRON CONCENTRATION 1998−CURRENT

TETRA TECH

LEGEND

SURFACE WATER STATION

HYDRAULIC CONTROL CHANNEL

AERIAL IMAGERY SOURCE:
ESRI/WORLD IMAGERY (2019) and DRONE FLIGHT (JULY 2020)

N

150 0 150 300

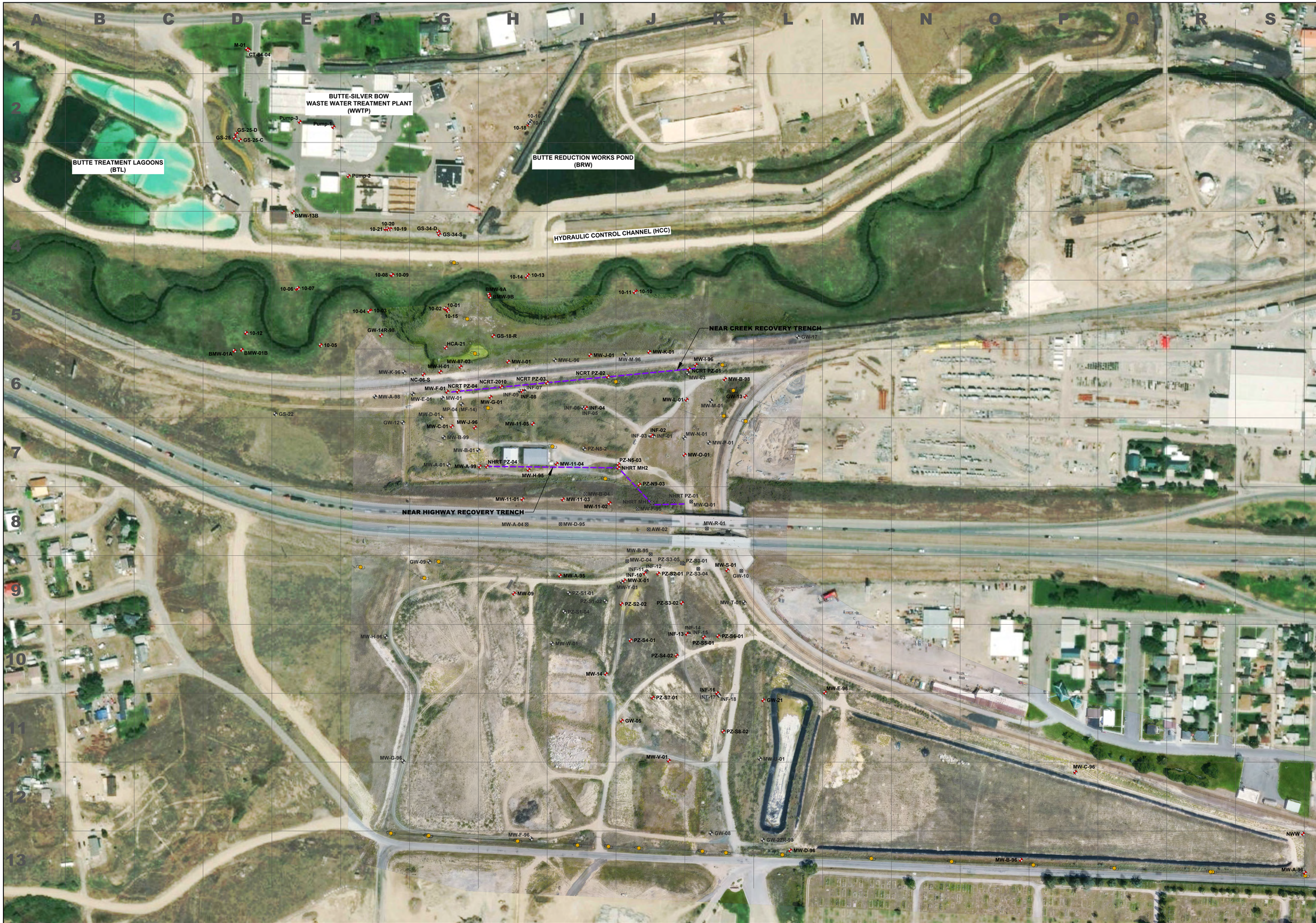
SCALE IN FEET

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE 4.1
LOCATION OF SURFACE WATER STATIONS

TETRA TECH

Figure 4.1_Surface Water Stations.dwg - DWH - 03/02/2021



MONITORING WELL	APPROXIMATE SCREENED INTERVAL	CURRENT STATUS	MAP GRID
10-01	Deep	Existing	5G
10-02	Shallow	Existing	5G
10-03	Deep	Existing	5F
10-04	Shallow	Existing	5F
10-05	Shallow	Existing	5E
10-06	Deep	Existing	5E
10-07	Shallow	Existing	5E
10-08	Deep	Existing	4F
10-09	Shallow	Existing	4F
10-10	Deep	Existing	5J
10-11	Shallow	Existing	5J
10-12	Shallow	Existing	5D
10-13	Deep	Existing	4H
10-14	Shallow	Existing	4H
10-15	Intermediate	Existing	5G
10-16	Deep	Existing	2H
10-17	Intermediate	Existing	2H
10-18	Shallow	Existing	2H
10-19	Deep	Existing	4F
10-20	Intermediate	Existing	4F
10-21	Shallow	Existing	4F
AW-02	Shallow	Abandoned	8J
BMW-01A	Deep	Existing (ARCO)	6D
BMW-01B	Deep	Existing (ARCO)	6D
BMW-13B	Deep	Existing (ARCO)	3E
BMW-9A	Shallow	Existing (ARCO)	5H
BMW-9B	Deep	Existing (ARCO)	5H
CT-84-04	Shallow	Existing (ARCO)	1D
GS-18-R	Deep	Existing (ARCO)	5H
GS-22	Shallow	Existing (ARCO)	6E
GS-25	Shallow	Existing (ARCO)	2D
GS-25-C	Deep	Existing (ARCO)	2D
GS-25-D	Deep	Existing (ARCO)	2D
GS-34-D	Deep	Existing (ARCO)	4G
GS-34-S	Shallow	Existing (ARCO)	4G
GW-05	Shallow	Existing	11J
GW-08	Deep	Existing	13K
GW-09	Shallow	Existing	9G
GW-10	Shallow	Destroyed	9K
GW-12	Deep	Existing	7F
GW-13	Deep	Existing	6K
GW-14R-98	Shallow	Existing	5F
GW-17	Shallow	Existing	5L
GW-21	Shallow	Existing	11L
GW-22R-98	Shallow	Existing	13L
HCA-21	Shallow	Existing (ARCO)	5G
INF-01	Intermediate	Existing	7J
INF-02	Shallow	Existing	7J
INF-03	Deep	Existing	7J
INF-04	Shallow	Existing	6I
INF-05	Intermediate	Existing	6I
INF-06	Deep	Existing	6I
INF-07	Deep	Existing	6H
INF-08	Intermediate	Existing	6H
INF-09	Shallow	Existing	6H
INF-10	Shallow	Existing	9J
INF-11	Intermediate	Existing	9J
INF-12	Deep	Existing	9J
INF-13	Shallow	Existing	10K
INF-14	Intermediate	Existing	10K
INF-15	Deep	Existing	10K
INF-16	Shallow	Existing	10K
INF-17	Intermediate	Existing	11K
INF-18	Deep	Existing	11K
M-01	Shallow	Existing (ARCO)	1D
MP-04 (MF-14)	Deep	Existing	6G
MW-01	Shallow	Existing	6G
MW-03	Shallow	Existing	6K
MW-09	Shallow	Existing	9H
MW-11-01	Shallow	Existing	8H
MW-11-02	Shallow	Existing	8I
MW-11-03	Shallow	Existing	8I
MW-11-04	Shallow	Existing	7I
MW-11-05	Shallow	Existing	7H
MW-14	Shallow	Existing	10I
MW-87-03	Shallow	Existing (ARCO)	6G
MW-A-01	Shallow	Existing	7G
MW-A-04	Shallow	Abandoned	8H
MW-A-95	Shallow	Existing	9I
MW-A-96	Shallow	Existing	13T
MW-A-98	Shallow	Existing	6F
MW-A-99	Shallow	Existing	7H
MW-B-01	Shallow	Existing	7G
MW-B-04	Shallow	Abandoned	8I
MW-B-95	Shallow	Abandoned	8J
MW-B-96	Shallow	Existing	13O
MW-B-98	Shallow	Existing	6K
MW-B-99	Shallow	Existing	7G
MW-C-01	Shallow	Existing	7G
MW-C-04	Shallow	Abandoned	8J
MW-C-96	Shallow	Existing	12P
MW-D-01	Shallow	Existing	6G
MW-D-95	Shallow	Abandoned	8I
MW-D-96	Shallow	Existing	13L
MW-E-01	Shallow	Existing	6G
MW-E-96	Shallow	Existing	10M
MW-F-01	Shallow	Existing	6G
MW-F-95	Shallow	Abandoned	8J
MW-F-96	Shallow	Existing	13H
MW-G-01	Shallow	Existing	6H
MW-G-96	Shallow	Existing (ARCO)	11F
MW-H-01	Shallow	Existing	6G
MW-H-95	Shallow	Existing	7H
MW-H-96	Shallow	Existing (ARCO)	10F
MW-I-01	Shallow	Existing	6H
MW-I-96	Shallow/Intermediate	Existing	6K
MW-J-01	Shallow	Existing	6I
MW-J-96	Intermediate/Deep	Existing	7G
MW-K-01	Shallow	Existing	6J
MW-K-96	Deep	Existing	6F
MW-L-01	Shallow	Existing	6K
MW-L-96	Deep	Existing	6I
MW-M-01	Shallow	Existing	6K
MW-M-96	Deep	Existing	6J
MW-N-01	Shallow	Existing	7J
MW-O-01	Shallow	Existing	7J
MW-P-01	Shallow	Existing	7K
MW-Q-01	Shallow	Abandoned	8K
MW-R-01	Shallow	Abandoned	8K
MW-S-01	Shallow	Existing	9K
MW-T-01	Shallow	Existing	9K
MW-U-01	Shallow	Existing	11L
MW-V-01	Shallow	Existing	11J
MW-W-01	Shallow	Existing	10I
MW-X-01	Shallow	Existing	9J
MW-Y-01	Shallow	Existing	9J
NC-06-S	Shallow	Existing	6G
NCRT PZ-01	In Trench	Existing	6K
NCRT PZ-02	In Trench	Existing	6I
NCRT PZ-03	Shallow	Existing	6H
NCRT PZ-04	In Trench	Existing	6G
NCRT-2010	Shallow	Existing	6H
NHRT MH1	In Trench	Abandoned	8J
NHRT MH2	In Trench	Existing	7J
NHRT PZ-01	Shallow	Abandoned	8J
NHRT PZ-04	In Trench	Existing	7H
NWW	Deep	Existing	13G
Pump-1	Manhole	Existing (BSB)	2E
Pump-2	Manhole	Existing (BSB)	3F
Pump-3	West Sump	Existing (BSB)	2E
PZ-NS-03	Shallow	Existing	7J
PZ-NS-2	Shallow	Existing	7I
PZ-N9-03	Shallow	Existing	7J
PZ-S1-01	Shallow	Existing	9I
PZ-S1-02	Shallow	Existing	9I
PZ-S1-04	Shallow	Existing	9I
PZ-S2-01	Shallow	Existing	9J
PZ-S2-02	Shallow	Existing	9J
PZ-S3-01	Shallow	Abandoned	9J
PZ-S3-02	Shallow	Existing	9J
PZ-S3-04	Shallow	Abandoned	9K
PZ-S3-05	Shallow	Abandoned	9J
PZ-S4-01	Shallow	Existing	10J
PZ-S4-02	Shallow	Existing	10J
PZ-S5-01	Shallow	Existing	10K
PZ-S6-01	Shallow	Existing	10K
PZ-S7-01	Shallow	Existing	11J
PZ-S8-02	Shallow	Existing	11K

AERIAL IMAGERY SOURCE: ESRI/WORLD IMAGERY(2019) and DRONE FLIGHT (JULY 2020)

LEGEND

- GROUNDWATER MONITORING WELL (TO BE RETAINED FOR SAMPLING)
- GROUNDWATER MONITORING WELL (NOT TO BE SAMPLED)
- GROUNDWATER MONITORING WELL (ABANDONED OR DESTROYED)
- UTILITY POLE

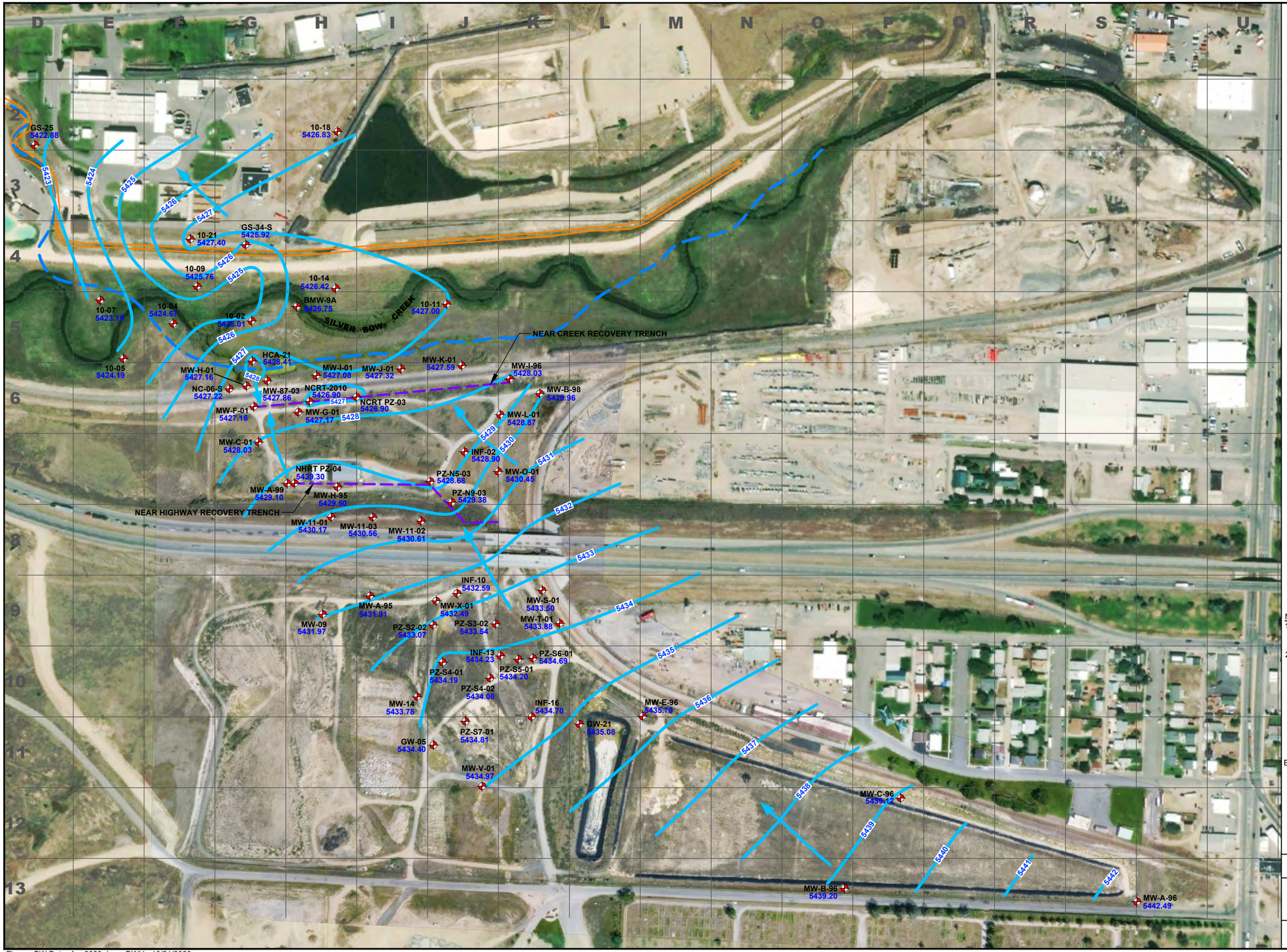
SCALE IN FEET: 70 0 70 140

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE 4.2
LOCATION OF ALL
MONTANA POLE AND TREATING PLANT
MONITORING WELLS

TETRA TECH

Figure 4.2_Location of All MPTP Monitoring Wells.dwg - DWH - 03/02/2021



LEGEND

- MONITORING WELL
- HISTORICAL SILVER BOW CREEK CHANNEL
- HYDRAULIC CONTROL CHANNEL
- GROUNDWATER CONTOUR - 1' INTERVAL
- INTERPRETED DIRECTION OF GROUNDWATER FLOW

NOTES:

1) THIS FIGURE PROVIDES ONE INTERPRETATION OF GROUNDWATER FLOW; OTHER INTERPRETATIONS ARE POSSIBLE.
2) ALL ELEVATIONS PRESENTED IN THIS REPORT ARE BASED ON THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29) VERTICAL CONTROL DATUM.

AERIAL IMAGERY SOURCE:
ESRI/WORLD IMAGERY (2019) and DRONE FLIGHT (JULY 2020)

N

150 0 150 300

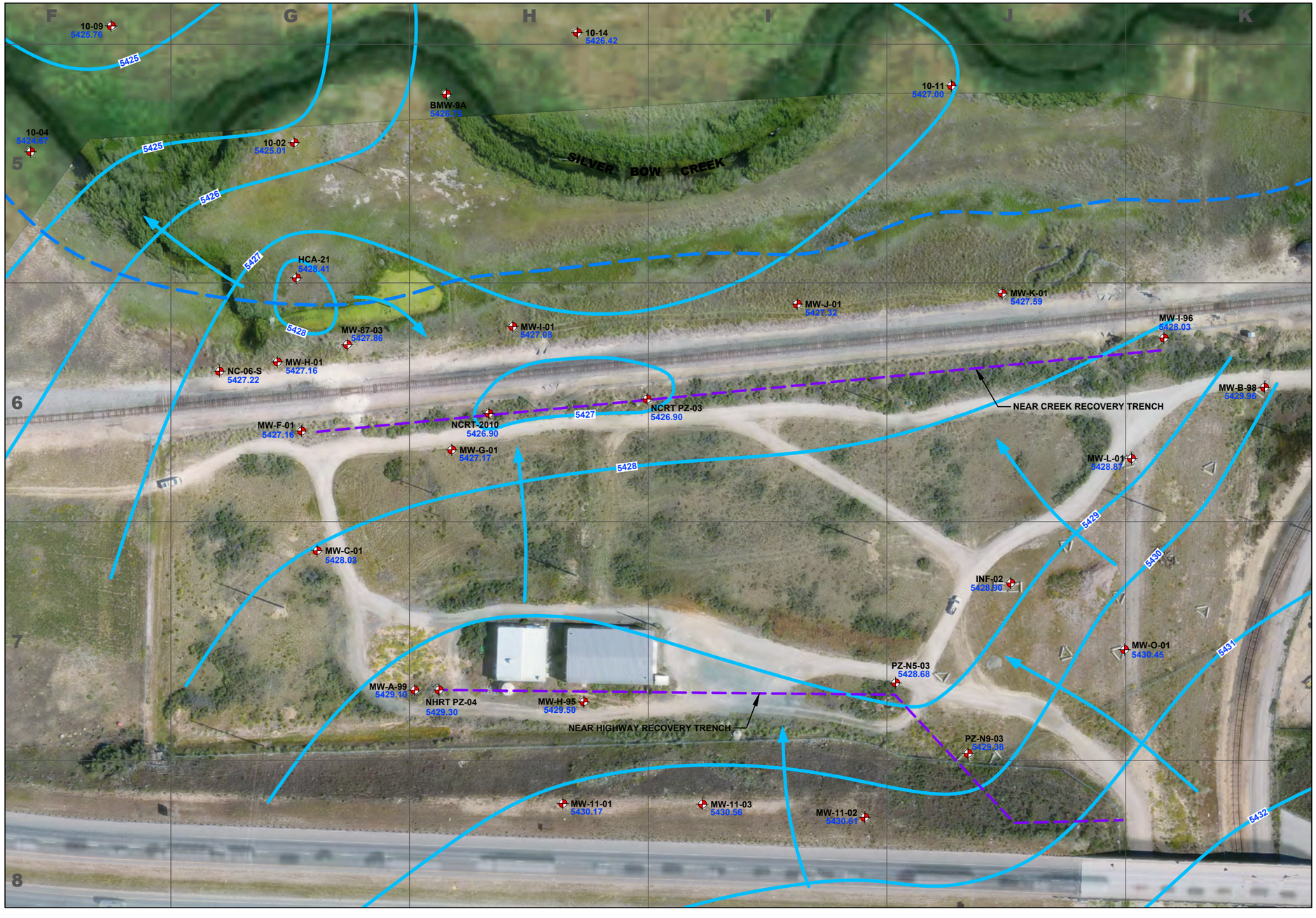
SCALE IN FEET

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE 4.3
GROUNDWATER LEVEL DATA - AUGUST 2020

TETRA TECH

Figure_GW Data_Aug2020.dwg - DWH - 10/21/2020



LEGEND

- MONITORING WELL
- HISTORICAL SILVER BOW CREEK CHANNEL
- GROUNDWATER CONTOUR - 1' INTERVAL
- INTERPRETED DIRECTION OF GROUNDWATER FLOW

NOTES:

1) THIS FIGURE PROVIDES ONE INTERPRETATION OF GROUNDWATER FLOW; OTHER INTERPRETATIONS ARE POSSIBLE.
2) ALL ELEVATIONS PRESENTED IN THIS REPORT ARE BASED ON THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD29) VERTICAL CONTROL DATUM.

AERIAL IMAGERY SOURCE:
ESRI/WORLD IMAGERY (2019) and DRONE FLIGHT (JULY 2020)

N

50 0 50 100

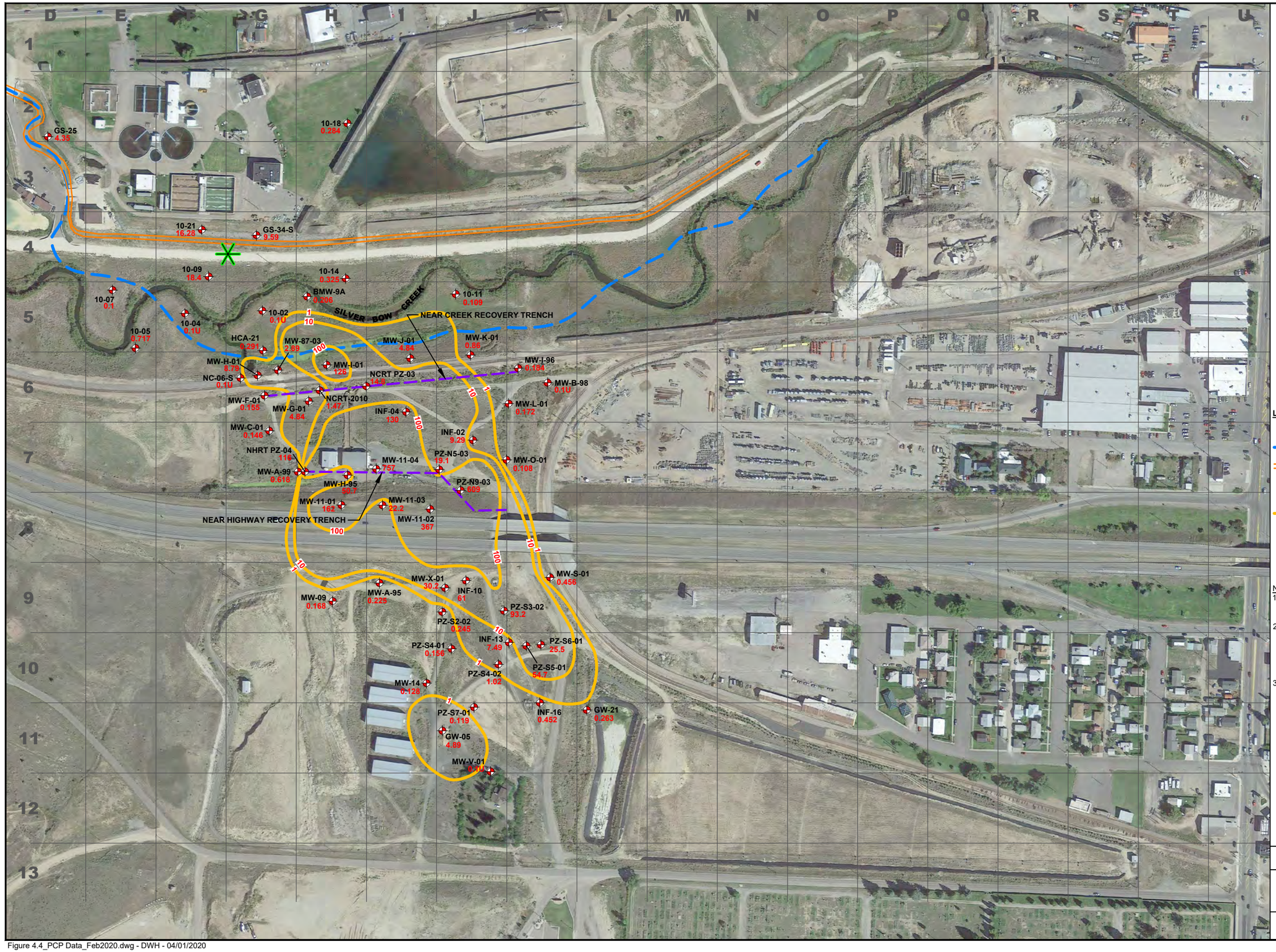
SCALE IN FEET

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE 4.4
ON-SITE GROUNDWATER LEVEL DATA - AUGUST 2020

TETRA TECH

Figure_On-Site GW Data_Aug2020.dwg - DWH - 10/21/2020



LEGEND

- MONITORING WELL
- HISTORICAL SILVER BOW CREEK CHANNEL
- HYDRAULIC CONTROL CHANNEL
- OFF-SITE SOURCE OF PCP INTERPRETED TO EXIST APPROXIMATELY IN THIS AREA
- PCP ISOCONTOUR - (µg/L) FEBRUARY 2020
- U — ANALYZED FOR BUT NOT DETECTED ABOVE THE METHOD DETECTION LIMIT
- µg/L — MICROGRAMS PER LITER

NOTES:

1) PENTACHLOROPHENOL (PCP) ISOCONTOURS ARE INTERPRETED; OTHER INTERPRETATIONS ARE POSSIBLE.

2) THE PCP PLUME IS NOT INTERPRETED TO FLOW THROUGH THE NCRT. RATHER, CONTAMINATED GROUNDWATER SOUTH OF THE SILVER BOW CREEK CHANNEL IS INTERPRETED TO BE MIGRATING TOWARD THE NCRT.

3) PLUME AREA SOUTH OF SILVER BOW CREEK BASED ON 1 µg/L CONTOUR INTERVAL: 17.97 ACRES

AERIAL IMAGERY SOURCE:
GOOGLE EARTH PRO (2013) DJA SURVEY JUNE 2015

N

150 0 150 300

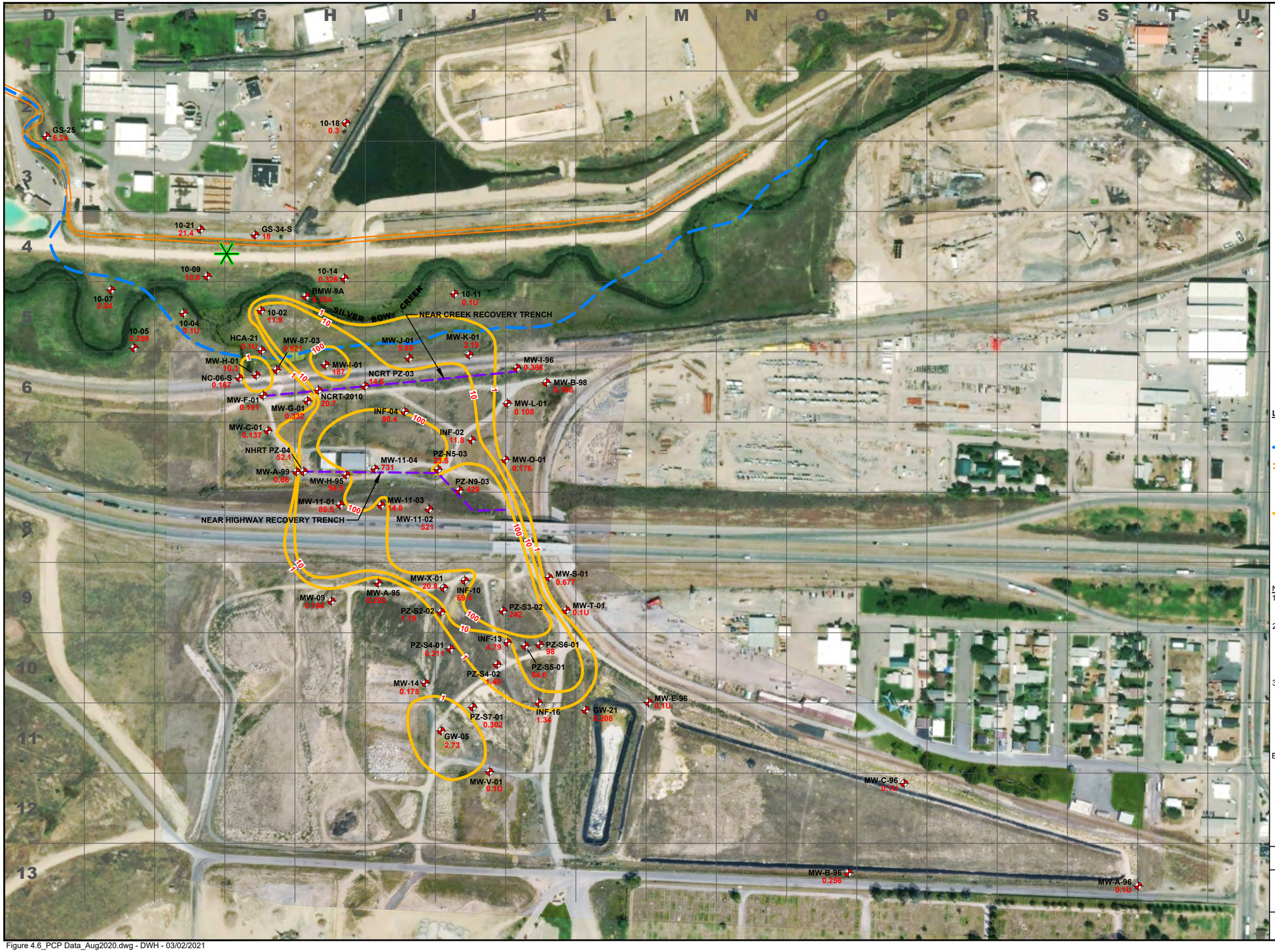
SCALE IN FEET

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE 4.5
PCP DATA - FEBRUARY 2020

TETRA TECH

Figure 4.4_PCP Data_Feb2020.dwg - DWH - 04/01/2020



LEGEND

- MONITORING WELL
- HISTORICAL SILVER BOW CREEK CHANNEL
- HYDRAULIC CONTROL CHANNEL
- OFF-SITE SOURCE OF PCP INTERPRETED TO EXIST APPROXIMATELY IN THIS AREA
- PCP ISOCONTOUR - (µg/L) AUGUST 2020
- U — ANALYZED FOR BUT NOT DETECTED ABOVE THE METHOD DETECTION LIMIT
- µg/L — MICROGRAMS PER LITER

NOTES:

1) PENTACHLOROPHENOL (PCP) ISOCONTOURS ARE INTERPRETED; OTHER INTERPRETATIONS ARE POSSIBLE.

2) THE PCP PLUME IS NOT INTERPRETED TO FLOW THROUGH THE NCRT. RATHER, CONTAMINATED GROUNDWATER SOUTH OF THE SILVER BOW CREEK CHANNEL IS INTERPRETED TO BE MIGRATING TOWARD THE NCRT.

3) PLUME AREA SOUTH OF SILVER BOW CREEK BASED ON 1 µg/L CONTOUR INTERVAL: 18.88 ACRES

AERIAL IMAGERY SOURCE:
ESRI/WORLD IMAGERY (2019) and DRONE FLIGHT (JULY 2020)

N

150 0 150 300

SCALE IN FEET

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE 4.6
PCP DATA - AUGUST 2020

TETRA TECH

Figure 4.6_PCP Data_Aug2020.dwg - DWH - 03/02/2021

LEGEND

- GROUNDWATER MONITORING WELL
- SURFACE WATER STATION
- WATER TREATMENT PLANT SAMPLE STATION
- APPROXIMATE AREA OF PLUME DEFINED BY 1 µg/L PCP ISOCONTOUR
- µg/L MICROGRAMS PER LITER
- PCP PENTACHLOROPHENOL

NOTES:
1) PCP PLUME BOUNDARY IS INTERPRETED; OTHER INTERPRETATIONS ARE POSSIBLE.
2) PLUME OUTLINE INTERPRETED BASED ON AUGUST 2020 CONDITIONS.

AERIAL IMAGERY SOURCE:
ESRI/WORLD IMAGERY (2019) and DRONE FLIGHT (JULY 2020)

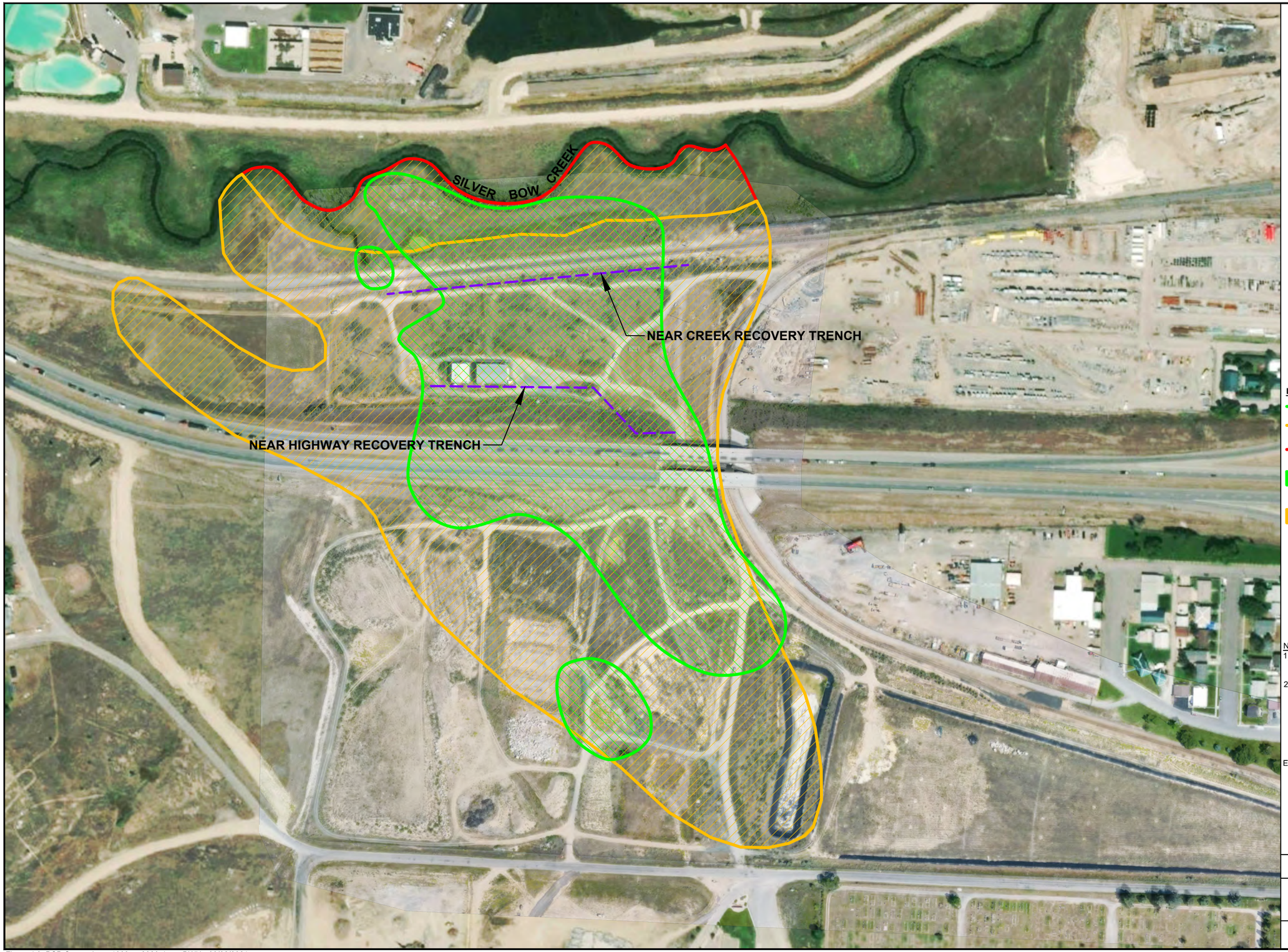
150 0 150 300
SCALE IN FEET

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE 4.7
LOCATIONS OF
SELECTED MONITORING STATIONS

TETRA TECH

Figure 4.7_Selected Monitoring Stations Locations.dwg - DWH - 03/02/2021



LEGEND

- AUGUST 2020 PCP PLUME CONTOUR (1 µg/L)
- 1993 PCP PLUME CONTOUR (1 µg/L) FROM ROD
- EXTENSION OF 1993 PLUME CONTOUR (1 µg/L) TO CURRENT LOCATION OF SILVER BOW CREEK
- APPROXIMATE AUGUST 2020 PCP PLUME AREA (18.88 acres)
- 1993 PCP PLUME AREA (41.70 acres) (INCLUDES AREA BETWEEN HISTORIC SILVER BOW CREEK (1993) AND CURRENT LOCATION OF SILVER BOW CREEK (2017))

PCP	PENTACHLOROPHENOL
ROD	RECORD OF DECISION
µg/L	MICROGRAMS PER LITER

NOTES:
1) PCP ISOCONTOURS ARE INTERPRETED; OTHER INTERPRETATIONS ARE POSSIBLE.

2) THE PCP PLUME IS NOT INTERPRETED TO FLOW THROUGH THE NEAR CREEK RECOVERY TRENCH (NCRT). RATHER, CONTAMINATED GROUNDWATER SOUTH OF THE SILVER BOW CREEK CHANNEL IS INTERPRETED TO BE MIGRATING TOWARD THE NCRT.

AERIAL IMAGERY SOURCE:
ESRI/WORLD IMAGERY (2019) and DRONE FLIGHT (JULY 2020)

N

125 0 125 250

SCALE IN FEET

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE 4.8
COMPARISON OF PLUME AREAS
1993 VERSUS AUGUST 2020

TETRA TECH

Figure 4.8_PCP Comparison_1993 vs 2020.dwg - DWH - 03/02/2021

BMW-9A
5.95
27

10-10
6.51
19.5

10-05
8.25
12.

HCA-21
3.17
9.5

MW-K-01
8.05
9.6

MW-I-96
11.99
17.6

MW-B-98
9.92
15

MW-L_01
11.6
14.4

INF-04
13.35
15

MW-C-01
10.6
13.3

PZ-N9-3
15.35
26.7

MW-09
19
27

PZ-S2-2
14.65
16.5

PZ-S3-2
18.25
25

PZ-S6-01
17.51
19.5

GW-21
17.62
24

GW-05
20.77
30.5

GW-21 — WELL ID
17.62 — STATIC WATER LEVEL
24 — TOTAL DEPTH

N

0 200 400 Feet

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE 4.9
PRESSURE TRANSDUCER MONITORING LOCATIONS

TETRA TECH

Figure_Pressure Transducer Montioring Locations.mxd - DWH - Tt EMI Helena -

APPENDIX A

Microsoft Access 2010 Database

(Separate CD)

APPENDIX B

2020 Sampling Results and Data

APPENDIX B-1

Water Treatment Plant – PCP

MPTP 2020 - PCP RESULTS FOR WATER TREATMENT PLANT SAMPLES

Date Sampled	Sample Type	Station Name	Sample ID	PCP Concentration	Qualifier	Duplicate Result	Duplicate Qualifier
1/6/2020	Plant	PL	BABB010620	0.455			
1/6/2020	Plant	PL	EFF010620	0.337			
1/6/2020	Plant	PL	IN010620	1.87			
1/13/2020	Plant	PL	BABB011320	0.257			
1/13/2020	Plant	PL	EFF011320	0.247			
1/13/2020	Plant	PL	IN011320	51.9	D		
1/13/2020	Plant	PL	NCRTEFF011320	4.97		4.81	
1/13/2020	Plant	PL	NHRTEFF011320	238	D		
1/20/2020	Plant	PL	BABB012020	0.172			
1/20/2020	Plant	PL	EFF012020	0.19		0.16	
1/20/2020	Plant	PL	IN012020	52.4	D		
1/27/2020	Plant	PL	BABB012720	0.256			
1/27/2020	Plant	PL	EFF012720	0.196			
1/27/2020	Plant	PL	IN012720	50.2	D		
2/3/2020	Plant	PL	BABB020320	0.24			
2/3/2020	Plant	PL	EFF020320	0.16			
2/3/2020	Plant	PL	IN020320	41	D		
2/3/2020	Plant	PL	NCRTEFF020320	4.67			
2/3/2020	Plant	PL	NHRTEFF020320	155	D		
2/10/2020	Plant	PL	BABB021020	0.322			
2/10/2020	Plant	PL	EFF021020	0.225			
2/10/2020	Plant	PL	IN021020	31.1	D		
2/17/2020	Plant	PL	BABB021720	0.345			
2/17/2020	Plant	PL	EFF021720	0.259		32.7	
2/17/2020	Plant	PL	IN021720	31.3	D		
2/24/2020	Plant	PL	BABB022420	0.593			
2/24/2020	Plant	PL	EFF022420	0.276			
2/24/2020	Plant	PL	IN022420	33.5	D		
3/2/2020	Plant	PL	BABB030220	0.317			
3/2/2020	Plant	PL	EFF030220	0.24			
3/2/2020	Plant	PL	IN030220	38.2	D		
3/2/2020	Plant	PL	NCRTEFF030220	4.55			
3/2/2020	Plant	PL	NHRTEFF030220	156	D	152	D
3/9/2020	Plant	PL	BABB030920	0.909		0.452	
3/9/2020	Plant	PL	EFF030920	0.362			
3/9/2020	Plant	PL	IN030920	42.6	D		
3/16/2020	Plant	PL	BABB031620	3.58			
3/16/2020	Plant	PL	EFF031620	0.37			
3/16/2020	Plant	PL	IN031620	49.8	D		
3/23/2020	Plant	PL	BABB032320	0.838			
3/23/2020	Plant	PL	EFF032320	0.592			
3/23/2020	Plant	PL	IN032320	42.4	D		
3/30/2020	Plant	PL	BABB033020	0.221			
3/30/2020	Plant	PL	EFF033020	0.536		0.747	

MPTP 2020 - PCP RESULTS FOR WATER TREATMENT PLANT SAMPLES

Date Sampled	Sample Type	Station Name	Sample ID	PCP Concentration	Qualifier	Duplicate Result	Duplicate Qualifier
3/30/2020	Plant	PL	IN033020	56.3	D		
4/6/2020	Plant	PL	BABB040620	0.364			
4/6/2020	Plant	PL	EFF040620	0.19			
4/6/2020	Plant	PL	IN040620	42.9	D		
4/6/2020	Plant	PL	NCRTEFF040620	4.2		3.81	
4/6/2020	Plant	PL	NHRTEFF040620	180	D		
4/13/2020	Plant	PL	BABB041320	0.223			
4/13/2020	Plant	PL	EFF041320	0.184			
4/13/2020	Plant	PL	IN041320	47.2	D		
4/20/2020	Plant	PL	BABB042020	0.154		0.134	
4/20/2020	Plant	PL	EFF042020	0.135			
4/20/2020	Plant	PL	IN042020	37.1	D		
4/27/2020	Plant	PL	BABB042720	0.14			
4/27/2020	Plant	PL	EFF042720	0.119			
4/27/2020	Plant	PL	IN042720	39.6	D		
5/4/2020	Plant	PL	BABB050420	0.155			
5/4/2020	Plant	PL	EFF050420	0.121			
5/4/2020	Plant	PL	IN050420	38.7	D		
5/4/2020	Plant	PL	NCRTEFF050420	3.53			
5/4/2020	Plant	PL	NHRTEFF050420	163	D		
5/11/2020	Plant	PL	BABB051120	0.14			
5/11/2020	Plant	PL	EFF051120	0.134			
5/11/2020	Plant	PL	IN051120	42.7	D	41.1	D
5/18/2020	Plant	PL	BABB051820	0.187			
5/18/2020	Plant	PL	EFF051820	0.191			
5/18/2020	Plant	PL	IN051820	41.3	D		
5/26/2020	Plant	PL	BABB052620	0.196			
5/26/2020	Plant	PL	EFF052620	0.152		0.133	
5/26/2020	Plant	PL	IN052620	43.6	D		
6/1/2020	Plant	PL	BABB060120	0.195			
6/1/2020	Plant	PL	EFF060120	0.136			
6/1/2020	Plant	PL	IN060120	46.7	D		
6/1/2020	Plant	PL	NCRTEFF060120	3.28			
6/1/2020	Plant	PL	NHRTEFF060120	203	D	192	D
6/8/2020	Plant	PL	BABB060820	0.133			
6/8/2020	Plant	PL	EFF060820	0.143			
6/8/2020	Plant	PL	IN060820	42.9	D		
6/15/2020	Plant	PL	BABB061520	0.203			
6/15/2020	Plant	PL	EFF061520	0.153			
6/15/2020	Plant	PL	IN061520	34.8	D		
6/22/2020	Plant	PL	BABB062220	0.246			
6/22/2020	Plant	PL	EFF062220	0.173			
6/22/2020	Plant	PL	IN062220	37.8	D	34.9	D
6/29/2020	Plant	PL	BABB062920	0.256			

MPTP 2020 - PCP RESULTS FOR WATER TREATMENT PLANT SAMPLES

Date Sampled	Sample Type	Station Name	Sample ID	PCP Concentration	Qualifier	Duplicate Result	Duplicate Qualifier
6/29/2020	Plant	PL	EFF062920	0.183			
6/29/2020	Plant	PL	IN062920	36.7	D		
7/6/2020	Plant	PL	BABB070620	0.185		0.164	
7/6/2020	Plant	PL	EFF070620	0.167			
7/6/2020	Plant	PL	IN070620	43.1	D		
7/6/2020	Plant	PL	NCRTEFF070620	5.21			
7/6/2020	Plant	PL	NHRTEFF070620	181	D		
7/13/2020	Plant	PL	BABB071320	0.15			
7/13/2020	Plant	PL	EFF071320	0.1	U		
7/13/2020	Plant	PL	IN071320	47.9	D		
7/20/2020	Plant	PL	BABB072020	0.131		0.1	U
7/20/2020	Plant	PL	EFF072020	0.109			
7/20/2020	Plant	PL	IN072020	44	D		
7/27/2020	Plant	PL	BABB072720	0.78			
7/27/2020	Plant	PL	EFF072720	0.301			
7/27/2020	Plant	PL	IN072720	47.7	D		
8/3/2020	Plant	PL	BABB080320	0.265			
8/3/2020	Plant	PL	EFF080320	0.198			
8/3/2020	Plant	PL	IN080320	44.1	D		
8/9/2020	Plant	PL	EFF080920	0.215			
8/9/2020	Plant	PL	IN080920	34.9	D		
8/9/2020	Plant	PL	NCRTEFF080920	2.64			
8/9/2020	Plant	PL	NHRTEFF080920	138	D		
8/9/2020	Plant	PL	BABB080920	0.164			
8/17/2020	Plant	PL	BABB081720	0.263		0.242	
8/17/2020	Plant	PL	EFF081720	0.3			
8/17/2020	Plant	PL	IN081720	38	D		
8/24/2020	Plant	PL	BABB082420	0.293			
8/24/2020	Plant	PL	EFF082420	0.234			
8/24/2020	Plant	PL	IN082420	54	D		
8/31/2020	Plant	PL	BABB083120	0.774			
8/31/2020	Plant	PL	EFF083120	0.176			
8/31/2020	Plant	PL	IN083120	25.8	D		
9/8/2020	Plant	PL	BABB090820	0.246			
9/8/2020	Plant	PL	EFF090820	0.204			
9/8/2020	Plant	PL	IN090820	42.2	D		
9/8/2020	Plant	PL	NCRTEFF090820	4.73		4.47	
9/8/2020	Plant	PL	NHRTEFF090820	114	D		
9/14/2020	Plant	PL	BABB091420	0.286			
9/14/2020	Plant	PL	EFF091420	0.186			
9/14/2020	Plant	PL	IN091420	38.5	D		
9/21/2020	Plant	PL	BABB092120	0.235			
9/21/2020	Plant	PL	EFF092120	0.201			
9/21/2020	Plant	PL	IN092120	42.2	D	41.6	D

APPENDIX B-2

Groundwater and Surface Water – PCP

MPTP 2020 - PCP RESULTS FOR WATER TREATMENT PLANT SAMPLES

Date Sampled	Sample Type	Station Name	Sample ID	PCP Concentration	Qualifier	Duplicate Result	Duplicate Qualifier
1/31/2020	MW	10-04	10-04013120	0.1	U		
1/31/2020	MW	10-05	10-05013120	0.717			
1/31/2020	MW	10-11	10-11013120	0.109			
1/31/2020	MW	MW-87-03	MW-87-03013120	**2.89**			
1/31/2020	MW	MW-B-98	MW-B-98013120	0.1	U		
1/31/2020	MW	MW-H-01	MW-H-01013120	**8.79**			
1/31/2020	MW	MW-I-01	MW-I-01013120	**126**	D		
1/31/2020	MW	MW-J-01	MW-J-01013120	**4.84**			
1/31/2020	MW	MW-K-01	MW-K-01013120	0.86			
1/31/2020	MW	NC-06-S	NC-06-S013120	0.1	U		
1/31/2020	MW	10-01	10-01013120	**1.99**			
1/31/2020	MW	10-02	10-02013120	0.1	U		
1/31/2020	MW	10-07	10-07013120	0.1			
1/31/2020	MW	10-09	10-09013120	**18.4**			
1/31/2020	MW	10-13	10-13013120	0.101			
1/31/2020	MW	10-14	10-14013120	0.325			
1/31/2020	MW	10-15	10-15013120	**13.1**			
1/31/2020	MW	10-18	10-18013120	0.284			
1/31/2020	MW	10-19	10-19013120	**7.75**			
1/31/2020	MW	10-20	10-20013120	**9.04**			
1/31/2020	MW	10-21	10-21013120	**16.28**			
1/31/2020	MW	BMW-9A	BMW-9A013120	0.206			
1/31/2020	MW	BMW-9B	BMW-9B013120	0.167			
1/31/2020	MW	GS-18-R	GS-18-R013120	**9.54**			
1/31/2020	MW	GS-25	GS-25013120	**4.35**			
1/31/2020	MW	GS-34-D	GS-34-D013120	0.624		0.568	
1/31/2020	MW	GS-34-S	GS-34-S013120	**9.59**			
1/31/2020	MW	HCA-21	HCA-21013120	0.291			
1/31/2020	MW	MW-C-01	MW-C-01013120	0.146			
1/31/2020	MW	MW-F-01	MW-F-01013120	0.155			

2/1/2020	MW	GW-05	GW-05020120	**4.89**		
2/1/2020	MW	GW-05	GW-05020120	**4.89**		
2/1/2020	MW	GW-21	GW-21020120	0.263		
2/1/2020	MW	GW-21	GW-21020120	0.263		
2/1/2020	MW	INF-16	INF-16020120	0.452		
2/1/2020	MW	INF-16	INF-16020120	0.452		
2/1/2020	MW	MW-09	MW-09020120	0.168		
2/1/2020	MW	MW-09	MW-09020120	0.168		
2/1/2020	MW	MW-14	MW-14020120	0.128		
2/1/2020	MW	MW-14	MW-14020120	0.128		
2/1/2020	MW	MW-A-95	MW-A-95020120	0.225		
2/1/2020	MW	MW-A-95	MW-A-95020120	0.225		
2/1/2020	MW	MW-A-99	MW-A-99020120	0.618		
2/1/2020	MW	MW-A-99	MW-A-99020120	0.618		
2/1/2020	MW	MW-G-01	MW-G-01020120	**4.84**		
2/1/2020	MW	MW-G-01	MW-G-01020120	**4.84**		
2/1/2020	MW	MW-I-96	MW-I-96020120	0.184		
2/1/2020	MW	MW-I-96	MW-I-96020120	0.184		
2/1/2020	MW	MW-J-96	MW-J-96020120	**1.36**		
2/1/2020	MW	MW-J-96	MW-J-96020120	**1.36**		
2/1/2020	MW	MW-L-01	MW-L-01020120	0.172		
2/1/2020	MW	MW-L-01	MW-L-01020120	0.172		
2/1/2020	MW	MW-O-01	MW-O-01020120	0.108		
2/1/2020	MW	MW-O-01	MW-O-01020120	0.108		
2/1/2020	MW	MW-S-01	MW-S-01020120	0.456		
2/1/2020	MW	MW-S-01	MW-S-01020120	0.456		
2/1/2020	MW	MW-V-01	MW-V-01020120	0.1	U	
2/1/2020	MW	MW-V-01	MW-V-01020120	0.1	U	
2/1/2020	PZ	PZ-S2-02	PZ-S2-02020120	0.245		0.236
2/1/2020	PZ	PZ-S2-02	PZ-S2-02020120	0.245		
2/1/2020	PZ	PZ-S4-01	PZ-S4-01020120	0.156		
2/1/2020	PZ	PZ-S4-01	PZ-S4-01020120	0.156		
2/1/2020	PZ	PZ-S4-02	PZ-S4-02020120	**1.02**		

2/1/2020	PZ	PZ-S4-02	PZ-S4-02020120	**1.02**			
2/1/2020	PZ	PZ-S5-01	PZ-S5-01020120	**54.7**	D		
2/1/2020	PZ	PZ-S5-01	PZ-S5-01020120	**54.7**	D		
2/1/2020	PZ	PZ-S6-01	PZ-S6-01020120	**25.5**			
2/1/2020	PZ	PZ-S6-01	PZ-S6-01020120	**25.5**			
2/1/2020	PZ	PZ-S7-01	PZ-S7-01020120	0.119			
2/1/2020	PZ	PZ-S7-01	PZ-S7-01020120	0.119			
2/1/2020	MW	INF-02	INF-02020120	**9.29**			
2/1/2020	MW	INF-04	INF-04020120	**130**	D		
2/1/2020	MW	INF-08	INF-08020120	**128**			
2/1/2020	MW	INF-10	INF-10020120	**61**	D	**58.4**	D
2/1/2020	MW	INF-13	INF-13020120	**7.49**			
2/1/2020	MW	MW-11-01	MW-11-01020120	**162**	D		
2/1/2020	MW	MW-11-02	MW-11-02020120	**367**	D		
2/1/2020	MW	MW-11-03	MW-11-03020120	**22.2**			
2/1/2020	MW	MW-11-04	MW-11-04020120	**757**	D		
2/1/2020	MW	MW-H-95	MW-H-95020120	**50.7**	D		
2/1/2020	MW	MW-X-01	MW-X-01020120	**30.2**			
2/1/2020	MW	NCRT-2010	NCRT-2010020120	**1.47**			
2/1/2020	MW	NCRT PZ-03	NCRTPZ-03020120	**14.8**			
2/1/2020	MW	NHRT PZ-04	NHRTPZ-04020120	**116**	D		
2/1/2020	PZ	PZ-N5-03	PZ-N5-03020120	**19.1**			
2/1/2020	PZ	PZ-N9-03	PZ-N9-03020120	**609**	D		
2/1/2020	PZ	PZ-S3-02	PZ-S3-02020120	**93.2**	D		
8/3/2020	MW	10-04	10-04080320	0.1	U		
8/3/2020	MW	10-05	10-05080320	0.269			
8/3/2020	MW	GW-21	GW-21080320	0.208			
8/3/2020	MW	MW-87-03	MW-87-03080320	0.621		0.647	
8/3/2020	MW	MW-A-96	MW-A-96080320	0.1	U		
8/3/2020	MW	MW-B-96	MW-B-96080320	0.256			
8/3/2020	MW	MW-B-98	MW-B-98080320	0.168			
8/3/2020	MW	MW-C-96	MW-C-96080320	0.1	U		

8/3/2020	MW	MW-E-96	MW-E-96080320	0.1	U		
8/3/2020	MW	MW-I-96	MW-I-96080320	0.386			
8/3/2020	MW	MW-K-01	MW-K-01080320	**2.19**			
8/3/2020	MW	MW-T-01	MW-T-01080320	0.1	U		
8/3/2020	MW	MW-V-01	MW-V-01080320	0.1	U		
8/3/2020	MW	NC-06-S	NC-06-S080320	0.167			
8/3/2020	MW	10-01	10-01080320	**6.07**			
8/3/2020	MW	10-02	10-02080320	**11.9**			
8/4/2020	MW	10-07	10-07080420	0.34			
8/4/2020	MW	10-09	10-09080420	**10.8**			
8/3/2020	MW	10-11	10-11080320	0.1	U		
8/4/2020	MW	10-13	10-13080420	0.12			
8/4/2020	MW	10-14	10-14080420	0.326			
8/3/2020	MW	10-15	10-15080320	**1.16**			
8/4/2020	MW	10-18	10-18080420	0.3			
8/3/2020	MW	BMW-9A	BMW-9A080320	0.184			
8/3/2020	MW	BMW-9B	BMW-9B080320	0.35			
8/3/2020	MW	GS-18-R	GS-18-R080320	**10.3**			
8/4/2020	MW	GS-25	GS-25080420	**6.24**			
8/4/2020	MW	GS-34-D	GS-34D080420	0.843			
8/4/2020	MW	GS-34-S	GS-34S080420	**18**			
8/3/2020	MW	MW-C-01	MW-C-01080320	0.137			
8/3/2020	MW	MW-F-01	MW-F-01080320	0.181			
8/3/2020	MW	MW-H-01	MW-H-01080320	**10.3**			
8/3/2020	MW	MW-I-01	MW-I-01080320	**187**	D	**193**	D
8/3/2020	MW	MW-J-01	MW-J-01080320	**5.89**			
8/4/2020	MW	10-19	10-19080420	**10.5**			
8/4/2020	MW	10-20	10-20080420	**9.58**			
8/4/2020	MW	10-21	10-21080420	**21.4**			
8/4/2020	MW	GW-05	GW-05080420	**2.73**			
8/4/2020	MW	INF-16	INF-16080420	**1.34**			
8/4/2020	MW	MW-09	MW-09080420	0.194			
8/4/2020	MW	MW-14	MW-14080420	0.175			

8/4/2020	MW	MW-A-95	MW-A-95080420	0.293			
8/4/2020	MW	MW-A-99	MW-A-99080420	0.66			
8/4/2020	MW	MW-G-01	MW-G-01080420	0.332			
8/4/2020	MW	MW-J-96	MW-J-96080420	0.523		0.798	
8/4/2020	MW	MW-L-01	MW-L-01080420	0.108			
8/4/2020	MW	MW-O-01	MW-O-01080420	0.176			
8/4/2020	MW	MW-S-01	MW-S-01080420	0.677			
8/4/2020	PZ	PZ-S2-02	PZ-S2-02080420	**1.19**			
8/4/2020	PZ	PZ-S4-01	PZ-S4-01080420	0.211			
8/4/2020	PZ	PZ-S4-02	PZ-S4-02080420	**1.49**			
8/5/2020	PZ	PZ-S5-01	PZ-S5-01080520	**84.6**	D		
8/5/2020	PZ	PZ-S6-01	PZ-S6-01080520	**98**	D		
8/4/2020	PZ	PZ-S7-01	PZ-S7-01080420	0.302			
8/5/2020	MW	INF-02	INF-02080520	11.8			
8/5/2020	MW	INF-08	INF-08080520	130	D		
8/5/2020	MW	INF-10	INF-10080520	69.4	D		
8/5/2020	MW	INF-13	INF-13080520	4.79			
8/5/2020	MW	MW-11-01	MW-11-01080520	80.5	D		
8/5/2020	MW	MW-11-02	MW-11-02080520	521	D		
8/5/2020	MW	MW-11-03	MW-11-03080520	14.8			14.1
8/5/2020	MW	MW-H-95	MW-H-95080520	94.8	D		
8/5/2020	MW	MW-X-01	MW-X-01080520	20.8			
8/5/2020	MW	NCRT-2010	NCRT-2010080520	20.7			
8/5/2020	MW	NCRT PZ-03	NCRTPZ-03080520	14.5			
8/5/2020	MW	NHRT PZ-04	NHRTPZ-04080520	52.1	D		
8/5/2020	PZ	PZ-N5-03	PZ-N5-03080520	23.5			
8/5/2020	PZ	PZ-N9-03	PZ-N9-03080520	429	D		
8/5/2020	PZ	PZ-S3-02	PZ-S3-02080520	242	D		
8/9/2020	MW	BMW-01A	BMW-1A080920	0.1	U		
8/9/2020	MW	BMW-01B	BMW-1B080920	0.1	U		
8/9/2020	MW	HCA-21	HCA-21080920	0.1	U		
8/9/2020	MW	INF-04	INF-04080920	90.4	D		
8/9/2020	MW	MW-11-04	MW-11-04080920	731	D		

Notes:
Effluent concentration bolded if greater than Record of Decision (ROD) cleanup level of 1 ug/L Units reported as micrograms per liter (ug/L)
BABB Between two activated carbon tanks
EFF Effluent
IN Influent
NCRT Near Creek Recovery Trench
NHRT Near Highway Recovery Trench
QC Quality Control
OPOQVC Placeholder name only for QC Sample
WRPVS Placeholder name only for QC Sample
PCP Pentachlorophenol
Plant Water Treatment Plant

QUALIFIERS:
J Detected above method detection limit (MDL) but less than method reporting limit
U Analyzed for but not detected above MDL
B Compound found in sample and blank
D Post extraction dilution
N Duplicate out of compliance (±20%)
M Matrix Spike recovery out of compliance (40-150%)
S Surrogate recovery out of compliance (50-130%)
C Calibration check out of compliance (70-130%)
CS Surrogate Calibration Check out of Compliance

APPENDIX B-3

DIOXIN (TEQ) – 2011 TO 2020

MPTP ROD METHODOLOGY VS. DEQ-7 METHODOLOGY

DIOXIN (TEQ) - 2011 TO 2019
MPTP ROD METHODOLOGY VS. DEQ-7 METHODOLOGY

STATION	ANALYTE	SAMPLE	DATE	MPTP ROD METHODOLOGY	DEQ-7 METHODOLOGY	UNITS	MPTP ROD METHODOLOGY	DEQ-7 METHODOLOGY	UNITS
10-12	Dioxin (TEQ)	10-12081213	8/12/2013	4.50E-08	1.41E-06	µg/L	0.05	1.41	pg/L
10-12	Dioxin (TEQ)	10-12081114	8/11/2014	2.70E-08	1.98E-06	µg/L	0.03	1.98	pg/L
10-12	Dioxin (TEQ)	10-12081015	8/10/2015	1.04E-07	1.03E-06	µg/L	0.10	1.03	pg/L
10-12	Dioxin (TEQ)	10-12080816	8/8/2016	2.30E-08	7.37E-07	µg/L	0.02	0.74	pg/L
BMW-01A	Dioxin (TEQ)	BMW-1A081213	8/12/2013	8.81E-08	1.33E-06	µg/L	0.09	1.33	pg/L
BMW-01A	Dioxin (TEQ)	BMW-1A081114	8/11/2014	2.08E-08	1.31E-06	µg/L	0.02	1.31	pg/L
BMW-01A	Dioxin (TEQ)	BMW-1A081015	8/10/2015	7.50E-09	1.04E-06	µg/L	0.01	1.04	pg/L
BMW-01A	Dioxin (TEQ)	BMW-1A080816	8/8/2016	4.40E-08	8.14E-07	µg/L	0.04	0.81	pg/L
BMW-01A	Dioxin (TEQ)	BMW-1A081017	8/10/2017	1.44E-08	1.08E-06	µg/L	0.01	1.08	pg/L
BMW-01A	Dioxin (TEQ)	BMW-1A081318	8/13/2018	2.20E-08	1.08E-06	µg/L	0.02	1.08	pg/L
BMW-01A	Dioxin (TEQ)	BMW-1A081119	8/11/2019	3.64E-08	8.63E-07	µg/L	0.04	0.86	pg/L
BMW-01B	Dioxin (TEQ)	BMW-1B081213	8/12/2013	1.12E-07	1.17E-06	µg/L	0.11	1.17	pg/L
BMW-01B	Dioxin (TEQ)	BMW-1B081114	8/11/2014	1.83E-08	1.15E-06	µg/L	0.02	1.15	pg/L
BMW-01B	Dioxin (TEQ)	BMW-1B081015	8/10/2015	2.70E-08	1.05E-06	µg/L	0.03	1.05	pg/L
BMW-01B	Dioxin (TEQ)	BMW-1B080816	8/8/2016	1.94E-08	6.71E-07	µg/L	0.02	0.67	pg/L
BMW-01B	Dioxin (TEQ)	BMW-1B081017	8/10/2017	8.50E-08	1.06E-06	µg/L	0.09	1.06	pg/L
BMW-01B	Dioxin (TEQ)	BMW-1B081318	8/13/2018	2.81E-08	2.57E-06	µg/L	0.03	2.57	pg/L
BMW-01B	Dioxin (TEQ)	BMW-1B081119	8/11/2019	1.27E-07	1.11E-06	µg/L	0.13	1.11	pg/L
GW-14R-98	Dioxin (TEQ)	GW14R081511	8/15/2011	1.05E-06	1.82E-06	µg/L	1.05	1.82	pg/L
GW-14R-98	Dioxin (TEQ)	GW-14R-98081312	8/13/2012	1.18E-07	1.27E-06	µg/L	0.12	1.27	pg/L
GW-14R-98	Dioxin (TEQ)	GW-14R-98081213	8/12/2013	6.70E-07	1.54E-06	µg/L	0.67	1.54	pg/L
GW-14R-98	Dioxin (TEQ)	GW-14R-98081114	8/11/2014	1.42E-07	1.49E-06	µg/L	0.14	1.49	pg/L
GW-14R-98	Dioxin (TEQ)	GW-14R-98081015	8/10/2015	9.03E-06	7.49E-06	µg/L	9.03	7.49	pg/L
GW-14R-98	Dioxin (TEQ)	GW-14R-98080816	8/8/2016	4.13E-07	1.07E-06	µg/L	0.41	1.07	pg/L
HCA-21	Dioxin (TEQ)	HCA-21081213	8/12/2013	8.04E-08	1.23E-06	µg/L	0.08	1.23	pg/L
HCA-21	Dioxin (TEQ)	HCA-21081114	8/11/2014	7.77E-07	1.69E-06	µg/L	0.78	1.69	pg/L
HCA-21	Dioxin (TEQ)	HCA-21081015	8/10/2015	4.23E-07	1.59E-06	µg/L	0.42	1.59	pg/L
HCA-21	Dioxin (TEQ)	HCA-21080816	8/8/2016	2.02E-07	7.55E-07	µg/L	0.20	0.75	pg/L
HCA-21	Dioxin (TEQ)	HCA-21081017	8/10/2017	3.60E-08	1.04E-06	µg/L	0.04	1.04	pg/L
HCA-21	Dioxin (TEQ)	HCA-21081318	8/13/2018	2.10E-09	1.92E-06	µg/L	0.002	1.92	pg/L
HCA-21	Dioxin (TEQ)	HCA-21081119	8/11/2019	1.27E-06	1.92E-06	µg/L	1.272	1.92	pg/L
INF-04	Dioxin (TEQ)	INF-04081511	8/15/2011	4.09E-06	4.13E-06	µg/L	4.09	4.13	pg/L
INF-04	Dioxin (TEQ)	INF-04081312	8/13/2012	2.75E-05	2.00E-05	µg/L	27.49	20.03	pg/L
INF-04	Dioxin (TEQ)	INF-04081213	8/12/2013	5.59E-06	5.55E-06	µg/L	5.59	5.55	pg/L
INF-04	Dioxin (TEQ)	INF-04081114	8/11/2014	**1.38E-04**	**9.93E-05**	µg/L	**138**	**99.33**	pg/L
INF-04	Dioxin (TEQ)	INF-04081015	8/10/2015	6.31E-07	1.35E-06	µg/L	0.63	1.35	pg/L
INF-04	Dioxin (TEQ)	INF-04080816	8/8/2016	7.76E-07	1.18E-06	µg/L	0.78	1.18	pg/L
INF-04	Dioxin (TEQ)	INF-04081017	8/10/2017	**8.41E-05**	**6.40E-05**	µg/L	**84.05**	**63.98**	pg/L
INF-04	Dioxin (TEQ)	INF-04081318	8/13/2018	**5.10E-04**	**3.65E-04**	µg/L	**509.81**	**364.57**	pg/L
INF-04	Dioxin (TEQ)	INF-04081119	8/11/2019	**9.21E-05**	**9.25E-05**	µg/L	**92.10**	**92.46**	pg/L
MW-11-04	Dioxin (TEQ)	MW-11-04081213	8/12/2013	9.91E-06	9.30E-06	µg/L	9.91	9.30	pg/L
MW-11-04	Dioxin (TEQ)	MW-11-04081114	8/11/2014	7.15E-06	8.42E-06	µg/L	7.15	8.42	pg/L
MW-11-04	Dioxin (TEQ)	MW-11-04081015	8/10/2015	6.46E-06	5.76E-06	µg/L	6.46	5.76	pg/L
MW-11-04	Dioxin (TEQ)	MW-11-04080816	8/8/2016	1.56E-05	1.21E-05	µg/L	15.60	12.11	pg/L
MW-11-04	Dioxin (TEQ)	MW-11-04081017	8/10/2017	**3.72E-04**	**2.52E-04**	µg/L	**372.40**	**252.09**	pg/L
MW-11-04	Dioxin (TEQ)	MW-11-04081318	8/13/2018	**5.62E-05**	**3.85E-05**	µg/L	**56.23**	**38.45**	pg/L
MW-11-04	Dioxin (TEQ)	MW-11-04081119	8/11/2019	**8.90E-05**	**6.55E-05**	µg/L	**88.97**	**65.52**	pg/L
MW-B-98	Dioxin (TEQ)	MW-B-98081511	8/15/2011	9.30E-09	1.48E-06	µg/L	0.01	1.48	pg/L
MW-B-98	Dioxin (TEQ)	MW-B98081312	8/13/2012	1.04E-07	1.16E-06	µg/L	0.10	1.16	pg/L

DIOXIN (TEQ) - 2011 TO 2019
MPTP ROD METHODOLOGY VS. DEQ-7 METHODOLOGY

STATION	ANALYTE	SAMPLE	DATE	MPTP ROD METHODOLOGY	DEQ-7 METHODOLOGY	UNITS	MPTP ROD METHODOLOGY	DEQ-7 METHODOLOGY	UNITS
MW-V-01	Dioxin (TEQ)	MW-V-01081511	8/15/2011	2.82E-08	1.71E-06	µg/L	0.03	1.71	pg/L
MW-V-01	Dioxin (TEQ)	MW-V-01081312	8/13/2012	3.30E-08	1.12E-06	µg/L	0.03	1.12	pg/L
NWW	Dioxin (TEQ)	NWW081511	8/15/2011	1.70E-08	1.45E-06	µg/L	0.02	1.45	pg/L
NWW	Dioxin (TEQ)	NWW081312	8/13/2012	7.40E-08	1.84E-06	µg/L	0.07	1.84	pg/L
EFF	Dioxin (TEQ)	EFF081511	8/15/2011	7.60E-08	4.69E-06	µg/L	0.08	4.69	pg/L
EFF	Dioxin (TEQ)	EFF081312	8/13/2012	4.44E-07	1.43E-06	µg/L	0.44	1.43	pg/L
EFF	Dioxin (TEQ)	EFF081213	8/12/2013	3.69E-07	1.23E-06	µg/L	0.37	1.23	pg/L
EFF	Dioxin (TEQ)	EFF081114	8/11/2014	7.99E-07	2.03E-06	µg/L	0.80	2.03	pg/L
EFF	Dioxin (TEQ)	EFF081015	8/10/2015	4.02E-07	1.71E-06	µg/L	0.40	1.71	pg/L
EFF	Dioxin (TEQ)	EFF080816	8/8/2016	3.08E-07	9.51E-07	µg/L	0.31	0.95	pg/L
EFF	Dioxin (TEQ)	EFF080917	8/9/2017	1.87E-06	3.40E-06	µg/L	1.87	3.40	pg/L
EFF	Dioxin (TEQ)	EFF081318	8/13/2018	9.79E-07	2.05E-06	µg/L	0.98	2.05	pg/L
EFF	Dioxin (TEQ)	EFF011119	8/11/2019	1.33E-06	1.35E-06	µg/L	1.33	1.35	pg/L
IN	Dioxin (TEQ)	IN081511	8/15/2011	3.91E-07	4.44E-06	µg/L	0.39	4.44	pg/L
IN	Dioxin (TEQ)	IN081312	8/13/2012	7.26E-06	6.18E-06	µg/L	7.26	6.18	pg/L
IN	Dioxin (TEQ)	IN081213	8/12/2013	3.58E-05	2.79E-05	µg/L	35.80	27.92	pg/L
IN	Dioxin (TEQ)	IN081114	8/11/2014	6.75E-06	8.31E-06	µg/L	6.75	8.31	pg/L
IN	Dioxin (TEQ)	IN0801015	8/10/2015	4.48E-06	5.34E-06	µg/L	4.48	5.34	pg/L
IN	Dioxin (TEQ)	IN080816	8/8/2016	2.80E-06	2.89E-06	µg/L	2.80	2.89	pg/L
IN	Dioxin (TEQ)	IN080717	8/7/2017	3.57E-06	3.42E-06	µg/L	3.57	3.42	pg/L
IN	Dioxin (TEQ)	IN081318	8/13/2018	1.02E-05	7.27E-06	µg/L	10.20	7.27	pg/L
IN	Dioxin (TEQ)	IN081119	8/11/2019	9.36E-07	1.45E-06	µg/L	0.94	1.45	pg/L
LTUDIS	Dioxin (TEQ)	LTUDIS080816	8/8/2016	3.85E-05	3.08E-05	µg/L	38.49	30.78	pg/L
NCRTEFF	Dioxin (TEQ)	NCRTEFF081511	8/15/2011	1.90E-07	6.28E-06	µg/L	0.19	6.28	pg/L
NCRTEFF	Dioxin (TEQ)	NCRTEFF081312	8/13/2012	1.21E-05	9.79E-06	µg/L	12.07	9.79	pg/L
NCRTEFF	Dioxin (TEQ)	NCRTEFF081213	8/12/2013	7.72E-06	6.94E-06	µg/L	7.72	6.94	pg/L
NCRTEFF	Dioxin (TEQ)	NCRTEFF081114	8/11/2014	3.07E-06	3.29E-06	µg/L	3.07	3.29	pg/L
NCRTEFF	Dioxin (TEQ)	NCRTEFF081015	8/10/2015	7.72E-06	6.59E-06	µg/L	7.72	6.59	pg/L
NCRTEFF	Dioxin (TEQ)	NCRTEFF080816	8/8/2016	2.12E-06	2.14E-06	µg/L	2.12	2.14	pg/L
NCRTEFF	Dioxin (TEQ)	NCRTEFF080717	8/7/2017	5.11E-06	4.70E-06	µg/L	5.11	4.70	pg/L
NCRTEFF	Dioxin (TEQ)	NCRTEFF081318	8/13/2018	4.14E-06	4.34E-06	µg/L	4.14	4.34	pg/L
NCRTEFF	Dioxin (TEQ)	NCRTEFF081119	8/11/2019	8.08E-07	1.33E-06	µg/L	0.81	1.33	pg/L
NHRTEFF	Dioxin (TEQ)	NHRTEFF081511	8/15/2011	1.91E-07	6.67E-06	µg/L	0.19	6.67	pg/L
NHRTEFF	Dioxin (TEQ)	NHRTEFF081312	8/13/2012	2.27E-05	1.83E-05	µg/L	22.68	18.31	pg/L
NHRTEFF	Dioxin (TEQ)	NHRTEFF081213	8/12/2013	1.27E-04	9.75E-05	µg/L	127.00	97.46	pg/L
NHRTEFF	Dioxin (TEQ)	NHRTEFF081114	8/11/2014	1.06E-05	1.19E-05	µg/L	10.64	11.94	pg/L
NHRTEFF	Dioxin (TEQ)	NHRTEFF081015	8/10/2015	5.68E-06	5.64E-06	µg/L	5.68	5.64	pg/L
NHRTEFF	Dioxin (TEQ)	NHRTEFF080816	8/8/2016	4.95E-06	4.66E-06	µg/L	4.95	4.66	pg/L
NHRTEFF	Dioxin (TEQ)	NHRTEFF080717	8/7/2017	9.20E-06	7.12E-06	µg/L	9.20	7.12	pg/L
NHRTEFF	Dioxin (TEQ)	NHRTEFF081318	8/13/2018	1.33E-05	9.87E-06	µg/L	13.30	9.87	pg/L
NHRTEFF	Dioxin (TEQ)	NHRTEFF081119	8/11/2019	1.59E-06	2.31E-06	µg/L	1.59	2.31	pg/L
SS-06A	Dioxin (TEQ)	SW06A081511	8/15/2011	1.09E-07	8.95E-07	µg/L	0.11	0.89	pg/L
SS-06A	Dioxin (TEQ)	SS-06A081312	8/13/2012	4.10E-08	1.14E-06	µg/L	0.04	1.14	pg/L
SS-06A	Dioxin (TEQ)	SS-06A081213	8/12/2013	1.90E-07	1.37E-06	µg/L	0.19	1.37	pg/L
SS-06A	Dioxin (TEQ)	SS-06A081114	8/11/2014	4.13E-08	1.14E-06	µg/L	0.04	1.14	pg/L
SS-06A	Dioxin (TEQ)	SS-06A081015	8/10/2015	3.94E-08	1.11E-06	µg/L	0.04	1.11	pg/L
SS-06A	Dioxin (TEQ)	SS-06A080816	8/8/2016	2.17E-07	7.39E-07	µg/L	0.22	0.74	pg/L
SS-06A	Dioxin (TEQ)	SS-06A080717	8/7/2017	1.90E-08	1.38E-06	µg/L	0.02	1.38	pg/L
SS-06A	Dioxin (TEQ)	SS-06A081318	8/13/2018	1.70E-08	1.57E-06	µg/L	0.02	1.57	pg/L
SS-06A	Dioxin (TEQ)	SS-06A081119	8/11/2019	1.73E-07	9.42E-07	µg/L	0.17	0.94	pg/L

DIOXIN (TEQ) - 2011 TO 2019
MPTP ROD METHODOLOGY VS. DEQ-7 METHODOLOGY

STATION	ANALYTE	SAMPLE	DATE	MPTP ROD METHODOLOGY	DEQ-7 METHODOLOGY	UNITS	MPTP ROD METHODOLOGY	DEQ-7 METHODOLOGY	UNITS
SW-03	Dioxin (TEQ)	SW03081511	8/15/2011	3.80E-08	1.44E-06	µg/L	0.04	1.44	pg/L
SW-05	Dioxin (TEQ)	SW05081511	8/15/2011	8.10E-08	1.16E-06	µg/L	0.08	1.16	pg/L
SW-05	Dioxin (TEQ)	SW-05081312	8/13/2012	3.47E-07	1.38E-06	µg/L	0.35	1.38	pg/L
SW-05	Dioxin (TEQ)	SW-05081213	8/12/2013	4.56E-07	1.87E-06	µg/L	0.46	1.87	pg/L
SW-05	Dioxin (TEQ)	SW-05081114	8/11/2014	5.84E-08	1.24E-06	µg/L	0.06	1.24	pg/L
SW-05	Dioxin (TEQ)	SW-05081015	8/10/2015	2.30E-08	1.01E-06	µg/L	0.02	1.01	pg/L
SW-05	Dioxin (TEQ)	SW-05080816	8/8/2016	2.15E-07	7.55E-07	µg/L	0.22	0.75	pg/L
SW-05	Dioxin (TEQ)	SW-05080717	8/7/2017	1.40E-07	1.09E-06	µg/L	0.14	1.09	pg/L
SW-05	Dioxin (TEQ)	SW-05081318	8/13/2018	5.90E-08	1.36E-06	µg/L	0.06	1.36	pg/L
SW-06	Dioxin (TEQ)	SW-05081119	8/11/2019	4.199E-07	1.2782E-06	µg/L	0.42	1.28	pg/L
SW-09	Dioxin (TEQ)	SW09081511	8/15/2011	1.70E-08	9.51E-07	µg/L	0.02	0.95	pg/L
SW-09	Dioxin (TEQ)	SW-09081312	8/13/2012	3.40E-08	1.37E-06	µg/L	0.03	1.37	pg/L
SW-09	Dioxin (TEQ)	SW-09081213	8/12/2013	1.86E-06	2.14E-06	µg/L	1.86	2.14	pg/L
SW-09	Dioxin (TEQ)	SW-09081114	8/11/2014	1.90E-08	1.25E-06	µg/L	0.02	1.25	pg/L
SW-09	Dioxin (TEQ)	SW-09081015	8/10/2015	5.14E-08	7.80E-07	µg/L	0.05	0.78	pg/L
SW-09	Dioxin (TEQ)	SW-09080816	8/8/2016	7.88E-08	1.06E-06	µg/L	0.08	1.06	pg/L
SW-09	Dioxin (TEQ)	SW-09080717	8/7/2017	1.20E-08	9.52E-07	µg/L	0.01	0.95	pg/L
SW-09	Dioxin (TEQ)	SW-09081318	8/13/2018	4.53E-08	1.49E-06	µg/L	0.05	1.49	pg/L
SW-10	Dioxin (TEQ)	SW-09081119	8/11/2019	3.84E-08	9.81E-07	µg/L	0.04	0.98	pg/L
LTU Zone 1_0	Dioxin (TEQ)	LTU Zone 1 091	9/19/2011	0.27	3.46	µg/Kg	-	-	-
LTU Zone 1_0	Dioxin (TEQ)	LTUZ01 092612	9/26/2012	3.55	2.67	µg/Kg	-	-	-
LTU Zone 10_0	Dioxin (TEQ)	LTU Zone 10 09	9/19/2011	0.08	6.09	µg/Kg	-	-	-
LTU Zone 10_0	Dioxin (TEQ)	LTUZ10 092612	9/26/2012	1.61	2.79	µg/Kg	-	-	-
LTU Zone 2_0	Dioxin (TEQ)	LTU Zone 2 091	9/19/2011	0.25	2.74	µg/Kg	-	-	-
LTU Zone 2_0	Dioxin (TEQ)	LTUZ02 092612	9/26/2012	2.75	5.55	µg/Kg	-	-	-
LTU Zone 3_0	Dioxin (TEQ)	LTU Zone 3 091	9/19/2011	0.98	10.23	µg/Kg	-	-	-
LTU Zone 3_0	Dioxin (TEQ)	LTUZ03 092612	9/26/2012	1.85	5.29	µg/Kg	-	-	-
LTU Zone 4_0	Dioxin (TEQ)	LTU Zone 4 091	9/19/2011	0.63	5.47	µg/Kg	-	-	-
LTU Zone 4_0	Dioxin (TEQ)	LTUZ04 092612	9/26/2012	2.84	4.01	µg/Kg	-	-	-
LTU Zone 5_0	Dioxin (TEQ)	LTU Zone 5 091	9/19/2011	0.38	8.22	µg/Kg	-	-	-
LTU Zone 5_0	Dioxin (TEQ)	LTUZ05 092612	9/26/2012	3.69	2.82	µg/Kg	-	-	-
LTU Zone 6_0	Dioxin (TEQ)	LTU Zone 6 091	9/19/2011	0.40	4.71	µg/Kg	-	-	-
LTU Zone 6_0	Dioxin (TEQ)	LTUZ06 092612	9/26/2012	2.55	40.37	µg/Kg	-	-	-
LTU Zone 7_0	Dioxin (TEQ)	LTU Zone 7 091	9/19/2011	0.35	10.50	µg/Kg	-	-	-
LTU Zone 7_0	Dioxin (TEQ)	LTUZ07 092612	9/26/2012	5.99	4.44	µg/Kg	-	-	-
LTU Zone 8_0	Dioxin (TEQ)	LTU Zone 8 091	9/19/2011	0.59	5.29	µg/Kg	-	-	-
LTU Zone 8_0	Dioxin (TEQ)	LTUZ08 092612	9/26/2012	1.95	1.45	µg/Kg	-	-	-
LTU Zone 9_0	Dioxin (TEQ)	LTU Zone 9 091	9/19/2011	0.11	2.44	µg/Kg	-	-	-
LTU Zone 9_0	Dioxin (TEQ)	LTUZ09 092612	9/26/2012	1.00	3.03	µg/Kg	-	-	-
SP-01_0	Dioxin (TEQ)	LTU Zone 11 09	9/19/2011	0.28	2.91	µg/Kg	-	-	-
SP-01_0	Dioxin (TEQ)	LTU Zone 12 09	9/19/2011	0.00	0.14	µg/Kg	-	-	-

Notes
All TEQ values compared to the applicable MPTP ROD cleanup level

Bold	Exceeds applicable MPTP ROD cleanup level
pg/L	Picograms per liter
µg/kg	Micrograms per kilogram
µg/L	Micrograms per liter
MPTP	Montana Pole and Treating Plant
ROD	Record of decision
TEQ	Toxicity equivalence quotient

ROD groundwater cleanup level for dioxin (TEQ) equals 3.00E-05 µg/L (equivalent to 30 ρg/L).

MPTP ROD Methodology

Dioxin (TEQ) is calculated using 0 for values qualified as "U" (analyzed for but not detected above the method detection level [MDL]) and ROD toxicity equivalency factors (TEF).

DEQ-7 Methodology

Dioxin (TEQ) is calculated using the 2005 World Health Organization methodology, using one-half the project reporting limit where not detected; using one-half the estimated maximum possible concentration when reported; and using 2005 TEFs as specified in DEQ-7 (DEQ 2012).

APPENDIX C

2020 Operational Flow Summary

Table C-1
2018 Operational Flow Summary

Date	NCRT (gpm)	NHRT (gpm)	NCRT+NHRT (gpm)	NCRT+NHRT (gallons)	Injection to Cell 1 (gpm)	Injection to Cell 2 (gpm)	Injection to Cell 4 (gpm)	Injection to Cell 5 (gpm)	Injection to Cell 6 (gpm)	Injection to Cell 8 (gpm)	West side Infiltration (gpm)	Discharge to Creek (gpm)	Beaver Dams
1/1/2018	195	75	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/2/2018	195	75	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/3/2018	195	75	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/4/2018	195	75	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/5/2018	195	75	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/6/2018	195	75	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/7/2018	195	75	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/8/2018	195	75	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/9/2018	195	75	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/10/2018	195	75	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/11/2018	195	75	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/12/2018	195	75	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/13/2018	195	75	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/14/2018	195	75	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/15/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/16/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/17/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/18/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/19/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/20/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/21/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/22/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/23/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/24/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/25/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/26/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/27/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/28/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/29/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/30/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
1/31/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/1/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/2/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/3/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/4/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/5/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/6/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/7/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/8/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/9/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/10/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/11/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/12/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/13/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/14/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/15/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/16/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/17/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/18/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/19/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/20/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/21/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/22/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/23/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/24/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/25/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/26/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/27/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
2/28/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/1/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/2/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/3/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/4/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/5/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/6/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/7/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/8/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/9/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/10/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/11/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/12/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/13/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/14/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/15/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/16/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/17/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/18/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/19/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/20/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/21/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/22/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/23/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/24/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/25/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/26/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/27/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/28/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/29/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/30/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
3/31/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/1/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/2/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/3/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/4/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/5/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/6/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/7/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/8/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/9/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/10/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/11/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/12/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/13/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/14/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/15/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/16/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/17/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/18/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/19/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/20/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/21/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/22/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/23/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/24/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/25/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/26/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/27/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/28/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/29/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
4/30/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
5/1/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
5/2/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
5/3/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
5/4/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
5/5/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
5/6/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
5/7/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
5/8/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill

Table C-1
2018 Operational Flow Summary

Date	NCRT (gpm)	NHRT (gpm)	NCRT+NHRT (gpm)	NCRT+NHRT (gallons)	Injection to Cell 1 (gpm)	Injection to Cell 2 (gpm)	Injection to Cell 4 (gpm)	Injection to Cell 5 (gpm)	Injection to Cell 6 (gpm)	Injection to Cell 8 (gpm)	West side Infiltration (gpm)	Discharge to Creek (gpm)	Beaver Dams
5/9/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
5/10/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
5/11/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
5/12/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
5/13/2018	200	70	270	388,800	0	0	0	0	0	0	25	245	1-discharge rill
5/14/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
5/15/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
5/16/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
5/17/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
5/18/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
5/19/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
5/20/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
5/21/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
5/22/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
5/23/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
5/24/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
5/25/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
5/26/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
5/27/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
5/28/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
5/29/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
5/30/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
5/31/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/1/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/2/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/3/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/4/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/5/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/6/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/7/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/8/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/9/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/10/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/11/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/12/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/13/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/14/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/15/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/16/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/17/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/18/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/19/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/20/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/21/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/22/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/23/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/24/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/25/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/26/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/27/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/28/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/29/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
6/30/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/1/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/2/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/3/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/4/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/5/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/6/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/7/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/8/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/9/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/10/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/11/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/12/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/13/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/14/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/15/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/16/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/17/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/18/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/19/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/20/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/21/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/22/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/23/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/24/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/25/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/26/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/27/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/28/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/29/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/30/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
7/31/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/1/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/2/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/3/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/4/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/5/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/6/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/7/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/8/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/9/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/10/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/11/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/12/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/13/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/14/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/15/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/16/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/17/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/18/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/19/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/20/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/21/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/22/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/23/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/24/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/25/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/26/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/27/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/28/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/29/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/30/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
8/31/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/1/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/2/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/3/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/4/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/5/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/6/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/7/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/8/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/9/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/10/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/11/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/12/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/13/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill

Table C-1
2018 Operational Flow Summary

Date	NCRT (gpm)	NHRT (gpm)	NCRT+NHRT (gpm)	NCRT+NHRT (gallons)	Injection to Cell 1 (gpm)	Injection to Cell 2 (gpm)	Injection to Cell 4 (gpm)	Injection to Cell 5 (gpm)	Injection to Cell 6 (gpm)	Injection to Cell 8 (gpm)	West side Infiltration (gpm)	Discharge to Creek (gpm)	Beaver Dams
9/14/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/15/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/16/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/17/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/18/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/19/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/20/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/21/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/22/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/23/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/24/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/25/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/26/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/27/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/28/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/29/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
9/30/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/1/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/2/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/3/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/4/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/5/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/6/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/7/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/8/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/9/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/10/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/11/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/12/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/13/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/14/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/15/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/16/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/17/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/18/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/19/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/20/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/21/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/22/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/23/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/24/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/25/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/26/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/27/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/28/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/29/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/30/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
10/31/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/1/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/2/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/3/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/4/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/5/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/6/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/7/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/8/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/9/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/10/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/11/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/12/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/13/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/14/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/15/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/16/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/17/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/18/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/19/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/20/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/21/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/22/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/23/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/24/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/25/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/26/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/27/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/28/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/29/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
11/30/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/1/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/2/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/3/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/4/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/5/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/6/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/7/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/8/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/9/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/10/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/11/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/12/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/13/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/14/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/15/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/16/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/17/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/18/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/19/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/20/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/21/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/22/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/23/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/24/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/25/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/26/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/27/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/28/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/29/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/30/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
12/31/2018	200	70	270	388,800	0	0	0	0	0	0	0	270	1-discharge rill
Minimum	195	70	270	388,800	0	0	0	0	0	0	0	245	
Maximum	200	75	270	388,800	0	0	0	0	0	0	25	270	
Average	200	70	270	388,800	0	0	0	0	0	0	9	261	
TOTAL				141,912,000									

Notes:
gpm gallons per minute
NCRT Near creek recovery trench
NHRT Near highway recovery trench

APPENDIX D

Daily Summary Reports

Field Notes – Daily Summary Report
Montana Pole and Treating Plant
Storage Building Removal

Project No.: 103S320360 **Dates**: 1/29/2018 to 3/15/2018

Tetra Tech Project Manager: Colin McCoy
DEQ Project Manager: David Bowers
Field Notes Prepared by: Dan Buffalo/Tom Bowler

Weather: varied **Temperature**: Varied (°F)

Contractor(s):
1. Markovich Construction
2. _____

PERSONNEL ON SITE	
Tetra Tech	**Arrival Time**
1. Tom Bowler 2.	varied
Contractor	**Arrival Time**
1. Markovich Construction, Butte, Montana 2.	varied

EQUIPMENT ON SITE
1. Various 2. 3.

CONSTRUCTION ACTIVITIES
1. Remove five storage buildings from the south side of the site (see attached photographs) 2.

ISSUES/CONCERNS
1. Screws remaining on surface will impact ability to drive in this area (very high potential to produce flat tires). 2. 3.

Date: Prior to January 2018 **Description:** Five storage buildings were constructed during the early 1990's.

Date: March 1, 2018 **Description:** First three storage buildings taken down, material banded, and staged on site.

Date: March 15, 2018 **Description:** Remaining storage buildings taken down and material removed off site.

Field Notes – Daily Summary Report
Montana Pole and Treating Plant
SCADA Evaluation
Montana Pole and Treating Plant Site

Project No.: 103S320360 **Date**: February 26, 2018

Tetra Tech Project Manager: Colin McCoy
DEQ Project Manager: David Bowers
Field Notes Prepared by: Brad Frayo

Weather: Cold/snow **Temperature**: 11° F

Contractor(s): 1. _none

PERSONNEL ON SITE	
Tetra Tech	**Arrival Time**
1. Brad Frayo 2. Corey Lamb 3. Tom Bowler	9:00 am
Contractor	**Arrival Time**
1. 2.	

EQUIPMENT ON SITE
1. see attached 2. 3.

CONSTRUCTION ACTIVITIES
1. see attached 2. 3.

ISSUES/CONCERNS
1. see attached 2. 3.

To:	Colin McCoy, Tetra Tech
Cc:	
From:	Brad Frayo, Corey Lamb, Tetra Tech
Date:	March 21, 2018
Subject:	MT Pole Site Visit and Evaluation

Tetra Tech SCADA engineers Brad Frayo and Corey Lamb made a trip to the Montana Pole treatment facility on the 26th of February, 2018. The purpose of the visit was to introduce themselves to the plant operator and to become familiar with the control system. The SCADA engineers also evaluated the current system and have recommendations to support the system and operations, as follows.

Overall, the control system is functional with no known issues. All SCADA and PLC functions are operable and the system is performing as it needs to. The control panels appeared neat despite numerous changes over the years. The SCADA PC and software have been updated within the last couple of years, and is still current. Two areas of improvement were identified – spare parts and remote access for support.

Because the PLC hardware for the plant is moving into obsolescence, it is recommended to have spare parts on hand to maintain the system as it is and not be forced into upgrading hardware, at this time. We found multiple boxes of Allen Bradley PLC components, including a number of CPUs on site. However, the CPU that is in service is a different part number than the spares that were found. It is recommended to procure an additional CPU as indicated in the table below.

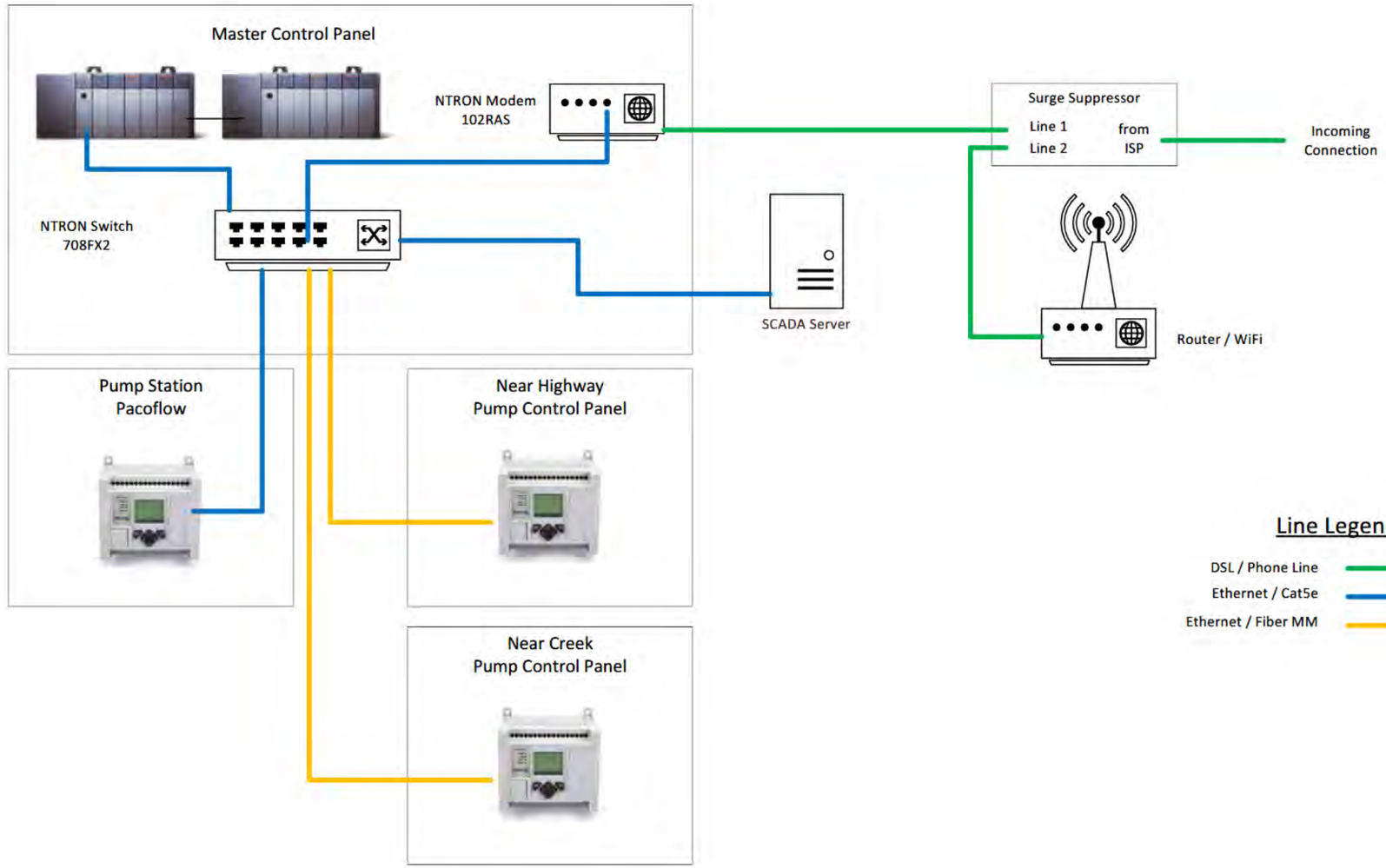
The second area of improvement is establishing a secure remote connection to be used for support. The system today consists of a single SCADA PC, with Windows Server 2008. This machine is connected to a PLC network for data collection and control. Separately, the site has a DSL internet connection and 'business' network. This 'business' network is for connectivity of various laptops and a printer. Refer to the attached network diagram. The investigation found an industrial modem installed in the PLC cabinet, but not connected, along with a Tofino firewall, also not connected. These devices are expected to be repurposed to establish secure remote connectivity. To implement, a connection protocol needs to be developed and suitability of the firewall to meet that protocol will need to be evaluated. Following this preliminary planning, the firewall will be configured and the connected tested. The remaining part of the remote support is having a remote individual available to support. The Tetra Tech SCADA engineers are available as needed and each have a backup for a total of four points of contact. See callout table below.

TABLE 1: PLC SPARE PARTS TO ORDER

	Description	Allen Bradley Part Number	Quantity
1	PLC CPU, w/ Ethernet	1746-L551	1

TABLE 2: REMOTE SUPPORT CALLOUT

Priority	Who	Office	Numbers
1	Brad Frayo	Seattle, WA	425-984-3208 206-883-9315
2	Corey Lamb	Denver, CO	303-656-8848 720-931-9349
3	Jon Saito	Seattle, WA	206-883-9323
4	Phong Hoang	Denver, CO	720-931-9305



DEQ
Montana Department of Environmental Quality

TETRA TECH

Montana DEQ Pole Treatment Site Network Diagram	
PAGE 1 OF 1	DATE 2/27/2018

FULL FILENAME
C:\USERS\COREY.LAMB.TT\DESKTOP\MT POLE NETWORK ARCH.VSDX

Field Notes – Daily Summary Report
Description of Project
Site

Project No.: 103S320352 **Date**: July 9, 2018

Tetra Tech Project Manager: Colin McCoy
DEQ Project Manager: David Bowers
Field Notes Prepared by: Chris Kelley

Weather: Clear, Sunny **Temperature**: 89 °F

Contractor(s): 1. Olympus Technical Services

PERSONNEL ON SITE	
Tetra Tech	**Arrival Time**
1. Chris Kelley	08:00 AM

EQUIPMENT ON SITE
1. Truck, camera, PPE, steel drums, 10 mil plastic, and pressure washer

FIELD ACTIVITIES
1. Provided oversight during the cleaning of the oil-water separator by Olympus Technical Services. 2. Performed walk through of oil-water separator, outdoor oil storage tank, and sump room that need to be cleaned. 3. Contractor pulled 8 filters from the oil-water separator tank and wrapped each filter in black 10 mil plastic sheeting. Filters dimensions are roughly 3 feet x 3 feet x 4 feet. 4. Crew cut a hole in side of oil-water separator to scrape and remove sediment from the tank. Sediment was sprayed with water to minimize dust during scrapping and removal. 5. Waste produced: a. Four full drums and one approximately half-full drum from the sediment in the oil-water separator tank. b. 8 filters wrapped in black 10 mil plastic sheeting.

ISSUES/CONCERNS
1. Filters from oil-water separator are too large to fit through door. Filters will probably need to be cut into pieces to be removed.

Date: 07/09/2018	**Direction:** NE	**Description:** Removal of filter from oil-water seperator tank.

Date: 07/09/2018	**Direction:** E	**Description:** Two of the eight oil-water seperator filters wrapped in 10 mil plastic.

Date: 07/09/2018	**Direction:** NE	**Description:** Cutting hole into the side of the oil-water seperator tank.

Date: 07/09/2018	**Direction:** E	**Description:** View inside oil-water seperator tank before cleaning.

Date: 07/09/2018	**Direction:** E	**Description:** View inside oil-water seperator tank after cleaning.

Date: 07/09/2018	**Direction:** SE	**Description:** Second view inside oil-water seperator tank after cleaning.

Date: 07/09/2018	**Direction:** E	**Description:** Example of sediment removed from oil-water seperator tank.

Field Notes – Daily Summary Report
Description of Project
Site

Project No.: 103S320352 **Date**: July 11, 2018

Tetra Tech Project Manager: Colin McCoy
DEQ Project Manager: David Bowers
Field Notes Prepared by: Chris Kelley (from logbook completed by Ruthanne Coffey

Weather: Clear, Sunny **Temperature**: 65 °F (on arrival)

Contractor(s): 1. Olympus Technical Services

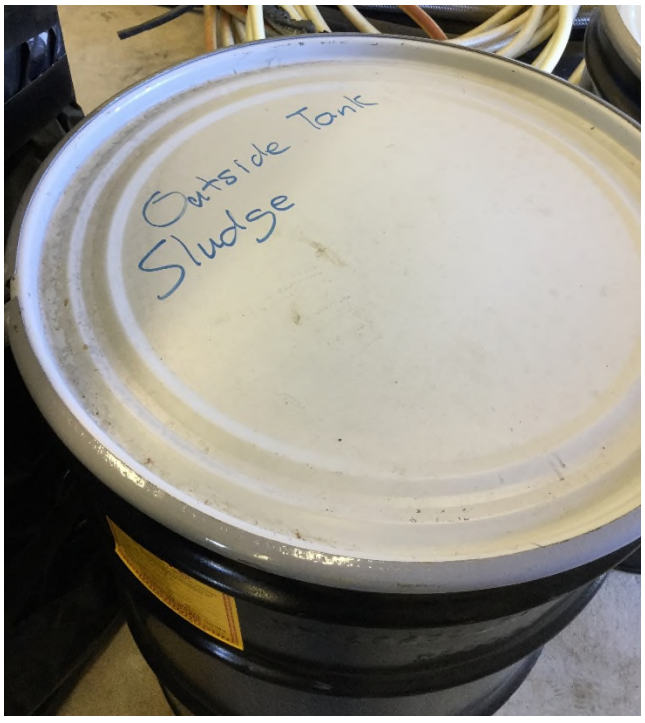
PERSONNEL ON SITE	
Tetra Tech	**Arrival Time**
1. Ruthanne Coffey	08:10 AM

EQUIPMENT ON SITE
1. Truck, camera, and contractor's supplies (provided by contractor).

FIELD ACTIVITIES
1. Provided oversight during the cleaning of the sump room by Olympus Technical Services. 2. Documented cleanup of sump room and outdoor oil tank. 3. Waste produced: a. 2 drums PPE b. 1 drum shovels and vacuum c. 9 drums of sediment from oil-water separator (dry sediment) d. 2 drums from outside tank (more liquid) e. 8 filters wrapped with plastic f. 2 pipe sections wrapped in plastic 4. Waste labeled with code F032

ISSUES/CONCERNS
1. None

Date: 07/11/2018	**Direction:** W	**Description:** Outdoor oil tank after access hole was cut.



Date: 07/11/2018	**Direction:** W	**Description:** Inside of outdoor oil tnak after cleaning was completed.

Date: 07/11/2018	**Direction:** W	**Description:** Inside of outdoor oil tnak after cleaning was completed.

Date: 07/11/2018	**Direction:** E	**Description:** Cleaning of sump room.

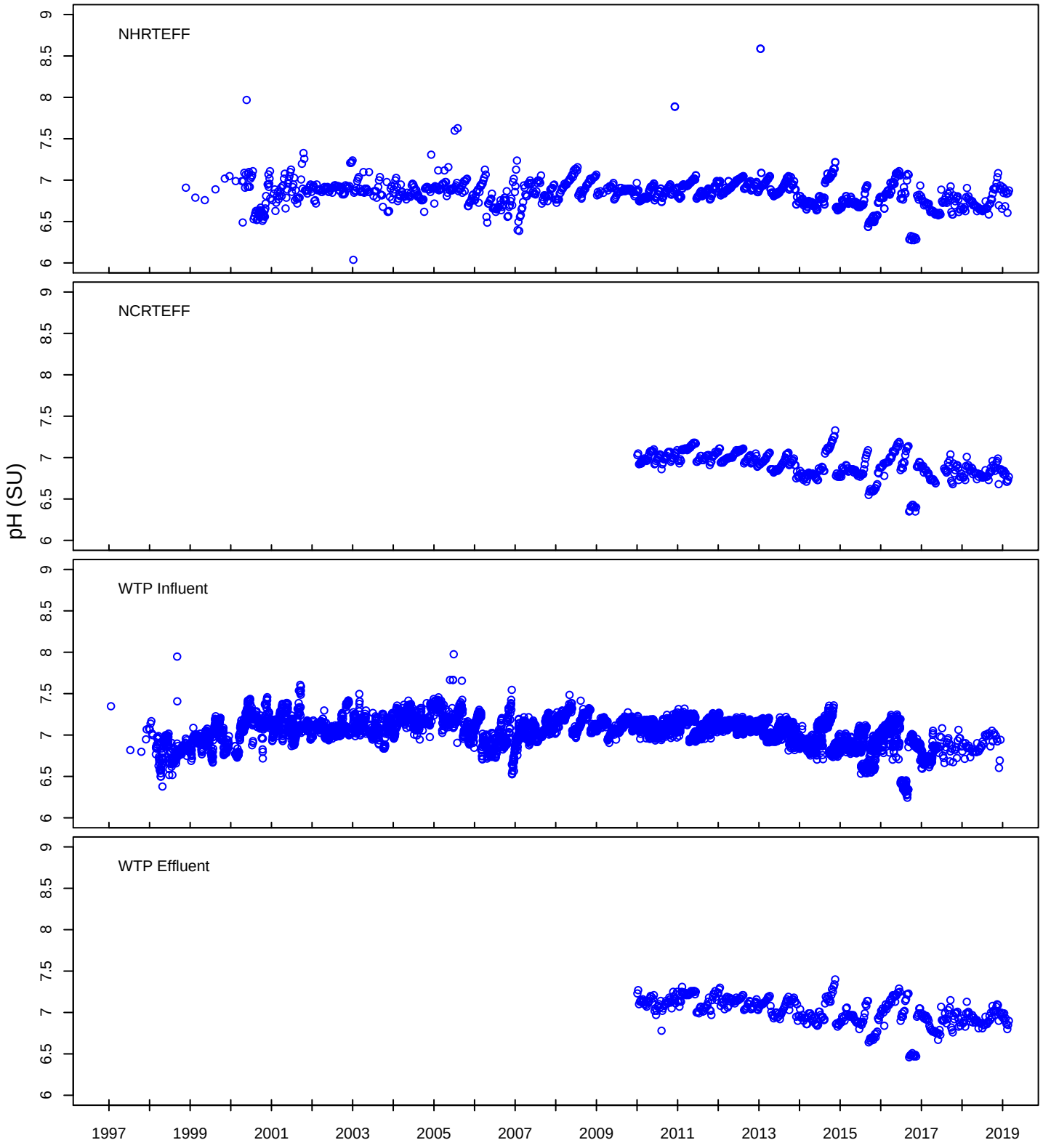
Date: 07/11/2018	**Direction:** E	**Description:** Sediment from sump room.

Date: 07/112018	**Direction:** E	**Description:** Sump room after cleaning.

Date: 07/11/2018	**Direction:** E	**Description:** Pipes wrapped in plastic.

APPENDIX E

R-Studio Water Treatment Plant Field Data Visualizations



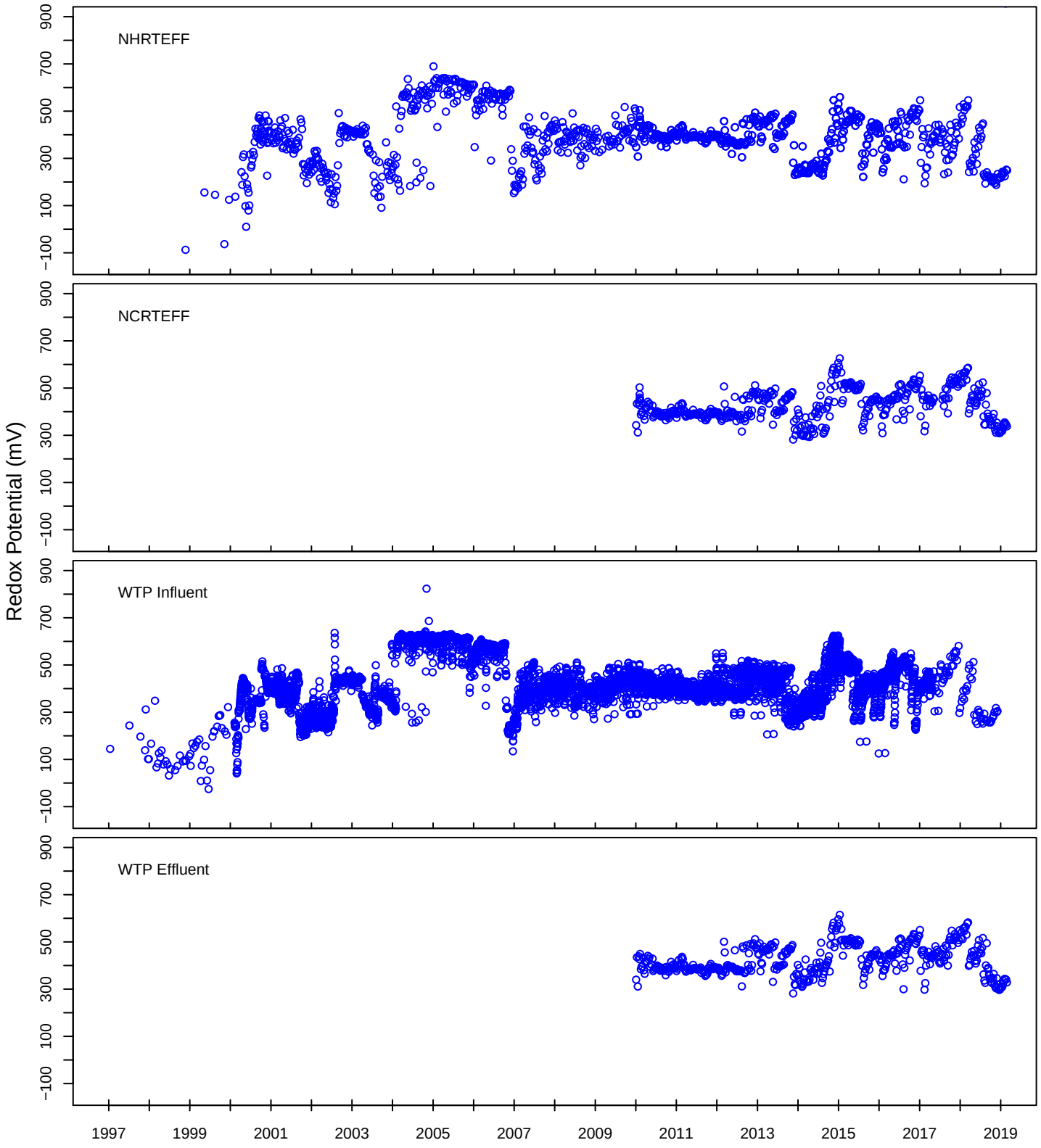
SU	Standard Units
MPTP	Montana Pole and Treating Plant
NCRTEFF	Near Creek Recovery Trench Effluent
NHRTEFF	Near Highway Recovery Trench Effluent
WTP	Water Treatment Plant

Montana Pole and Treating Plant
Butte−Silver Bow Montana

FIGURE E1
WTP FIELD pH
1997 − CURRENT

TETRA TECH

CJK 20190304



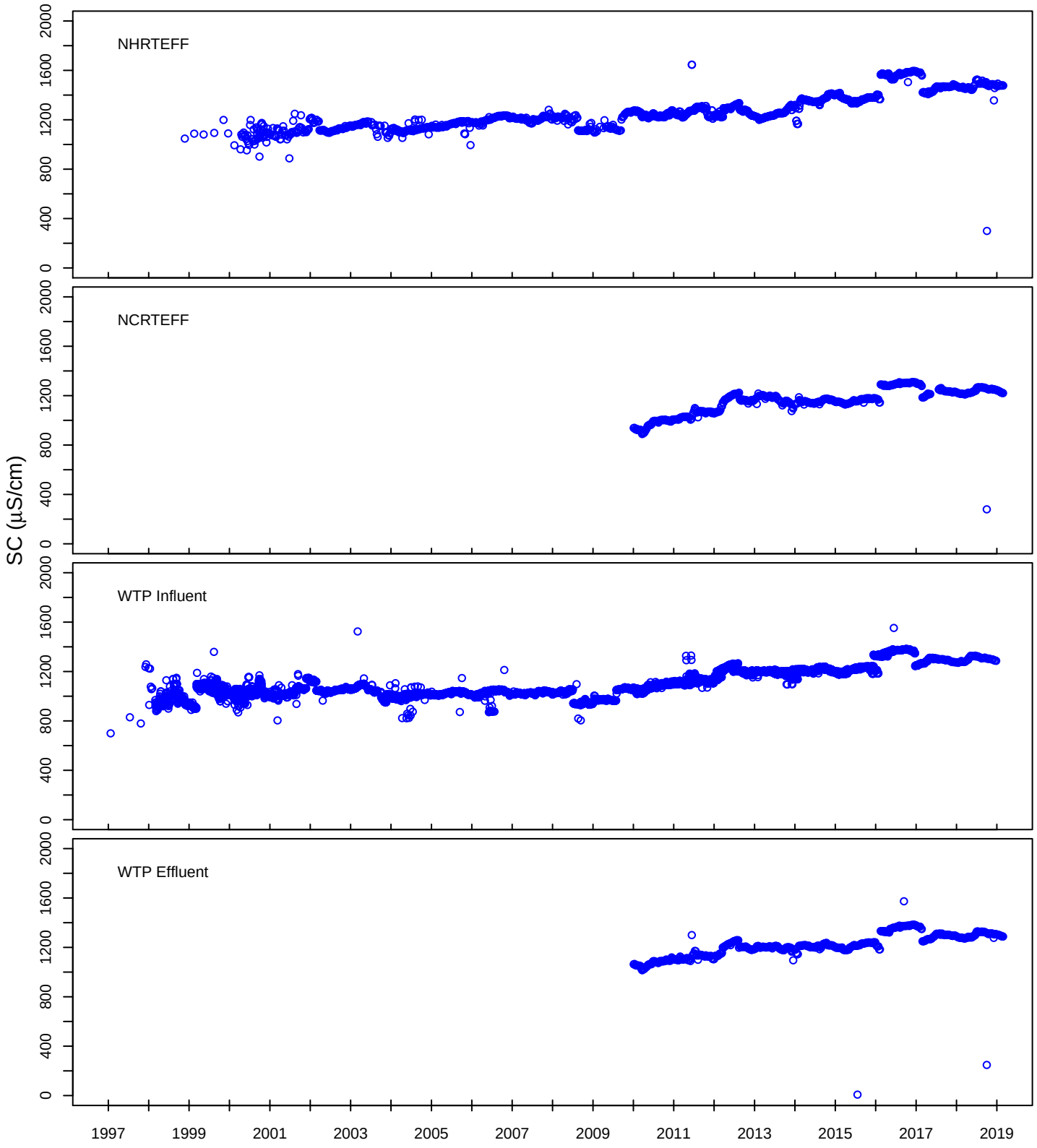
mV	milliVolts
MPTP	Montana Pole and Treating Plant
NCRTEFF	Near Creek Recovery Trench Effluent
NHRTEFF	Near Highway Recovery Trench Effluent
WTP	Water Treatment Plant

Montana Pole and Treating Plant
Butte−Silver Bow Montana

FIGURE E2
WTP FIELD REDOX
1997 − CURRENT

TETRA TECH

CJK 20190304



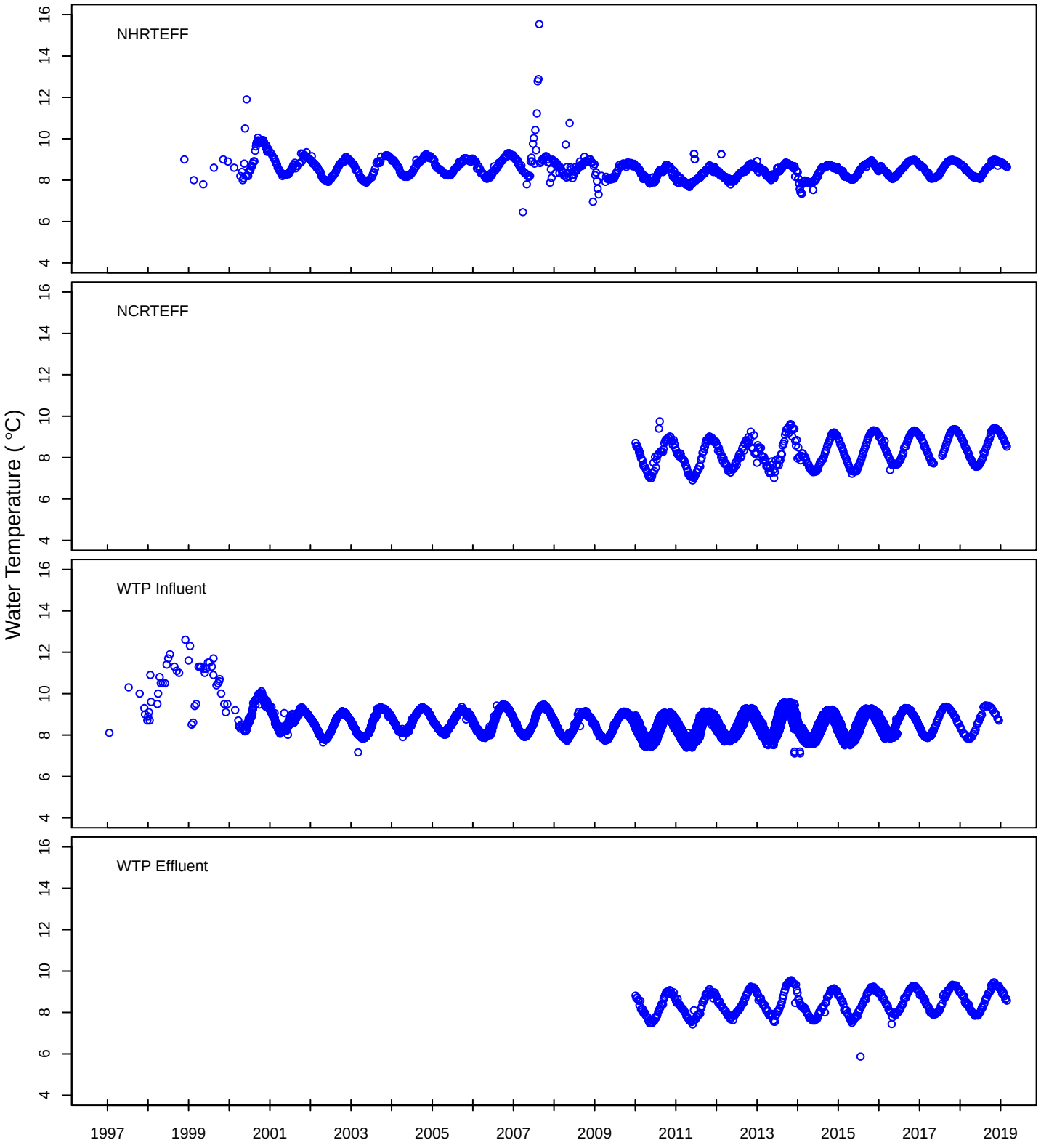
µS/cm	microSeimans per centimeter
MPTP	Montana Pole and Treating Plant
NCRTEFF	Near Creek Recovery Trench Effluent
NHRTEFF	Near Highway Recovery Trench Effluent
SC	Specific Conductance
WTP	Water Treatment Plant

Montana Pole and Treating Plant
Butte−Silver Bow Montana

FIGURE E3
WTP FIELD SC
1997 − CURRENT

TETRA TECH

CJK 20190304



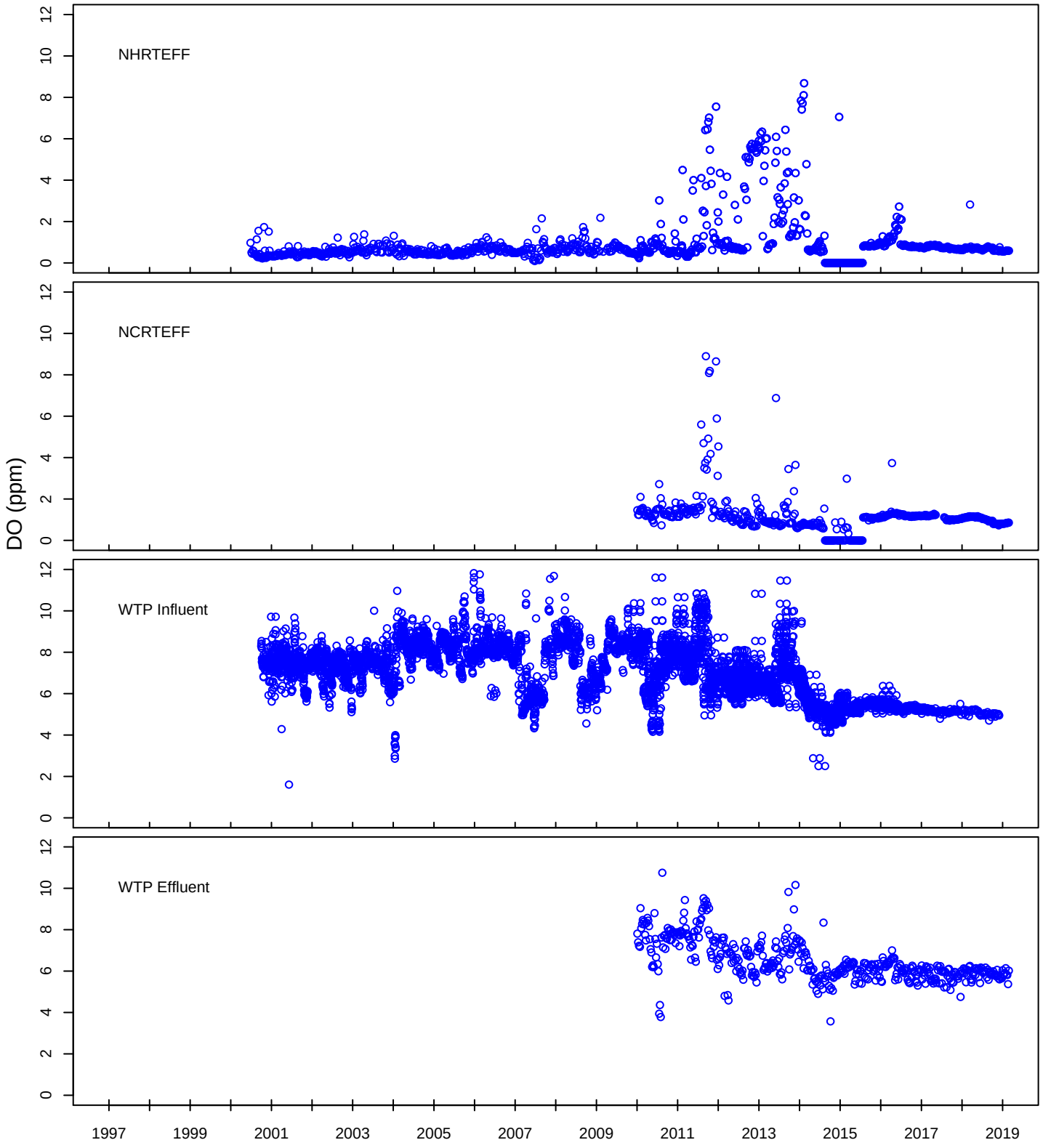
C	Celcius
MPTP	Montana Pole and Treating Plant
NCRTEFF	Near Creek Recovery Trench Effluent
NHRTEFF	Near Highway Recovery Trench Effluent
Temp	Temperature
WTP	Water Treatment Plant

Montana Pole and Treating Plant
Butte−Silver Bow Montana

FIGURE E4
WTP FIELD WATER TEMP
1997 − CURRENT

TETRA TECH

CJK 20190304



DO	Dissolved Oxygen
MPTP	Montana Pole and Treating Plant
NCRTEFF	Near Creek Recovery Trench Effluent
NHRTEFF	Near Highway Recovery Trench Effluent
ppm	Parts Per MIllion
WTP	Water Treatment Plant

Montana Pole and Treating Plant
Butte−Silver Bow Montana

FIGURE E5
WTP FIELD DO
1997 − CURRENT

TETRA TECH

CJK 20190304

APPENDIX F

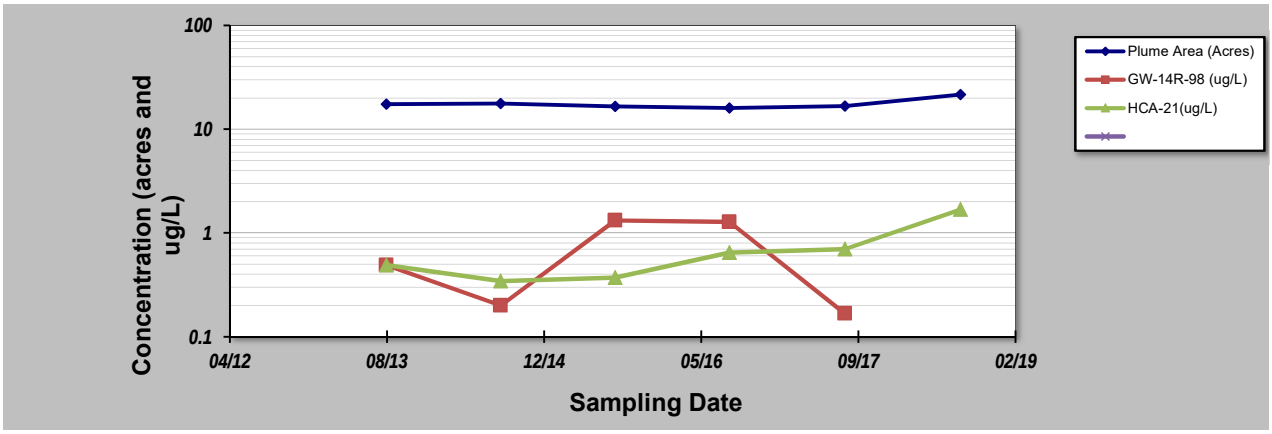
Mann-Kendall Tests

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	January 24, 2018	**Job ID:**	2017 Annual Report
Facility Name:	Montana Pole and Treating Plant	**Constituent:**	Pentachlorophenol - Plume Area and Wells
Conducted By:	DB	**Concentration Units:**	acres and ug/L

Sampling Point ID:	Plume Area (Acres)	GW-14R-98 (ug/L)	HCA-21(ug/L)				Note: green: <RL

Sampling Event	Sampling Date	PENTACHLOROPHENOL - PLUME AREA AND WELLS CONCENTRATION (acres and ug/L)						
1	12-Aug-13	17.47	0.49	0.49				
2	11-Aug-14	17.70	0.2	0.343				
3	10-Aug-15	16.60	1.32	0.37				
4	8-Aug-16	16.00	1.28	0.646				
5	10-Aug-17	16.7	0.167	0.699	<-Well 10-04 data used in lieu of data from GW-14-R-98 on this date.			
6	13-Aug-18	21.6	-	1.68				
7								
8								
9								
10								
11								
12								
13								
14								
15								
16								
17								
18								
19								
20								
Coefficient of Variation:		0.11	0.82	0.71				
Mann-Kendall Statistic (S):		1	-2	11				
Confidence Factor:		50.0%	59.2%	97.2%				
Concentration Trend:		No Trend	Stable	Increasing				



Notes:

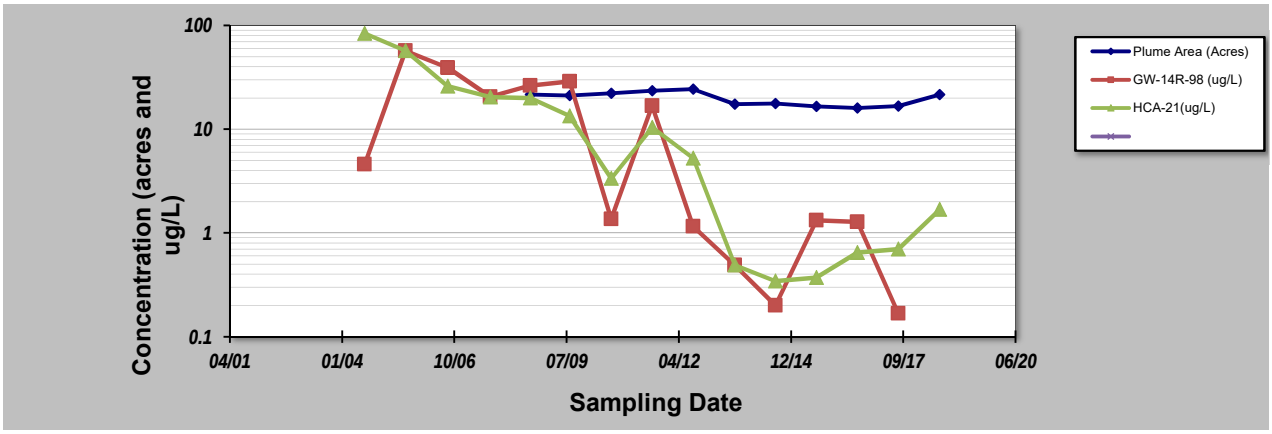
1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.
4. 0.2 = PCP concentration below the 0.2 ug/L reporting limit (RL)

GSI MANN-KENDALL TOOLKIT
for Constituent Trend Analysis

Evaluation Date:	January 24, 2018	**Job ID:**	2017 Annual Report
Facility Name:	Montana Pole and Treating Plant	**Constituent:**	Pentachlorophenol - Plume Area and Wells
Conducted By:	DB	**Concentration Units:**	acres and ug/L

Sampling Point ID:	Plume Area (Acres)	GW-14R-98 (ug/L)	HCA-21(ug/L)				Note: green: <RL

Sampling Event	Sampling Date	PENTACHLOROPHENOL - PLUME AREA AND WELLS CONCENTRATION (acres and ug/L)						
1	3-Aug-04		4.6	84				
2	1-Aug-05		57	57				
3	14-Aug-06		39.2	26.04				
4	27-Aug-07		20.6	20.4				
5	18-Aug-08	21.64	26.3	20				
6	3-Aug-09	21.14	28.9	13.45				
7	9-Aug-10	22.27	1.36	3.35				
8	9-Aug-11	23.48	16.9	10.37				
9	7-Aug-12	24.29	1.16	5.26				
10	12-Aug-13	17.47	0.49	0.49				
11	11-Aug-14	17.70	0.2	0.343				
12	10-Aug-15	16.60	1.32	0.37				
13	8-Aug-16	16.00	1.28	0.646				
14	10-Aug-17	16.7	0.167	0.699	<-Well 10-04 data used in lieu of data from GW-14-R-98 on this date.			
15	13-Aug-18	21.6	-	1.68				
16								
17								
18								
19								
20								
Coefficient of Variation:		0.15	1.26	1.48				
Mann-Kendall Statistic (S):		-19	-59	-75				
Confidence Factor:		91.8%	100.0%	>99.9%				
Concentration Trend:		Prob. Decreasing	Decreasing	Decreasing				

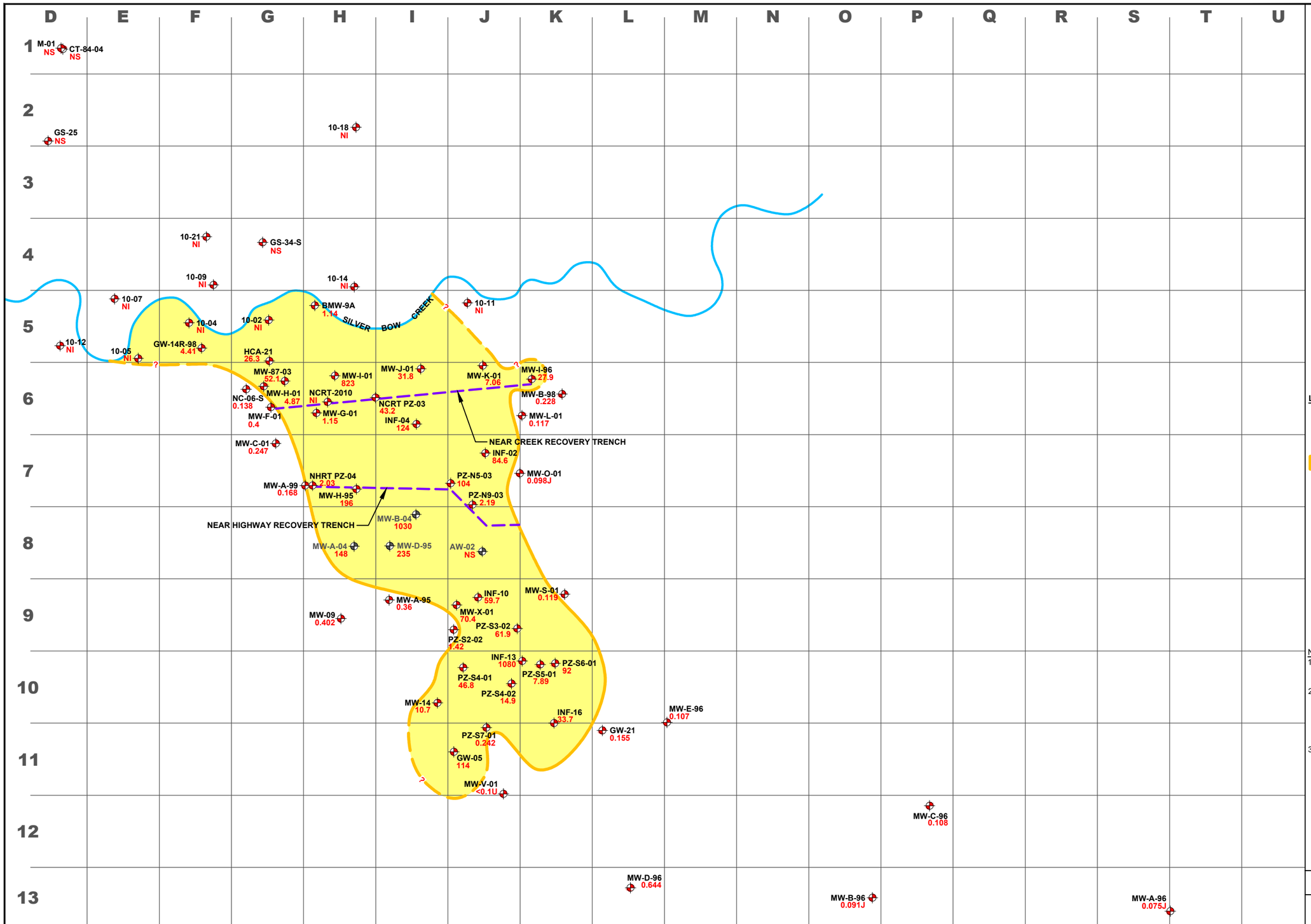


Notes:

1. At least four independent sampling events per well are required for calculating the trend. *Methodology is valid for 4 to 40 samples.*
2. Confidence in Trend = Confidence (in percent) that constituent concentration is increasing (S>0) or decreasing (S<0): >95% = Increasing or Decreasing; ≥ 90% = Probably Increasing or Probably Decreasing; < 90% and S>0 = No Trend; < 90%, S≤0, and COV ≥ 1 = No Trend; < 90% and COV < 1 = Stable.
3. Methodology based on "MAROS: A Decision Support System for Optimizing Monitoring Plans", J.J. Aziz, M. Ling, H.S. Rifai, C.J. Newell, and J.R. Gonzales, *Ground Water*, 41(3):355-367, 2003.
4. 0.2 = PCP concentration below the 0.2 ug/L reporting limit (RL)

APPENDIX G

Plume Area Maps



LEGEND

- MONITORING WELL
- MONITORING WELL (ABANDONED IN 2009)
- APPROXIMATE AREA OF PLUME DEFINED BY 1 µg/L PCP ISOCONTOUR - DASHED WHERE INFERRED, ? WHERE UNKNOWN
- µg/L MICROGAMS PER LITER
- J ESTIMATED VALUE
- NI NOT INSTALLED AT THE TIME OF SAMPLING
- NS NOT SAMPLED
- PCP PENTACHLOROPHENOL
- U ANALYZED FOR BUT NOT DETECTED ABOVE THE METHOD DETECTION LIMIT
- < LESS THAN

NOTES:

1) PENTACHLOROPHENOL (PCP) ISOCONTOURS ARE INTERPRETED; OTHER INTERPRETATIONS ARE POSSIBLE.

2) THE PCP PLUME IS NOT INTERPRETED TO FLOW THROUGH THE NEAR CREEK RECOVERY TRENCH (NCRT). RATHER, CONTAMINATED GROUNDWATER NEAR THE HISTORICAL SILVER BOW CREEK CHANNEL IS INTERPRETED TO BE MIGRATING TOWARD THE NCRT.

3) PLUME AREA BASED ON 1 µg/L CONTOUR INTERVAL: 21.64 ACRES

N

150 0 150 300

SCALE IN FEET

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE G1
PCP DATA - AUGUST 2008

TETRA TECH

Figure G1_PCP Area_August 2008.dwg - DWH - 08/20/2018

D E F G H I J K L M N O P Q R S T U

1 2 3 4 5 6 7 8 9 10 11 12 13

M-01 NS
CT-84-04 NS
GS-25 NS
10-18 NI
10-21 NI
GS-34-S NS
10-09 NI
10-14 NI
10-07 NI
BMW-9A 2.51
10-11 NI
10-04 NI
10-02 NI
10-12 NI
GW-14R-98 2.6
10-05 NI
HCA-21 28.9
MW-87-03 43.2
MW-I-01 286
MW-J-01 19.6
MW-K-01 7.61
MW-I-96 29.3
MW-B-98 <0.5U
NC-06-S 0.336
MW-H-01 0.997
NCRT-2010 NI
NCRT PZ-03 1.37
MW-F-01 0.129
MW-G-01 0.891
INF-04 79.3
MW-L-01 0.159
NEAR CREEK RECOVERY TRENCH
MW-C-01 0.651
INF-02 67.6
NHRT PZ-04 13.2
MW-A-99 0.316
MW-H-95 234
PZ-N5-03 NS
MW-O-01 NS
PZ-N9-03 NS
NEAR HIGHWAY RECOVERY TRENCH
MW-B-04 2700
MW-A-04 NS
MW-D-95 NS
AW-02 NS
MW-A-95 0.42
INF-10 160
MW-S-01 NS
MW-09 0.162
MW-X-01 23.6
PZ-S3-02 38.7
PZ-S2-02 NS
INF-13 54.1
PZ-S6-01 4.29
PZ-S5-01 1.57
PZ-S4-01 6.23
PZ-S4-02 6.2
MW-14 0.73
INF-16 17.1
MW-E-96 <0.1U
GW-21 0.148
PZ-S7-01 0.297
GW-05 224
MW-V-01 0.06J
MW-C-96 <0.1U
MW-D-96 0.088J
MW-B-96 0.073J
MW-A-96 <0.1U

SILVER BOW CREEK

LEGEND

- MONITORING WELL
- MONITORING WELL (ABANDONED IN 2009)
- APPROXIMATE AREA OF PLUME DEFINED BY 1 µg/L PCP ISOCONTOUR - DASHED WHERE INFERRED, ? WHERE UNKNOWN
- µg/L MICROGAMS PER LITER
- J ESTIMATED VALUE
- NI NOT INSTALLED AT THE TIME OF SAMPLING
- NS NOT SAMPLED
- PCP PENTACHLOROPHENOL
- U ANALYZED FOR BUT NOT DETECTED ABOVE THE METHOD DETECTION LIMIT
- < LESS THAN

NOTES:

1) PENTACHLOROPHENOL (PCP) ISOCONTOURS ARE INTERPRETED; OTHER INTERPRETATIONS ARE POSSIBLE.

2) THE PCP PLUME IS NOT INTERPRETED TO FLOW THROUGH THE NEAR CREEK RECOVERY TRENCH (NCRT). RATHER, CONTAMINATED GROUNDWATER NEAR THE HISTORICAL SILVER BOW CREEK CHANNEL IS INTERPRETED TO BE MIGRATING TOWARD THE NCRT.

3) PLUME AREA BASED ON 1 µg/L CONTOUR INTERVAL: 21.14 ACRES

N

150 0 150 300

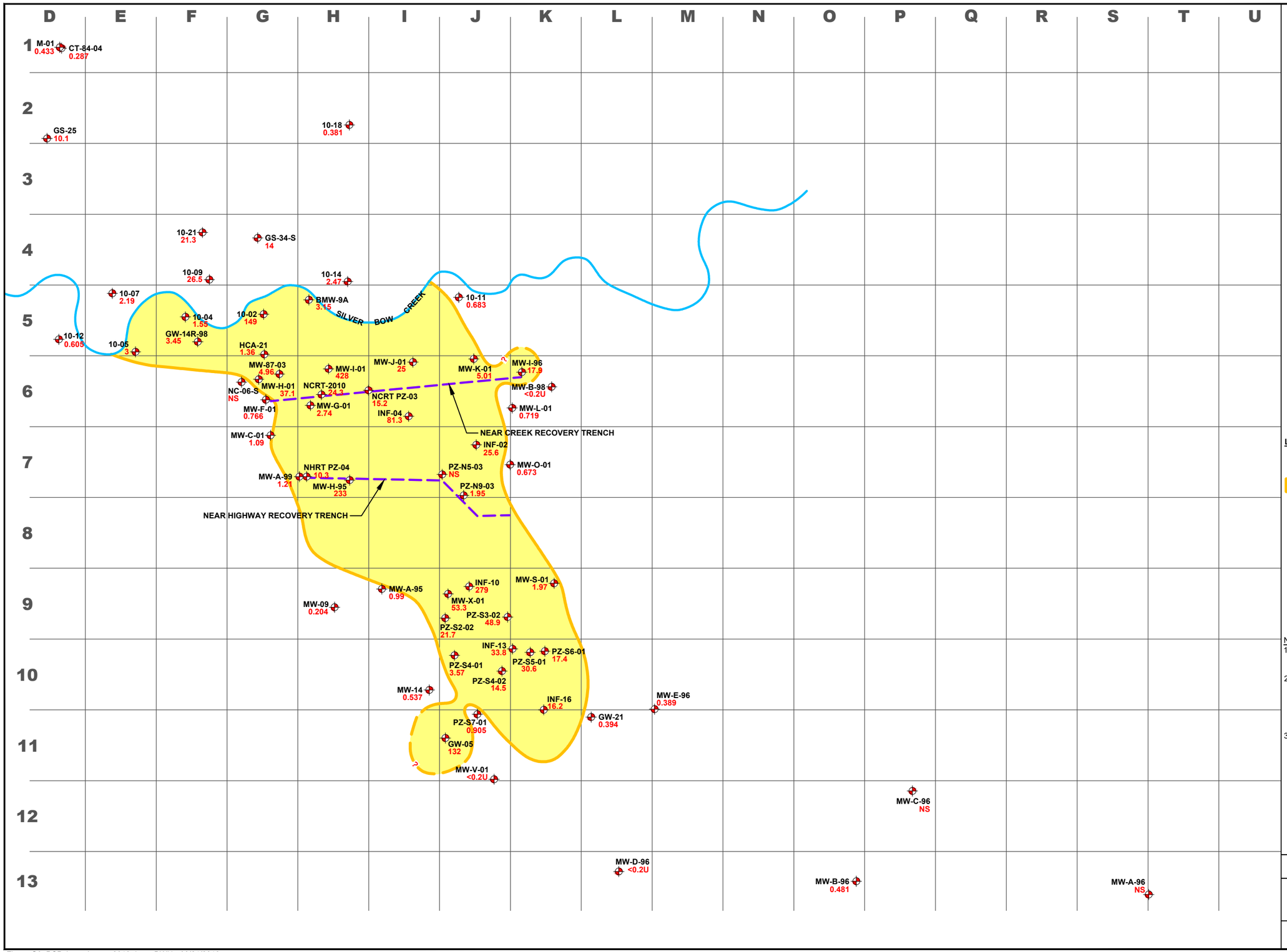
SCALE IN FEET

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE G2
PCP DATA - AUGUST 2009

TETRA TECH

Figure G2_PCP Area_August 2009.dwg - DWH - 08/21/2018



LEGEND

- MONITORING WELL
- APPROXIMATE AREA OF PLUME DEFINED BY 1 µg/L PCP ISOCONTOUR - DASHED WHERE INFERRED, ? WHERE UNKNOWN
- µg/L MICROGAMS PER LITER
- NS NOT SAMPLED
- PCP PENTACHLOROPHENOL
- U ANALYZED FOR BUT NOT DETECTED ABOVE THE METHOD DETECTION LIMIT
- < LESS THAN

NOTES:

1) PENTACHLOROPHENOL (PCP) ISOCONTOURS ARE INTERPRETED; OTHER INTERPRETATIONS ARE POSSIBLE.

2) THE PCP PLUME IS NOT INTERPRETED TO FLOW THROUGH THE NEAR CREEK RECOVERY TRENCH (NCRT). RATHER, CONTAMINATED GROUNDWATER NEAR THE HISTORICAL SILVER BOW CREEK CHANNEL IS INTERPRETED TO BE MIGRATING TOWARD THE NCRT.

3) PLUME AREA BASED ON 1 µg/L CONTOUR INTERVAL: 22.27 ACRES

N

150 0 150 300

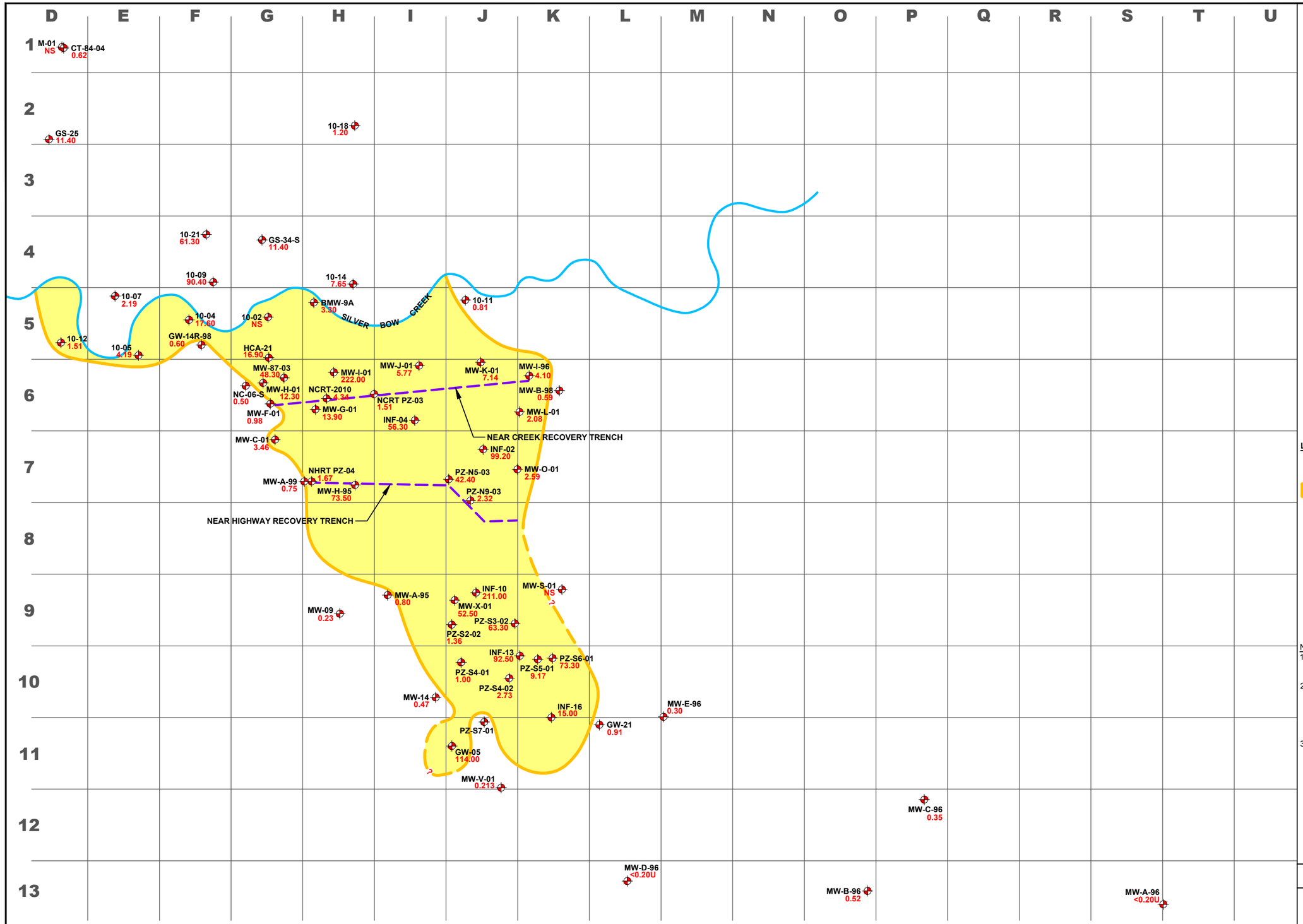
SCALE IN FEET

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE G3
PCP DATA - AUGUST 2010

TETRA TECH

Figure G3_PCP Area_August 2010.dwg - DWH - 08/21/2018



LEGEND

- MONITORING WELL
- APPROXIMATE AREA OF PLUME DEFINED BY 1 µg/L PCP ISOCONTOUR - DASHED WHERE INFERRED, ? WHERE UNKNOWN
- µg/L MICROGAMS PER LITER
- NS NOT SAMPLED
- PCP PENTACHLOROPHENOL
- U ANALYZED FOR BUT NOT DETECTED ABOVE THE METHOD DETECTION LIMIT
- < LESS THAN

NOTES:

1) PENTACHLOROPHENOL (PCP) ISOCONTOURS ARE INTERPRETED; OTHER INTERPRETATIONS ARE POSSIBLE.

2) THE PCP PLUME IS NOT INTERPRETED TO FLOW THROUGH THE NEAR CREEK RECOVERY TRENCH (NCRT). RATHER, CONTAMINATED GROUNDWATER NEAR THE HISTORICAL SILVER BOW CREEK CHANNEL IS INTERPRETED TO BE MIGRATING TOWARD THE NCRT.

3) PLUME AREA BASED ON 1 µg/L CONTOUR INTERVAL: 23.48 ACRES

N

150 0 150 300

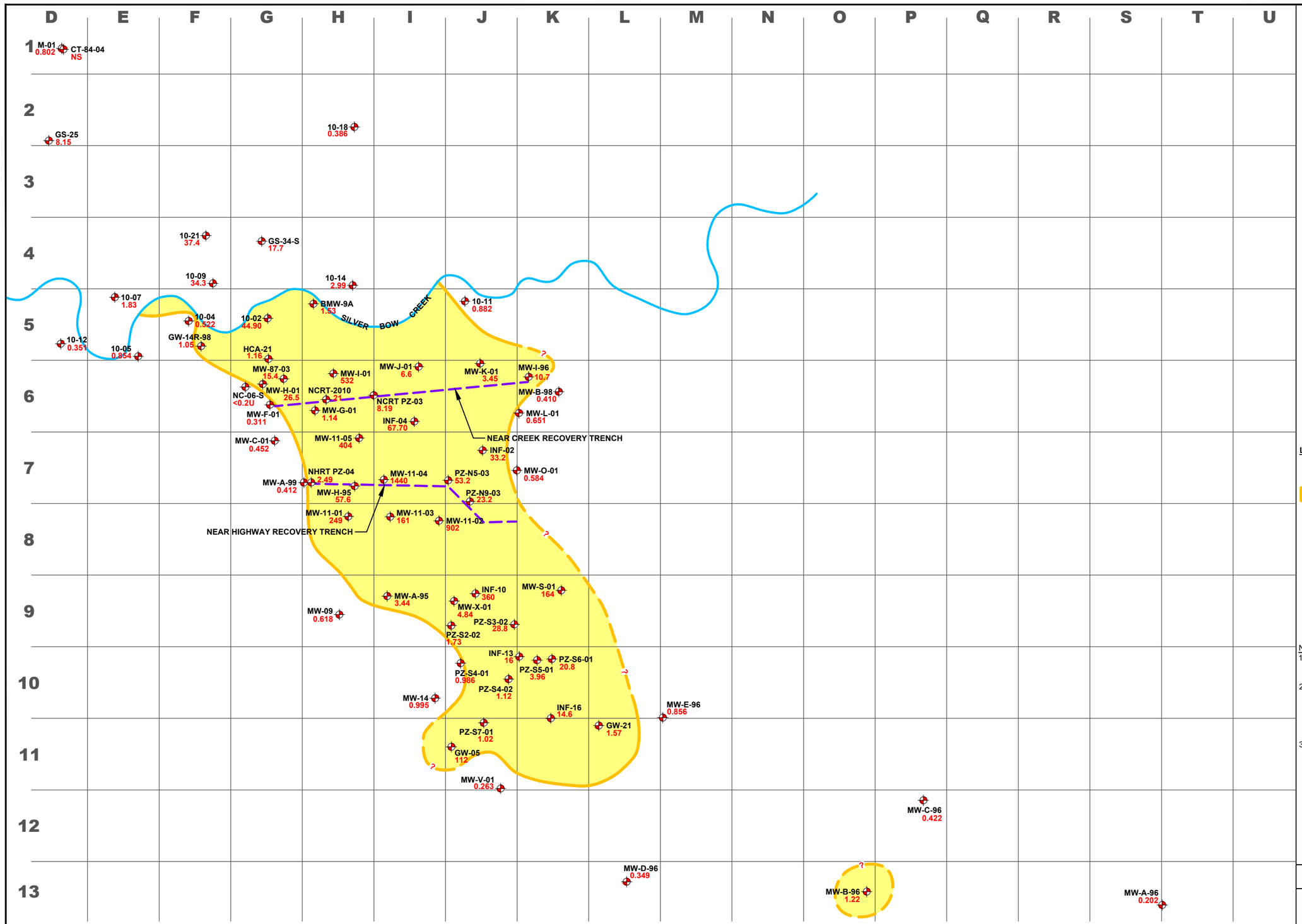
SCALE IN FEET

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE G4
PCP DATA - AUGUST 2011

TETRA TECH

Figure G4_PCP Area_August 2011.dwg - DWH - 08/21/2018



LEGEND

- MONITORING WELL
- APPROXIMATE AREA OF PLUME DEFINED BY 1 µg/L PCP ISOCONTOUR - DASHED WHERE INFERRED, ? WHERE UNKNOWN
- µg/L MICROGAMS PER LITER
- NS NOT SAMPLED
- PCP PENTACHLOROPHENOL
- U ANALYZED FOR BUT NOT DETECTED ABOVE THE METHOD DETECTION LIMIT
- < LESS THAN

NOTES:

1) PENTACHLOROPHENOL (PCP) ISOCONTOURS ARE INTERPRETED; OTHER INTERPRETATIONS ARE POSSIBLE.

2) THE PCP PLUME IS NOT INTERPRETED TO FLOW THROUGH THE NEAR CREEK RECOVERY TRENCH (NCRT). RATHER, CONTAMINATED GROUNDWATER NEAR THE HISTORICAL SILVER BOW CREEK CHANNEL IS INTERPRETED TO BE MIGRATING TOWARD THE NCRT.

3) PLUME AREA BASED ON 1 µg/L CONTOUR INTERVAL: 24.29 ACRES

N

150 0 150 300

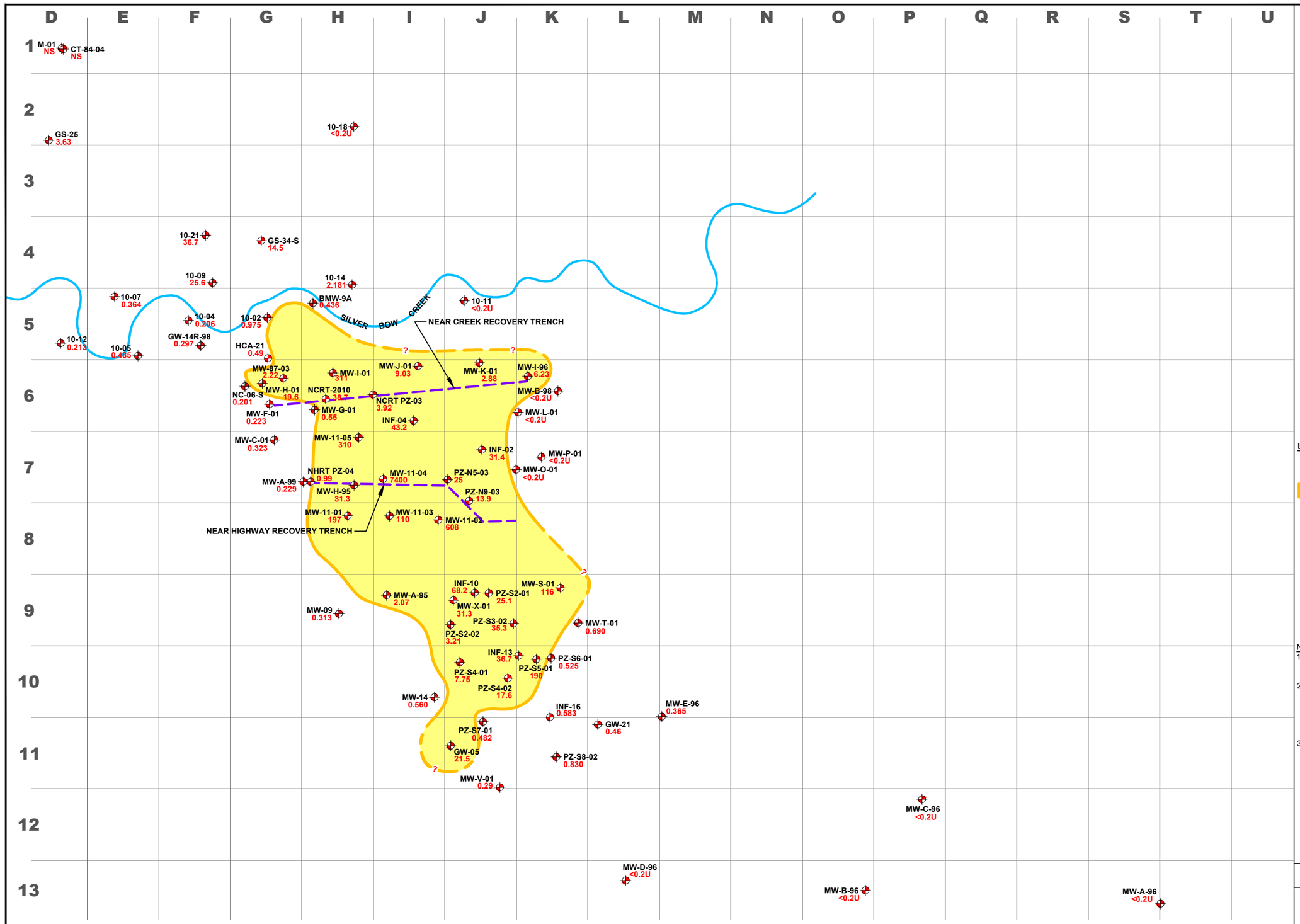
SCALE IN FEET

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE G5
PCP DATA - AUGUST 2012

TETRA TECH

Figure G5_PCP Area_August 2012.dwg - DWH - 03/16/2017



LEGEND

- MONITORING WELL
- APPROXIMATE AREA OF PLUME DEFINED BY 1 µg/L PCP ISOCONTOUR - DASHED WHERE INFERRED, ? WHERE UNKNOWN
- µg/L MICROGAMS PER LITER
- NS NOT SAMPLED
- PCP PENTACHLOROPHENOL
- U ANALYZED FOR BUT NOT DETECTED ABOVE THE METHOD DETECTION LIMIT
- < LESS THAN

NOTES:

1) PENTACHLOROPHENOL (PCP) ISOCONTOURS ARE INTERPRETED; OTHER INTERPRETATIONS ARE POSSIBLE.

2) THE PCP PLUME IS NOT INTERPRETED TO FLOW THROUGH THE NEAR CREEK RECOVERY TRENCH (NCRT). RATHER, CONTAMINATED GROUNDWATER NEAR THE HISTORICAL SILVER BOW CREEK CHANNEL IS INTERPRETED TO BE MIGRATING TOWARD THE NCRT.

3) PLUME AREA BASED ON 1 µg/L CONTOUR INTERVAL: 17.47 ACRES

N

150 0 150 300

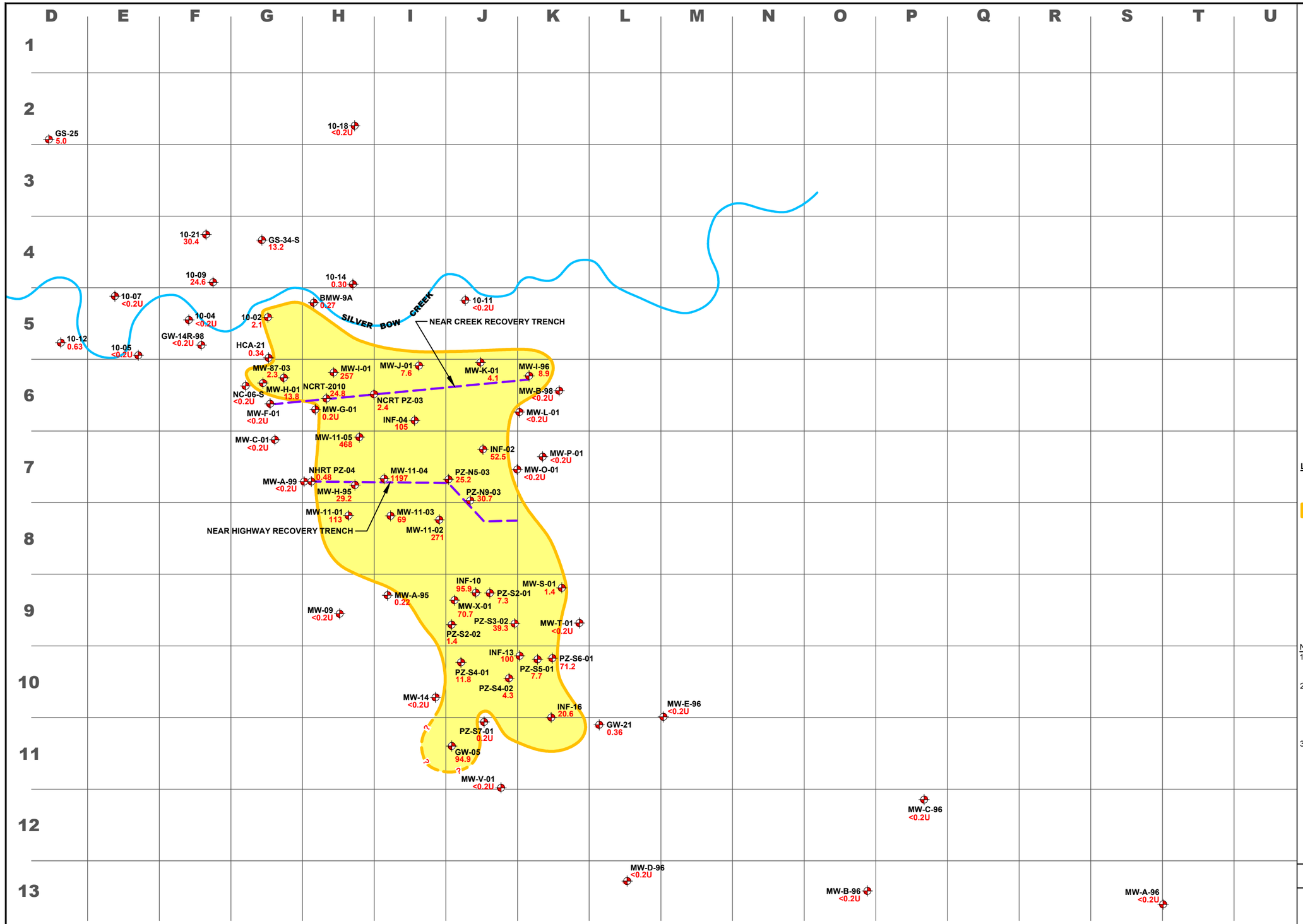
SCALE IN FEET

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE G6
PCP DATA - AUGUST 2013

TETRA TECH

Figure K6_PCP Area_August 2013.dwg - DWH - 08/21/2018



LEGEND

- MONITORING WELL
- APPROXIMATE AREA OF PLUME DEFINED BY 1 µg/L PCP ISOCONTOUR - DASHED WHERE INFERRED, ? WHERE UNKNOWN
- µg/L MICROGAMS PER LITER
- PCP PENTACHLOROPHENOL
- U ANALYZED FOR BUT NOT DETECTED ABOVE THE METHOD DETECTION LIMIT
- < LESS THAN

NOTES:

1) PENTACHLOROPHENOL (PCP) ISOCONTOURS ARE INTERPRETED; OTHER INTERPRETATIONS ARE POSSIBLE.

2) THE PCP PLUME IS NOT INTERPRETED TO FLOW THROUGH THE NEAR CREEK RECOVERY TRENCH (NCRT). RATHER, CONTAMINATED GROUNDWATER NEAR THE HISTORICAL SILVER BOW CREEK CHANNEL IS INTERPRETED TO BE MIGRATING TOWARD THE NCRT.

3) PLUME AREA BASED ON 1 µg/L CONTOUR INTERVAL: 17.7 ACRES

N

150 0 150 300

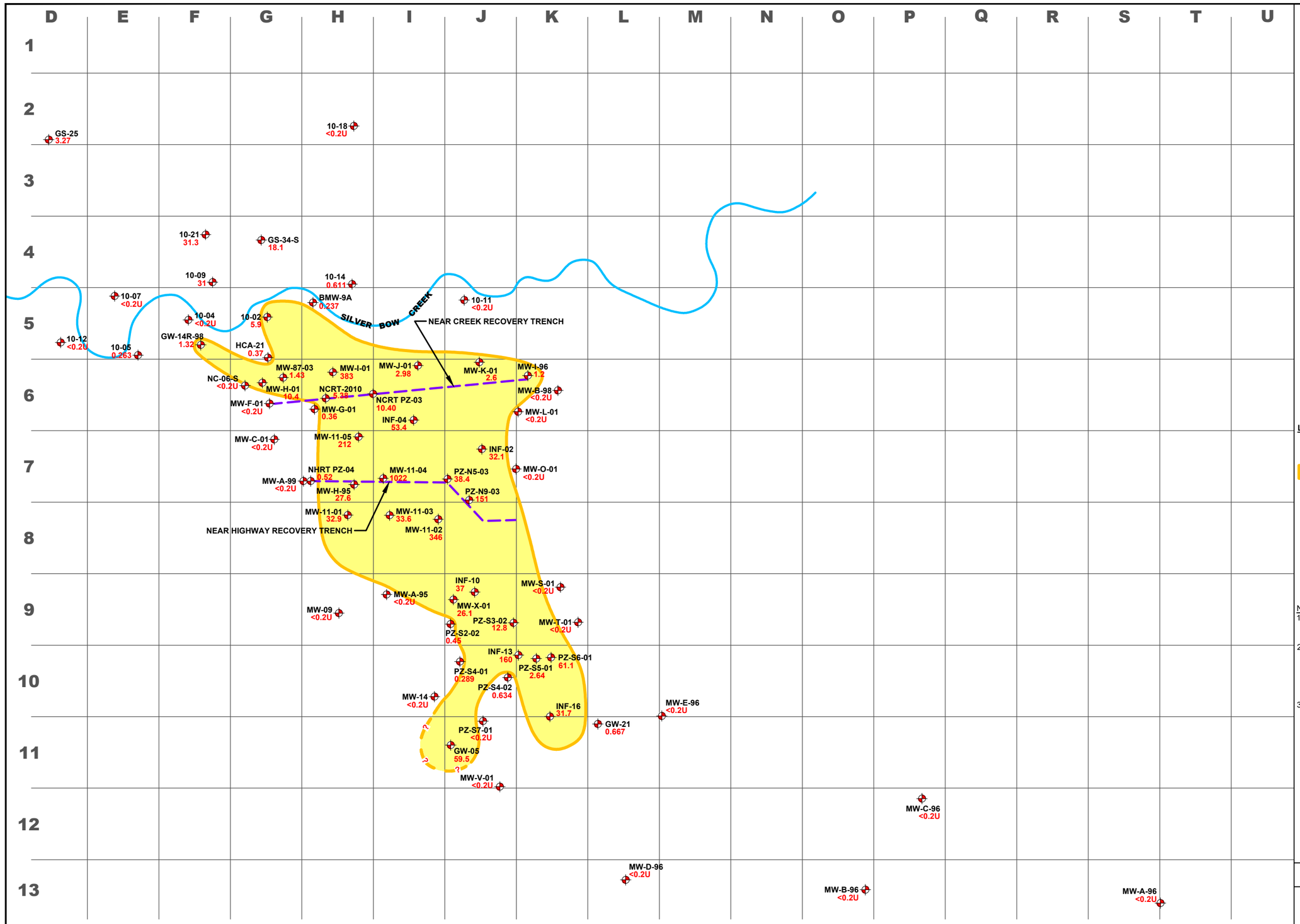
SCALE IN FEET

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE G7
PCP DATA - AUGUST 2014

TETRA TECH

Figure G7_PCP Area_August 2014.dwg - DWH - 08/21/2018



LEGEND

- MONITORING WELL
- APPROXIMATE AREA OF PLUME DEFINED BY 1 µg/L PCP ISOCONTOUR - DASHED WHERE INFERRED, ? WHERE UNKNOWN
- µg/L MICROGAMS PER LITER
- PCP PENTACHLOROPHENOL
- U ANALYZED FOR BUT NOT DETECTED ABOVE THE METHOD DETECTION LIMIT
- < LESS THAN

NOTES:

1) PENTACHLOROPHENOL (PCP) ISOCONTOURS ARE INTERPRETED; OTHER INTERPRETATIONS ARE POSSIBLE.

2) THE PCP PLUME IS NOT INTERPRETED TO FLOW THROUGH THE NEAR CREEK RECOVERY TRENCH (NCRT). RATHER, CONTAMINATED GROUNDWATER NEAR THE HISTORICAL SILVER BOW CREEK CHANNEL IS INTERPRETED TO BE MIGRATING TOWARD THE NCRT.

3) PLUME AREA BASED ON 1 µg/L CONTOUR INTERVAL: 16.6 ACRES

N

150 0 150 300

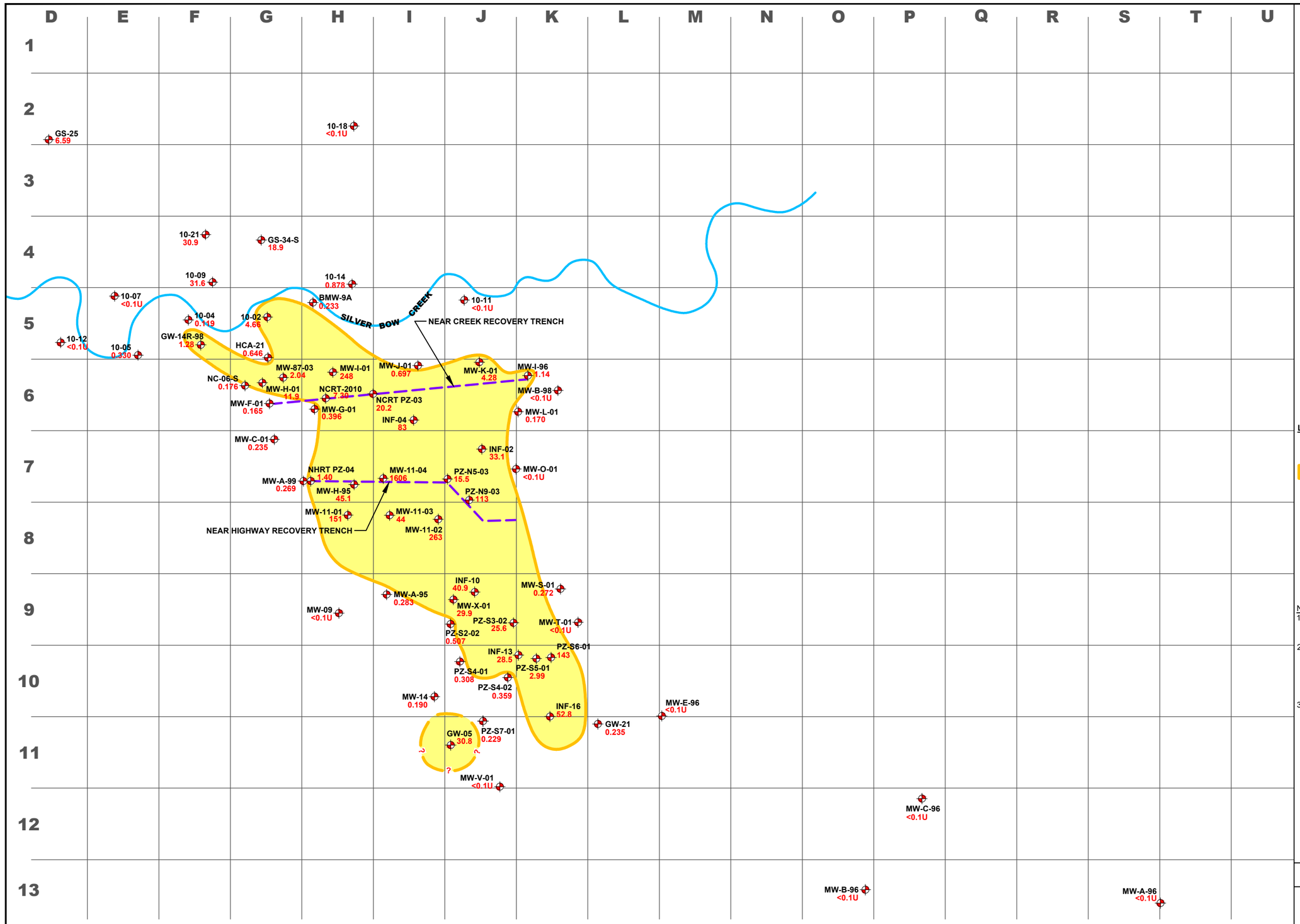
SCALE IN FEET

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE G8
PCP DATA - AUGUST 10, 2015

TETRA TECH

Figure G8_PCP Area_August 2015.dwg - DWH - 08/21/2018



LEGEND

- MONITORING WELL
- APPROXIMATE AREA OF PLUME DEFINED BY 1 µg/L PCP ISOCONTOUR - DASHED WHERE INFERRED, ? WHERE UNKNOWN
- µg/L MICROGAMS PER LITER
- PCP PENTACHLOROPHENOL
- U ANALYZED FOR BUT NOT DETECTED ABOVE THE METHOD DETECTION LIMIT
- < LESS THAN

NOTES:

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3) PLUME AREA BASED ON 1 µg/L CONTOUR INTERVAL: 16.0 ACRES

N

150 0 150 300

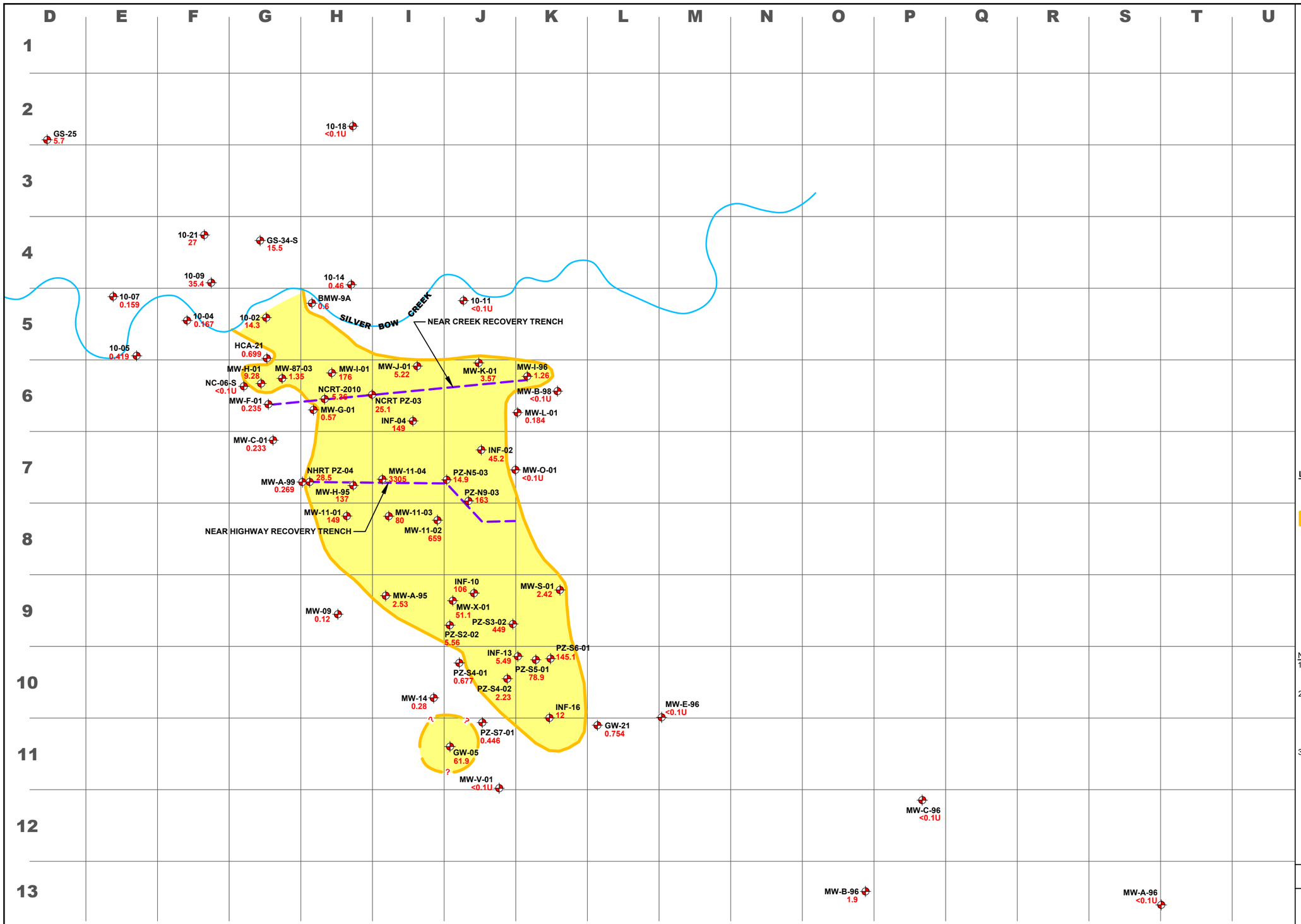
SCALE IN FEET

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE G9
PCP DATA - AUGUST 8, 2016

TETRA TECH

Figure G9_PCP Area_August 2016.dwg - DWH - 08/21/2018



LEGEND

- MONITORING WELL
- APPROXIMATE AREA OF PLUME DEFINED BY 1 µg/L PCP ISOCONTOUR - DASHED WHERE INFERRED, ? WHERE UNKNOWN
- µg/L MICROGAMS PER LITER
- PCP PENTACHLOROPHENOL
- U ANALYZED FOR BUT NOT DETECTED ABOVE THE METHOD DETECTION LIMIT
- < LESS THAN

NOTES:

1) PENTACHLOROPHENOL (PCP) ISOCONTOURS ARE INTERPRETED; OTHER INTERPRETATIONS ARE POSSIBLE.

2) THE PCP PLUME IS NOT INTERPRETED TO FLOW THROUGH THE NEAR CREEK RECOVERY TRENCH (NCRT), RATHER, CONTAMINATED GROUNDWATER SOUTH OF THE SILVER BOW CREEK CHANNEL IS INTERPRETED TO BE MIGRATING TOWARD THE NCRT.

3) PLUME AREA SOUTH OF SILVER BOW CREEK BASED ON 1 µg/L CONTOUR INTERVAL: 16.7 ACRES

N

150 0 150 300

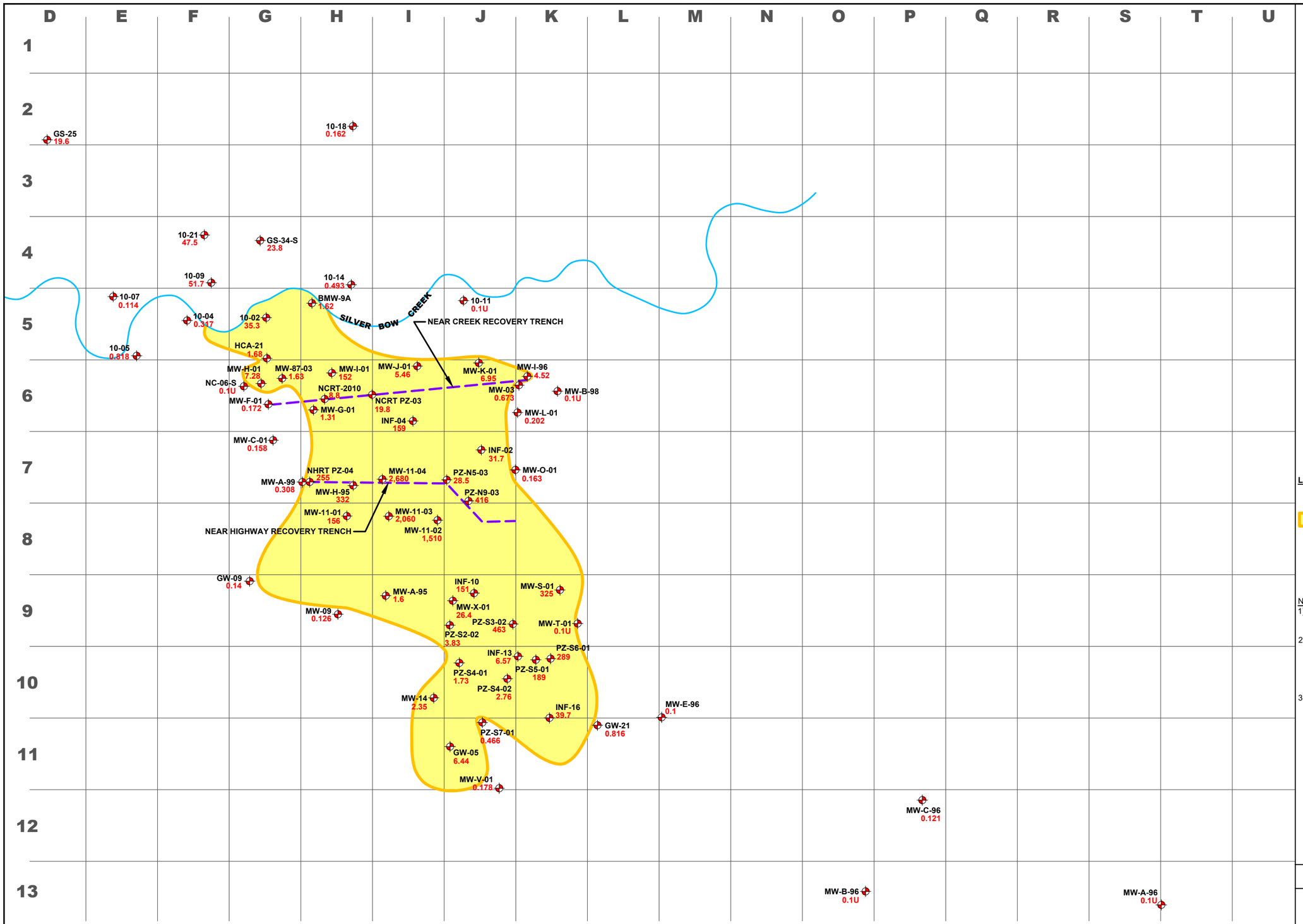
SCALE IN FEET

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE G10
PCP DATA - AUGUST 1, 2017

TETRA TECH

Figure 4.6_PCP Data_August 2017.dwg - DWH - 08/21/2018



LEGEND

- MONITORING WELL
- APPROXIMATE AREA OF PLUME DEFINED BY 1 µg/L PCP ISOCONTOUR
- U — ANALYZED FOR BUT NOT DETECTED ABOVE THE METHOD DETECTION LIMIT
- µg/L — MICROGRAMS PER LITER

NOTES:

1) PENTACHLOROPHENOL (PCP) ISOCONTOURS ARE INTERPRETED; OTHER INTERPRETATIONS ARE POSSIBLE.

2) THE PCP PLUME IS NOT INTERPRETED TO FLOW THROUGH THE NCRT. RATHER, CONTAMINATED GROUNDWATER SOUTH OF THE SILVER BOW CREEK CHANNEL IS INTERPRETED TO BE MIGRATING TOWARD THE NCRT.

3) PLUME AREA SOUTH OF SILVER BOW CREEK BASED ON 1 µg/L CONTOUR INTERVAL: 21.60 ACRES

N

150 0 150 300

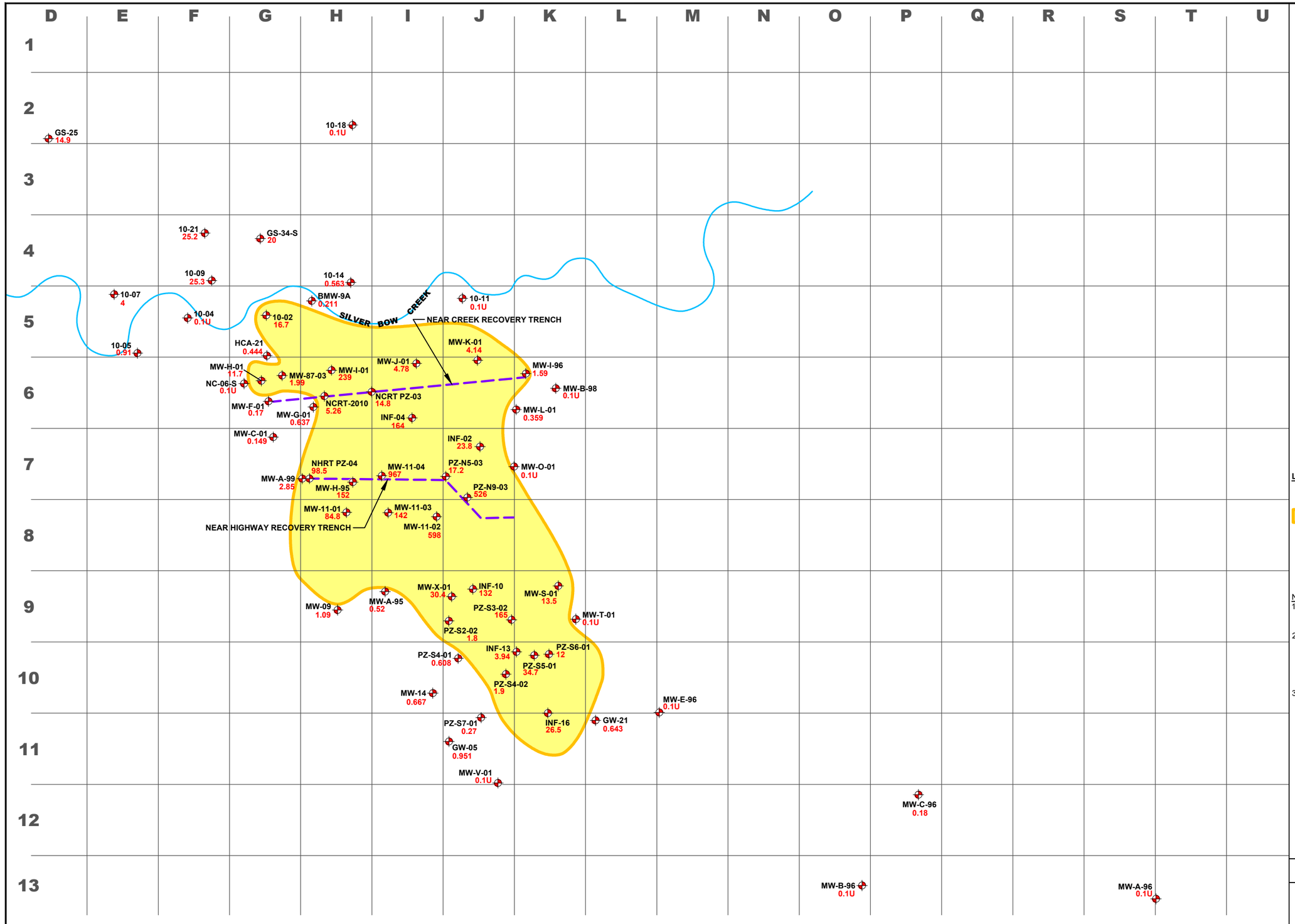
SCALE IN FEET

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE G11
PCP DATA - AUGUST 6, 2018

TETRA TECH

Figure G11_PCP Data_Aug2018.dwg - DWH - 02/28/2019



LEGEND

- MONITORING WELL
- APPROXIMATE AREA OF PLUME DEFINED BY 1 µg/L PCP ISOCONTOUR
- U — ANALYZED FOR BUT NOT DETECTED ABOVE THE METHOD DETECTION LIMIT
- µg/L — MICROGRAMS PER LITER

NOTES:

1) PENTACHLOROPHENOL (PCP) ISOCONTOURS ARE INTERPRETED; OTHER INTERPRETATIONS ARE POSSIBLE.

2) THE PCP PLUME IS NOT INTERPRETED TO FLOW THROUGH THE NCRT. RATHER, CONTAMINATED GROUNDWATER SOUTH OF THE SILVER BOW CREEK CHANNEL IS INTERPRETED TO BE MIGRATING TOWARD THE NCRT.

3) PLUME AREA SOUTH OF SILVER BOW CREEK BASED ON 1 µg/L CONTOUR INTERVAL: 19.11 ACRES

AERIAL IMAGERY SOURCE:
GOOGLE EARTH PRO (2013) DJA SURVEY JUNE 2015

N

150 0 150 300

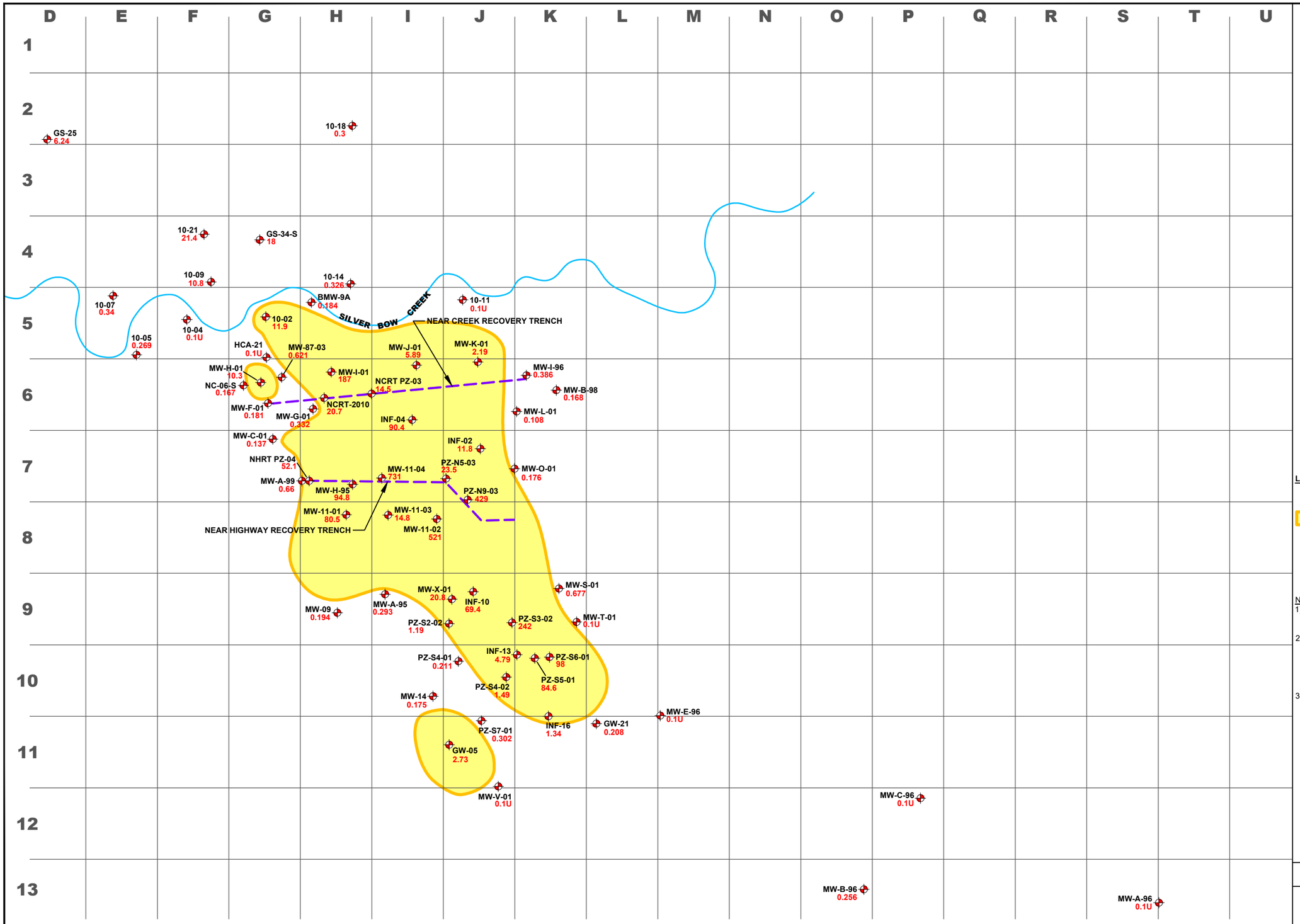
SCALE IN FEET

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGURE G12
PCP DATA - AUGUST 2019

TETRA TECH

Figure G12_PCP Data_August 2019.dwg - DWH - 2/07/2020



LEGEND

- MONITORING WELL
- APPROXIMATE AREA OF PLUME DEFINED BY 1 µg/L PCP ISOCONTOUR
- U — ANALYZED FOR BUT NOT DETECTED ABOVE THE METHOD DETECTION LIMIT
- µg/L — MICROGRAMS PER LITER

NOTES:

1) PENTACHLOROPHENOL (PCP) ISOCONTOURS ARE INTERPRETED; OTHER INTERPRETATIONS ARE POSSIBLE.

2) THE PCP PLUME IS NOT INTERPRETED TO FLOW THROUGH THE NCRT. RATHER, CONTAMINATED GROUNDWATER SOUTH OF THE SILVER BOW CREEK CHANNEL IS INTERPRETED TO BE MIGRATING TOWARD THE NCRT.

3) PLUME AREA SOUTH OF SILVER BOW CREEK BASED ON 1 µg/L CONTOUR INTERVAL: 18.88 ACRES

N

150 0 150 300

SCALE IN FEET

Montana Pole and Treating Plant
Butte-Silver Bow Montana

FIGUREG13
PCP DATA - AUGUST 2020

TETRA TECH

Figure G13_PCP Data_Aug2020.dwg - DWH - 03/02/2020

APPENDIX H

Quality Control for Electronic Data Deliverables

Year	MBMG SDG#	COC-Page 1	COC Pages	Date - Min	Date - Max	QC'd?	Comment
2018	114911	SDG_114911_2018JAN08_COC	1	1/2/2018	1/8/2018	√	plant 01-02 and 01-08
2018	116914	SDG_116914_2018JAN22_COC	1	1/15/2018	1/22/2018	√	plant 01-15 and 01-22
2018	116917	SDG_116917_2018JAN29_COC	1	1/29/2018	1/29/2018	√	plant 01-29
2018	116918	SDG_116918_2018FEB06_COC	2	2/5/2018	2/5/2018	√	semi-annual 02-05
2018	116919	SDG_116919_2018FEB06_COC	2	2/5/2018	2/6/2018	√	semi-annual 02-05 and 02-06
2018	116920	SDG_116920_2018FEB07_COC	2	2/6/2018	2/6/2018	√	semi-annual 02-06
2018	116921	SDG_116921_2018FEB07_COC	1	2/7/2018	2/7/2018	√	semi-annual 02-07 and 02-08
2018	116925	SDG_116925_2018FEB19_COC	1	2/12/2018	2/19/2018	√	plant 02-12 and 02-19
2018	116930	SDG_116930_2018MAR05_COC	1	2/26/2018	3/5/2018	√	plant 02-26 and 03-05
2018	116933	SDG_116933_2018MAR19_COC	1	3/12/2018	3/19/2018	√	plant 03-12 and 03-19
2018	116946	SDG_116946_2018APR02_COC	1	3/19/2018	4/2/2018	√	plant 03-26 and 04-02
2018	116950	SDG_116950_2018APR16_COC	1	4/9/2018	4/16/2018	√	plant 04-09 and 04-16
2018	116955	SDG_116955_2018APR30_COC	1	4/23/2018	4/30/2018	√	plant 04-23 and 04-30
2018	116960	SDG_116960_2018MAY14_COC	1	5/7/2018	5/14/2018	√	plant 05-07 and 05-14
2018	116979	SDG_116979_2018MAY29_COC	1	5/21/2018	5/29/2018	√	plant 05-21 and 05-29
2018	116986	SDG_116979_2018JUNE11_COC	1	6/4/2018	6/11/2018	√	plant 06-04 and 06-11
2018	116998	SDG_116998_2018JUNE25_COC	1	6/18/2018	6/25/2018	√	plant 06-18 and 06-25
2018	117006	SDG_117006_2018JULY09_COC	1	7/2/2018	7/9/2018	√	plant 07-02 and 07-09
2018	117017	SDG_117017_2018JULY23_COC	1	7/12/2018	7/23/2018	√	plant 7-16 and 7-23, select wells 7-12
2018	118022	SDG_118022_2018JULY30_COC	1	7/30/2018	7/30/2018	√	plant 7-30
2018	118033	SDG_118033_2018AUG6_COC	2	8/6/2018	8/6/2018	√	annual PCP 08-06
2018	118034	SDG_118034_2018AUG7_COC	2	8/6/2018	8/7/2018	√	annual PCP 08-06 and 08-07
2018	118036	SDG_118036_2018AUG8_COC	2	8/7/2018	8/8/2018	√	annual PCP 08-07 and 08-08
2018	118037	SDG_118037_2018AUG8_COC	2	8/8/2018	8/8/2018	√	annual PCP 08-08
2018	119037_CHLOROSUITE	SDG_119037_CHLOROSUITE_2018AUG13_COC	1	8/13/2018	8/13/2018	√	annual Chlorophenols 08-13
2018	119037_PAH	SDG_119037_PAH_2018AUG13_COC	2	8/13/2018	8/13/2018	√	annual PAHs 08-13
2018	11038_INORGANIC	SDG_11038_INORGANIC_2018AUG13_COC	2	8/13/2018	8/13/2018	√	annual Inorganics 08-13
2018	10443733_SW8290	SDG_10443733_SW8290_2018JULY13_COC	2	8/13/2018	8/13/2018	√	Annual Dioxin 08-13
2018	120054	SDG_120054_2018AUG27_COC	1	8/20/2018	8/27/2018	√	plant 08-20 and 08-27
2018	120074	SDG_120074_2018SEPT10_COC	1	9/4/2018	9/10/2018	√	plant 09-04 and 09-10
2018	120086	SDG_120086_2018SEPT24_COC	1	9/17/2018	9/24/2018	√	plant 09-17 and 09-24
2018	120097	SDG_120097_2018OCT8_COC	1	10/1/2018	10/8/2018	√	plant 10-1 and 10-08
2018	120103	SDG_120103_2018OCT22_COC	1	10/15/2018	10/22/2018	√	plant 10-15 and 10-22
2018	121110	SDG_121110_2018NOV5_COC	1	10/29/2018	11/5/2018	√	plant 10-15 and 11-05
2018	121116	SDG_121116_2018NOV19_COC	1	11/12/2018	11/19/2018	√	plant 11-12 and 11-19
2018	122120	SDG_122120_2018DEC3_COC	1	11/26/2018	12/3/2018	√	plant 11-26 and 12-03
2018	122123	SDG_122123_2018DEC17_COC	1	12/10/2018	12/17/2018	√	plant 12-10 and 12-17
2018	124126	SDG_124126_2018DEC31_COC	1	12/24/2018	12/31/2018	√	plant 12-24 and 12-31

APPENDIX I

Climate Statistics

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 02/18/2019

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	01	01	20	-8		0.00		0.0		0.0								
2018	01	02	18	-12		0.00												
2018	01	03	27	1		0.00												
2018	01	04	25	2		T												
2018	01	05	44	23		0.00												
2018	01	06	42	31		0.00												
2018	01	07	40	20		0.00												
2018	01	08	42	18		0.00												
2018	01	09	44	17		T												
2018	01	10	36	18		0.16												
2018	01	11	36	17		T												
2018	01	12	40	30		T												
2018	01	13	41	24		0.00												
2018	01	14	35	13		0.00												
2018	01	15	31	12		0.00												
2018	01	16	29	4		0.00												
2018	01	17	31	8		0.00												
2018	01	18	44	18		0.23												
2018	01	19	33	1		0.18												
2018	01	20	26	-3		0.00												
2018	01	21	20	-4		0.00												
2018	01	22	28	7		T												
2018	01	23	30	-1		T												
2018	01	24	38	6		0.00												
2018	01	25	37	13		0.06												
2018	01	26	31	11		0.01												
2018	01	27	34	12		0.00												
2018	01	28	37	15		T												
2018	01	29	50	26		0.00												
2018	01	30	48	18		T												
2018	01	31	29	14		T												
		Summary	34	11		0.64		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

Data value inconsistency may be present due to rounding calculations during the conversion process from SI metric units to standard imperial units.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

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Generated on 02/18/2019

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	02	01	33	-1		0.00												
2018	02	02	46	25		0.02												
2018	02	03	43	33		0.06												
2018	02	04	44	28		0.15												
2018	02	05	39	29		0.01												
2018	02	06	38	26		0.01												
2018	02	07	44	32		0.00												
2018	02	08	46	20		0.00												
2018	02	09	21	1		0.17												
2018	02	10	19	-5		0.01												
2018	02	11	24	-7		T				0.0								
2018	02	12	13	-16		T												
2018	02	13	29	-14		0.00												
2018	02	14	36	16		T												
2018	02	15	26	6		0.01												
2018	02	16	30	9		0.03												
2018	02	17	34	12		0.07												
2018	02	18	34	-3		0.13												
2018	02	19	4	-24		T												
2018	02	20	6	-30		T												
2018	02	21	21	-16		T												
2018	02	22	21	-8		T												
2018	02	23	21	-9		T												
2018	02	24	27	7		T												
2018	02	25	30	7		0.00												
2018	02	26	25	-4		0.01												
2018	02	27	26	-19		T												
2018	02	28	32	8		0.00												
		Summary	29	4		0.68		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

Data value inconsistency may be present due to rounding calculations during the conversion process from SI metric units to standard imperial units.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 02/18/2019

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	03	01	37	7		0.00		0.0										
2018	03	02	39	7		0.02												
2018	03	03	32	-2		T												
2018	03	04	24	16		0.04												
2018	03	05	32	1		T												
2018	03	06	37	6		0.00												
2018	03	07	42	-3		0.00												
2018	03	08	45	17		0.00												
2018	03	09	43	22		0.10												
2018	03	10	39	4		0.00												
2018	03	11	41	3		0.00												
2018	03	12	45	7		0.00												
2018	03	13	50	9		0.00												
2018	03	14	50	23		0.04												
2018	03	15	40	31		0.08												
2018	03	16	39	23		T												
2018	03	17	37	21		T												
2018	03	18	37	27		0.02												
2018	03	19	39	19		0.00												
2018	03	20	42	24		0.00		0.0		0.0								
2018	03	21	45	17		0.00												
2018	03	22	47	33		0.03												
2018	03	23	48	31		0.00		0.0										
2018	03	24	41	23		T												
2018	03	25	36	17		0.00												
2018	03	26	38	15		0.00												
2018	03	27	49	29		0.01												
2018	03	28	44	29		0.03												
2018	03	29	46	29		0.00												
2018	03	30	53	35		0.00												
2018	03	31	38	18		0.03												
		Summary	41	17		0.40		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

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"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

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U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

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Generated on 06/26/2018

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	04	01	48	19		0.11												
2018	04	02	32	13		0.02												
2018	04	03	41	15		0.00												
2018	04	04	45	34		T												
2018	04	05	50	19		0.20												
2018	04	06	36	16		0.03												
2018	04	07	54	22		0.14												
2018	04	08	46	30		T												
2018	04	09	49	30		T												
2018	04	10	53	25		0.00												
2018	04	11	52	33		0.07												
2018	04	12	42	29		0.21												
2018	04	13	45	27		T												
2018	04	14	50	31		T												
2018	04	15	55	29		T												
2018	04	16	52	29		0.31												
2018	04	17	41	22		T												
2018	04	18	48	21		0.00												
2018	04	19	56	26		0.00												
2018	04	20	61	26		0.00												
2018	04	21	64	27		0.00												
2018	04	22	58	27		0.03												
2018	04	23	43	28		0.11												
2018	04	24	56	20		0.00				9.0								
2018	04	25	64	25		0.00												
2018	04	26	70	27		0.00												
2018	04	27	73	30		0.00												
2018	04	28	77	37		0.00												
2018	04	29	50	33		0.51												
2018	04	30	41	33		0.09												
		Summary	52	26		1.83		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

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"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

Data value inconsistency may be present due to rounding calculations during the conversion process from SI metric units to standard imperial units.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 06/26/2018

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	05	01	52	36		0.07												
2018	05	02	56	33		0.00												
2018	05	03	64	32		0.00												
2018	05	04	71	33		0.00												
2018	05	05	63	40		T												
2018	05	06	76	46		0.21												
2018	05	07	63	38		0.00												
2018	05	08	73	35		0.00												
2018	05	09	71	40		0.12												
2018	05	10	61	41		0.29												
2018	05	11	51	39		0.01												
2018	05	12	51	38		T												
2018	05	13	50	41		0.18												
2018	05	14	67	35		0.00												
2018	05	15	73	36		0.00												
2018	05	16	68	42		0.05												
2018	05	17	61	40		0.22												
2018	05	18	49	39		0.08												
2018	05	19	56	39		0.11												
2018	05	20	68	36		0.06												
2018	05	21	67	41		0.02												
2018	05	22	69	45		0.50												
2018	05	23	62	41		0.11												
2018	05	24	71	45		0.01												
2018	05	25	77	42		T												
2018	05	26	72	43		0.01												
2018	05	27	73	42		T												
2018	05	28	71	47		0.03		0.0		0.0								
2018	05	29	75	42		0.00												
2018	05	30	67	46		0.06												
2018	05	31	68	46		0.93												
		Summary	65	40		3.07		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

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"s" This data value failed one of NCDC's quality control tests.

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U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 07/05/2018

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	06	01	52	38		0.16												
2018	06	02	70	31		0.00												
2018	06	03	77	40		0.00												
2018	06	04	82	46		T												
2018	06	05	76	43		T												
2018	06	06	78	42		0.01												
2018	06	07	72	47		0.14												
2018	06	08	76	46		T												
2018	06	09	86	45		0.02												
2018	06	10	53	40		0.24												
2018	06	11	51	35		0.03												
2018	06	12	69	28		0.00												
2018	06	13	83	36		0.00												
2018	06	14	68	50		T												
2018	06	15	65	43		0.06												
2018	06	16	54	44		0.79												
2018	06	17	55	45		0.10												
2018	06	18	55	48		0.87												
2018	06	19	59	47		0.26												
2018	06	20	68	48		0.02												
2018	06	21	63	47		0.11												
2018	06	22	75	52		0.06												
2018	06	23	60	42		0.07												
2018	06	24	72	50		0.00												
2018	06	25	84	46		0.05				0.0								
2018	06	26	74	45		0.00												
2018	06	27	81	37		0.00												
2018	06	28	75	44		0.18												
2018	06	29	61	45		0.04												
2018	06	30	68	40		T												
		Summary	69	43		3.21		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

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"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

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U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 09/26/2018

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	07	01	72	50		T												
2018	07	02	72	48		0.00												
2018	07	03	60	38		T												
2018	07	04	76	32		0.00												
2018	07	05	91	49		0.00												
2018	07	06	90	50		0.00												
2018	07	07	87	48		0.00												
2018	07	08	87	44		0.00												
2018	07	09	93	49		0.00		0.0		0.0								
2018	07	10	90	53		0.00												
2018	07	11	80	44		0.00												
2018	07	12	83	46		0.00												
2018	07	13	91	48		0.00												
2018	07	14	88	49		0.00												
2018	07	15	87	49		0.00												
2018	07	16	88	49		0.00												
2018	07	17	77	52		0.14												
2018	07	18	87	46		0.00												
2018	07	19	86	43		0.00												
2018	07	20	88	45		0.00												
2018	07	21	90	48		0.00												
2018	07	22	83	42		0.00												
2018	07	23	87	43		0.00												
2018	07	24	87	46		T												
2018	07	25	85	45		0.00												
2018	07	26	86	47		0.00												
2018	07	27	80	46		0.00												
2018	07	28	83	43		T												
2018	07	29	82	44		0.00												
2018	07	30	87	43		0.00												
2018	07	31	85	47		T												
		Summary	84	46		0.14		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

Data value inconsistency may be present due to rounding calculations during the conversion process from SI metric units to standard imperial units.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 09/26/2018

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	08	01	89	49		T												
2018	08	02	87	49		T		0.0		0.0								
2018	08	03	81	44		0.00												
2018	08	04	77	39		T												
2018	08	05	73	45		0.56												
2018	08	06	81	40		0.00												
2018	08	07	83	43		0.00												
2018	08	08	90	43		0.00												
2018	08	09	93	46		0.00												
2018	08	10	94	46		0.00		0.0		0.0								
2018	08	11	97	50		0.04												
2018	08	12	87	49		0.00												
2018	08	13	83	43		0.00		0.0		0.0								
2018	08	14	82	43		0.00												
2018	08	15	88	39		0.00												
2018	08	16	88	41		0.00												
2018	08	17	86	47		0.03												
2018	08	18	75	49		0.18												
2018	08	19	78	44		0.00												
2018	08	20	58	46		0.07												
2018	08	21	57	46		0.01												
2018	08	22	75	38		0.00												
2018	08	23	80	43		0.00												
2018	08	24	76	41		0.00												
2018	08	25	77	37		0.00												
2018	08	26	63	47		0.18												
2018	08	27	54	44		0.21												
2018	08	28	65	36		T												
2018	08	29	76	36		0.00												
2018	08	30	76	40		0.00												
2018	08	31	71	40		0.00												
		Summary	79	43		1.28		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

Data value inconsistency may be present due to rounding calculations during the conversion process from SI metric units to standard imperial units.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 10/22/2018

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	09	01	73	35		0.00												
2018	09	02	76	34		0.00												
2018	09	03	78	34		0.00												
2018	09	04	71	36		0.00												
2018	09	05	82	42		T												
2018	09	06	85	43		T												
2018	09	07	83	45		0.00												
2018	09	08	78	48		0.00												
2018	09	09	77	39		0.00												
2018	09	10	79	37		0.00												
2018	09	11	69	35		0.00												
2018	09	12	57	40		0.04												
2018	09	13	61	39		0.01												
2018	09	14	65	28		0.00												
2018	09	15	74	40		0.34												
2018	09	16	73	34		0.00												
2018	09	17	71	32		0.00												
2018	09	18	71	32		0.00												
2018	09	19	58	37		0.32												
2018	09	20	60	35		T												
2018	09	21	70	30		0.00												
2018	09	22	74	35		0.00												
2018	09	23	59	34		0.13												
2018	09	24	53	28		T												
2018	09	25	60	28		0.00		0.0		0.0								
2018	09	26	64	27		0.00												
2018	09	27	66	39		0.00												
2018	09	28	57	37		0.00												
2018	09	29	43	33		T												
2018	09	30	41	31		0.10												
Summary			68	36		0.94		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

Data value inconsistency may be present due to rounding calculations during the conversion process from SI metric units to standard imperial units.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

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Generated on 11/26/2018

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	10	01	63	26		0.00												
2018	10	02	62	45		T												
2018	10	03	58	34		0.01												
2018	10	04	42	32		0.13												
2018	10	05	47	30		T												
2018	10	06	48	37		0.01												
2018	10	07	48	29		0.00												
2018	10	08	49	22		0.00												
2018	10	09	39	32		0.03												
2018	10	10	37	30		0.01												
2018	10	11	44	27		0.00												
2018	10	12	60	22		0.00												
2018	10	13	39	26		0.03												
2018	10	14	40	17		T												
2018	10	15	50	23		0.00												
2018	10	16	59	21		0.00												
2018	10	17	64	21		0.00												
2018	10	18	65	21		0.00												
2018	10	19	65	27		0.00												
2018	10	20	72	25		0.00		0.0		0.0								
2018	10	21	71	28		0.00												
2018	10	22	65	25		0.00												
2018	10	23	62	27		0.00												
2018	10	24	62	31		T												
2018	10	25	53	38		0.00												
2018	10	26	60	41		0.03												
2018	10	27	57	29		0.03												
2018	10	28	60	27		0.15												
2018	10	29	44	31		0.03												
2018	10	30	41	29		0.00												
2018	10	31	39	30		0.02												
		Summary	54	28		0.48		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

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U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

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Generated on 01/28/2019

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	11	01	48	34		0.01												
2018	11	02	51	36		0.03												
2018	11	03	43	35		0.04												
2018	11	04	48	37		0.02				0.0								
2018	11	05	42	31		0.03												
2018	11	06	38	21		0.25												
2018	11	07	34	17		0.10												
2018	11	08	31	3		0.01												
2018	11	09	40	0		T												
2018	11	10	32	19		T												
2018	11	11	28	9		T												
2018	11	12	31	-1		0.00												
2018	11	13	39	6		0.00												
2018	11	14	50	14		0.00												
2018	11	15	47	25		0.00												
2018	11	16	45	17		0.07												
2018	11	17	29	9		0.00												
2018	11	18	34	8		0.00												
2018	11	19	45	17		0.00												
2018	11	20	45	12		0.00												
2018	11	21	46	8		0.00												
2018	11	22	43	23		0.00												
2018	11	23	39	22		0.15												
2018	11	24	31	21		0.07												
2018	11	25	25	-2		0.00												
2018	11	26	29	-2		0.00												
2018	11	27	48	26		T												
2018	11	28	41	20		0.01												
2018	11	29	38	11		0.00												
2018	11	30	28	9		0.03												
		Summary	39	16		0.82		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

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U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

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Generated on 01/28/2019

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	12	01	32	8		T												
2018	12	02	27	-1		0.00												
2018	12	03	27	18		T												
2018	12	04	29	0		0.00												
2018	12	05	22	-9		T												
2018	12	06	20	-10		0.00												
2018	12	07	30	-10		0.00												
2018	12	08	29	-4		0.00												
2018	12	09	27	-4		0.00												
2018	12	10	34	9		0.00												
2018	12	11	36	12		0.00												
2018	12	12	35	18		T												
2018	12	13	37	11		0.00												
2018	12	14	36	6		0.00												
2018	12	15	38	10		T												
2018	12	16	47	9		0.00												
2018	12	17	42	21		0.00												
2018	12	18	42	17		0.05												
2018	12	19	38	11		0.03												
2018	12	20	39	9		0.00												
2018	12	21	39	21		0.01												
2018	12	22	28	4		0.00												
2018	12	23	37	11		0.00												
2018	12	24	33	13		0.15												
2018	12	25	25	15		T												
2018	12	26	20	-7		0.00												
2018	12	27	22	12		0.01												
2018	12	28	23	2		T												
2018	12	29	39	10		0.01												
2018	12	30	38	11		0.06												
2018	12	31																
		Summary	32	7		0.32		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

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U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 02/18/2019

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	01	01	20	-8		0.00		0.0		0.0								
2018	01	02	18	-12		0.00												
2018	01	03	27	1		0.00												
2018	01	04	25	2		T												
2018	01	05	44	23		0.00												
2018	01	06	42	31		0.00												
2018	01	07	40	20		0.00												
2018	01	08	42	18		0.00												
2018	01	09	44	17		T												
2018	01	10	36	18		0.16												
2018	01	11	36	17		T												
2018	01	12	40	30		T												
2018	01	13	41	24		0.00												
2018	01	14	35	13		0.00												
2018	01	15	31	12		0.00												
2018	01	16	29	4		0.00												
2018	01	17	31	8		0.00												
2018	01	18	44	18		0.23												
2018	01	19	33	1		0.18												
2018	01	20	26	-3		0.00												
2018	01	21	20	-4		0.00												
2018	01	22	28	7		T												
2018	01	23	30	-1		T												
2018	01	24	38	6		0.00												
2018	01	25	37	13		0.06												
2018	01	26	31	11		0.01												
2018	01	27	34	12		0.00												
2018	01	28	37	15		T												
2018	01	29	50	26		0.00												
2018	01	30	48	18		T												
2018	01	31	29	14		T												
		Summary	34	11		0.64		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

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U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

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Generated on 02/18/2019

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	02	01	33	-1		0.00												
2018	02	02	46	25		0.02												
2018	02	03	43	33		0.06												
2018	02	04	44	28		0.15												
2018	02	05	39	29		0.01												
2018	02	06	38	26		0.01												
2018	02	07	44	32		0.00												
2018	02	08	46	20		0.00												
2018	02	09	21	1		0.17												
2018	02	10	19	-5		0.01												
2018	02	11	24	-7		T				0.0								
2018	02	12	13	-16		T												
2018	02	13	29	-14		0.00												
2018	02	14	36	16		T												
2018	02	15	26	6		0.01												
2018	02	16	30	9		0.03												
2018	02	17	34	12		0.07												
2018	02	18	34	-3		0.13												
2018	02	19	4	-24		T												
2018	02	20	6	-30		T												
2018	02	21	21	-16		T												
2018	02	22	21	-8		T												
2018	02	23	21	-9		T												
2018	02	24	27	7		T												
2018	02	25	30	7		0.00												
2018	02	26	25	-4		0.01												
2018	02	27	26	-19		T												
2018	02	28	32	8		0.00												
		Summary	29	4		0.68		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

Data value inconsistency may be present due to rounding calculations during the conversion process from SI metric units to standard imperial units.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 02/18/2019

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	03	01	37	7		0.00		0.0										
2018	03	02	39	7		0.02												
2018	03	03	32	-2		T												
2018	03	04	24	16		0.04												
2018	03	05	32	1		T												
2018	03	06	37	6		0.00												
2018	03	07	42	-3		0.00												
2018	03	08	45	17		0.00												
2018	03	09	43	22		0.10												
2018	03	10	39	4		0.00												
2018	03	11	41	3		0.00												
2018	03	12	45	7		0.00												
2018	03	13	50	9		0.00												
2018	03	14	50	23		0.04												
2018	03	15	40	31		0.08												
2018	03	16	39	23		T												
2018	03	17	37	21		T												
2018	03	18	37	27		0.02												
2018	03	19	39	19		0.00												
2018	03	20	42	24		0.00		0.0		0.0								
2018	03	21	45	17		0.00												
2018	03	22	47	33		0.03												
2018	03	23	48	31		0.00		0.0										
2018	03	24	41	23		T												
2018	03	25	36	17		0.00												
2018	03	26	38	15		0.00												
2018	03	27	49	29		0.01												
2018	03	28	44	29		0.03												
2018	03	29	46	29		0.00												
2018	03	30	53	35		0.00												
2018	03	31	38	18		0.03												
		Summary	41	17		0.40		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

Data value inconsistency may be present due to rounding calculations during the conversion process from SI metric units to standard imperial units.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 06/26/2018

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	04	01	48	19		0.11												
2018	04	02	32	13		0.02												
2018	04	03	41	15		0.00												
2018	04	04	45	34		T												
2018	04	05	50	19		0.20												
2018	04	06	36	16		0.03												
2018	04	07	54	22		0.14												
2018	04	08	46	30		T												
2018	04	09	49	30		T												
2018	04	10	53	25		0.00												
2018	04	11	52	33		0.07												
2018	04	12	42	29		0.21												
2018	04	13	45	27		T												
2018	04	14	50	31		T												
2018	04	15	55	29		T												
2018	04	16	52	29		0.31												
2018	04	17	41	22		T												
2018	04	18	48	21		0.00												
2018	04	19	56	26		0.00												
2018	04	20	61	26		0.00												
2018	04	21	64	27		0.00												
2018	04	22	58	27		0.03												
2018	04	23	43	28		0.11												
2018	04	24	56	20		0.00				9.0								
2018	04	25	64	25		0.00												
2018	04	26	70	27		0.00												
2018	04	27	73	30		0.00												
2018	04	28	77	37		0.00												
2018	04	29	50	33		0.51												
2018	04	30	41	33		0.09												
		Summary	52	26		1.83		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

Data value inconsistency may be present due to rounding calculations during the conversion process from SI metric units to standard imperial units.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 06/26/2018

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	05	01	52	36		0.07												
2018	05	02	56	33		0.00												
2018	05	03	64	32		0.00												
2018	05	04	71	33		0.00												
2018	05	05	63	40		T												
2018	05	06	76	46		0.21												
2018	05	07	63	38		0.00												
2018	05	08	73	35		0.00												
2018	05	09	71	40		0.12												
2018	05	10	61	41		0.29												
2018	05	11	51	39		0.01												
2018	05	12	51	38		T												
2018	05	13	50	41		0.18												
2018	05	14	67	35		0.00												
2018	05	15	73	36		0.00												
2018	05	16	68	42		0.05												
2018	05	17	61	40		0.22												
2018	05	18	49	39		0.08												
2018	05	19	56	39		0.11												
2018	05	20	68	36		0.06												
2018	05	21	67	41		0.02												
2018	05	22	69	45		0.50												
2018	05	23	62	41		0.11												
2018	05	24	71	45		0.01												
2018	05	25	77	42		T												
2018	05	26	72	43		0.01												
2018	05	27	73	42		T												
2018	05	28	71	47		0.03		0.0		0.0								
2018	05	29	75	42		0.00												
2018	05	30	67	46		0.06												
2018	05	31	68	46		0.93												
		Summary	65	40		3.07		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

Data value inconsistency may be present due to rounding calculations during the conversion process from SI metric units to standard imperial units.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 07/05/2018

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	06	01	52	38		0.16												
2018	06	02	70	31		0.00												
2018	06	03	77	40		0.00												
2018	06	04	82	46		T												
2018	06	05	76	43		T												
2018	06	06	78	42		0.01												
2018	06	07	72	47		0.14												
2018	06	08	76	46		T												
2018	06	09	86	45		0.02												
2018	06	10	53	40		0.24												
2018	06	11	51	35		0.03												
2018	06	12	69	28		0.00												
2018	06	13	83	36		0.00												
2018	06	14	68	50		T												
2018	06	15	65	43		0.06												
2018	06	16	54	44		0.79												
2018	06	17	55	45		0.10												
2018	06	18	55	48		0.87												
2018	06	19	59	47		0.26												
2018	06	20	68	48		0.02												
2018	06	21	63	47		0.11												
2018	06	22	75	52		0.06												
2018	06	23	60	42		0.07												
2018	06	24	72	50		0.00												
2018	06	25	84	46		0.05				0.0								
2018	06	26	74	45		0.00												
2018	06	27	81	37		0.00												
2018	06	28	75	44		0.18												
2018	06	29	61	45		0.04												
2018	06	30	68	40		T												
		Summary	69	43		3.21		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

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U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 09/26/2018

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	07	01	72	50		T												
2018	07	02	72	48		0.00												
2018	07	03	60	38		T												
2018	07	04	76	32		0.00												
2018	07	05	91	49		0.00												
2018	07	06	90	50		0.00												
2018	07	07	87	48		0.00												
2018	07	08	87	44		0.00												
2018	07	09	93	49		0.00		0.0		0.0								
2018	07	10	90	53		0.00												
2018	07	11	80	44		0.00												
2018	07	12	83	46		0.00												
2018	07	13	91	48		0.00												
2018	07	14	88	49		0.00												
2018	07	15	87	49		0.00												
2018	07	16	88	49		0.00												
2018	07	17	77	52		0.14												
2018	07	18	87	46		0.00												
2018	07	19	86	43		0.00												
2018	07	20	88	45		0.00												
2018	07	21	90	48		0.00												
2018	07	22	83	42		0.00												
2018	07	23	87	43		0.00												
2018	07	24	87	46		T												
2018	07	25	85	45		0.00												
2018	07	26	86	47		0.00												
2018	07	27	80	46		0.00												
2018	07	28	83	43		T												
2018	07	29	82	44		0.00												
2018	07	30	87	43		0.00												
2018	07	31	85	47		T												
		Summary	84	46		0.14		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

Data value inconsistency may be present due to rounding calculations during the conversion process from SI metric units to standard imperial units.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 09/26/2018

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	08	01	89	49		T												
2018	08	02	87	49		T		0.0		0.0								
2018	08	03	81	44		0.00												
2018	08	04	77	39		T												
2018	08	05	73	45		0.56												
2018	08	06	81	40		0.00												
2018	08	07	83	43		0.00												
2018	08	08	90	43		0.00												
2018	08	09	93	46		0.00												
2018	08	10	94	46		0.00		0.0		0.0								
2018	08	11	97	50		0.04												
2018	08	12	87	49		0.00												
2018	08	13	83	43		0.00		0.0		0.0								
2018	08	14	82	43		0.00												
2018	08	15	88	39		0.00												
2018	08	16	88	41		0.00												
2018	08	17	86	47		0.03												
2018	08	18	75	49		0.18												
2018	08	19	78	44		0.00												
2018	08	20	58	46		0.07												
2018	08	21	57	46		0.01												
2018	08	22	75	38		0.00												
2018	08	23	80	43		0.00												
2018	08	24	76	41		0.00												
2018	08	25	77	37		0.00												
2018	08	26	63	47		0.18												
2018	08	27	54	44		0.21												
2018	08	28	65	36		T												
2018	08	29	76	36		0.00												
2018	08	30	76	40		0.00												
2018	08	31	71	40		0.00												
		Summary	79	43		1.28		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

Data value inconsistency may be present due to rounding calculations during the conversion process from SI metric units to standard imperial units.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 10/22/2018

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	09	01	73	35		0.00												
2018	09	02	76	34		0.00												
2018	09	03	78	34		0.00												
2018	09	04	71	36		0.00												
2018	09	05	82	42		T												
2018	09	06	85	43		T												
2018	09	07	83	45		0.00												
2018	09	08	78	48		0.00												
2018	09	09	77	39		0.00												
2018	09	10	79	37		0.00												
2018	09	11	69	35		0.00												
2018	09	12	57	40		0.04												
2018	09	13	61	39		0.01												
2018	09	14	65	28		0.00												
2018	09	15	74	40		0.34												
2018	09	16	73	34		0.00												
2018	09	17	71	32		0.00												
2018	09	18	71	32		0.00												
2018	09	19	58	37		0.32												
2018	09	20	60	35		T												
2018	09	21	70	30		0.00												
2018	09	22	74	35		0.00												
2018	09	23	59	34		0.13												
2018	09	24	53	28		T												
2018	09	25	60	28		0.00		0.0		0.0								
2018	09	26	64	27		0.00												
2018	09	27	66	39		0.00												
2018	09	28	57	37		0.00												
2018	09	29	43	33		T												
2018	09	30	41	31		0.10												
Summary			68	36		0.94		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

"A" values in the Precipitation Flag or the Snow Flag column indicate a multiday total, accumulated since last measurement, is being used.

Data value inconsistency may be present due to rounding calculations during the conversion process from SI metric units to standard imperial units.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 11/26/2018

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	10	01	63	26		0.00												
2018	10	02	62	45		T												
2018	10	03	58	34		0.01												
2018	10	04	42	32		0.13												
2018	10	05	47	30		T												
2018	10	06	48	37		0.01												
2018	10	07	48	29		0.00												
2018	10	08	49	22		0.00												
2018	10	09	39	32		0.03												
2018	10	10	37	30		0.01												
2018	10	11	44	27		0.00												
2018	10	12	60	22		0.00												
2018	10	13	39	26		0.03												
2018	10	14	40	17		T												
2018	10	15	50	23		0.00												
2018	10	16	59	21		0.00												
2018	10	17	64	21		0.00												
2018	10	18	65	21		0.00												
2018	10	19	65	27		0.00												
2018	10	20	72	25		0.00		0.0		0.0								
2018	10	21	71	28		0.00												
2018	10	22	65	25		0.00												
2018	10	23	62	27		0.00												
2018	10	24	62	31		T												
2018	10	25	53	38		0.00												
2018	10	26	60	41		0.03												
2018	10	27	57	29		0.03												
2018	10	28	60	27		0.15												
2018	10	29	44	31		0.03												
2018	10	30	41	29		0.00												
2018	10	31	39	30		0.02												
		Summary	54	28		0.48		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

*Ground Cover: 1=Grass; 2=Fallow; 3=Bare Ground; 4=Brome grass; 5=Sod; 6=Straw mulch; 7=Grass muck; 8=Bare muck; 0=Unknown

"s" This data value failed one of NCDC's quality control tests.

"T" values in the Precipitation or Snow category above indicate a "trace" value was recorded.

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Data value inconsistency may be present due to rounding calculations during the conversion process from SI metric units to standard imperial units.

U.S. Department of Commerce
National Oceanic & Atmospheric Administration
National Environmental Satellite, Data, and Information Service

Record of Climatological Observations

These data are quality controlled and may not be identical to the original observations.

Generated on 01/28/2019

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	11	01	48	34		0.01												
2018	11	02	51	36		0.03												
2018	11	03	43	35		0.04												
2018	11	04	48	37		0.02				0.0								
2018	11	05	42	31		0.03												
2018	11	06	38	21		0.25												
2018	11	07	34	17		0.10												
2018	11	08	31	3		0.01												
2018	11	09	40	0		T												
2018	11	10	32	19		T												
2018	11	11	28	9		T												
2018	11	12	31	-1		0.00												
2018	11	13	39	6		0.00												
2018	11	14	50	14		0.00												
2018	11	15	47	25		0.00												
2018	11	16	45	17		0.07												
2018	11	17	29	9		0.00												
2018	11	18	34	8		0.00												
2018	11	19	45	17		0.00												
2018	11	20	45	12		0.00												
2018	11	21	46	8		0.00												
2018	11	22	43	23		0.00												
2018	11	23	39	22		0.15												
2018	11	24	31	21		0.07												
2018	11	25	25	-2		0.00												
2018	11	26	29	-2		0.00												
2018	11	27	48	26		T												
2018	11	28	41	20		0.01												
2018	11	29	38	11		0.00												
2018	11	30	28	9		0.03												
		Summary	39	16		0.82		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

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Generated on 01/28/2019

National Centers for Environmental Information
151 Patton Avenue
Asheville, North Carolina 28801

Current Location: Elev: 5506 ft. Lat: 45.9647° N Lon: -112.5006° W

Station: **BUTTE BERT MOONEY AIRPORT, MT US USW00024135**

Observation Time Temperature: Unknown Observation Time Precipitation: 2400

Year	Month	Day	Temperature (F)			Precipitation					Evaporation		Soil Temperature (F)					
			24 Hrs. Ending at Observation Time		At Observation	24 Hour Amounts Ending at Observation Time				At Obs. Time			4 in. Depth			8 in. Depth		
			Max.	Min.		Rain, Melted Snow, Etc. (in)	Flag	Snow, Ice Pellets, Hail (in)	Flag	Snow, Ice Pellets, Hail, Ice on Ground (in)	24 Hour Wind Movement (mi)	Amount of Evap. (in)	Ground Cover (see *)	Max.	Min.	Ground Cover (see *)	Max.	Min.
2018	12	01	32	8		T												
2018	12	02	27	-1		0.00												
2018	12	03	27	18		T												
2018	12	04	29	0		0.00												
2018	12	05	22	-9		T												
2018	12	06	20	-10		0.00												
2018	12	07	30	-10		0.00												
2018	12	08	29	-4		0.00												
2018	12	09	27	-4		0.00												
2018	12	10	34	9		0.00												
2018	12	11	36	12		0.00												
2018	12	12	35	18		T												
2018	12	13	37	11		0.00												
2018	12	14	36	6		0.00												
2018	12	15	38	10		T												
2018	12	16	47	9		0.00												
2018	12	17	42	21		0.00												
2018	12	18	42	17		0.05												
2018	12	19	38	11		0.03												
2018	12	20	39	9		0.00												
2018	12	21	39	21		0.01												
2018	12	22	28	4		0.00												
2018	12	23	37	11		0.00												
2018	12	24	33	13		0.15												
2018	12	25	25	15		T												
2018	12	26	20	-7		0.00												
2018	12	27	22	12		0.01												
2018	12	28	23	2		T												
2018	12	29	39	10		0.01												
2018	12	30	38	11		0.06												
2018	12	31																
		Summary	32	7		0.32		0.0										

Empty, or blank, cells indicate that a data observation was not reported.

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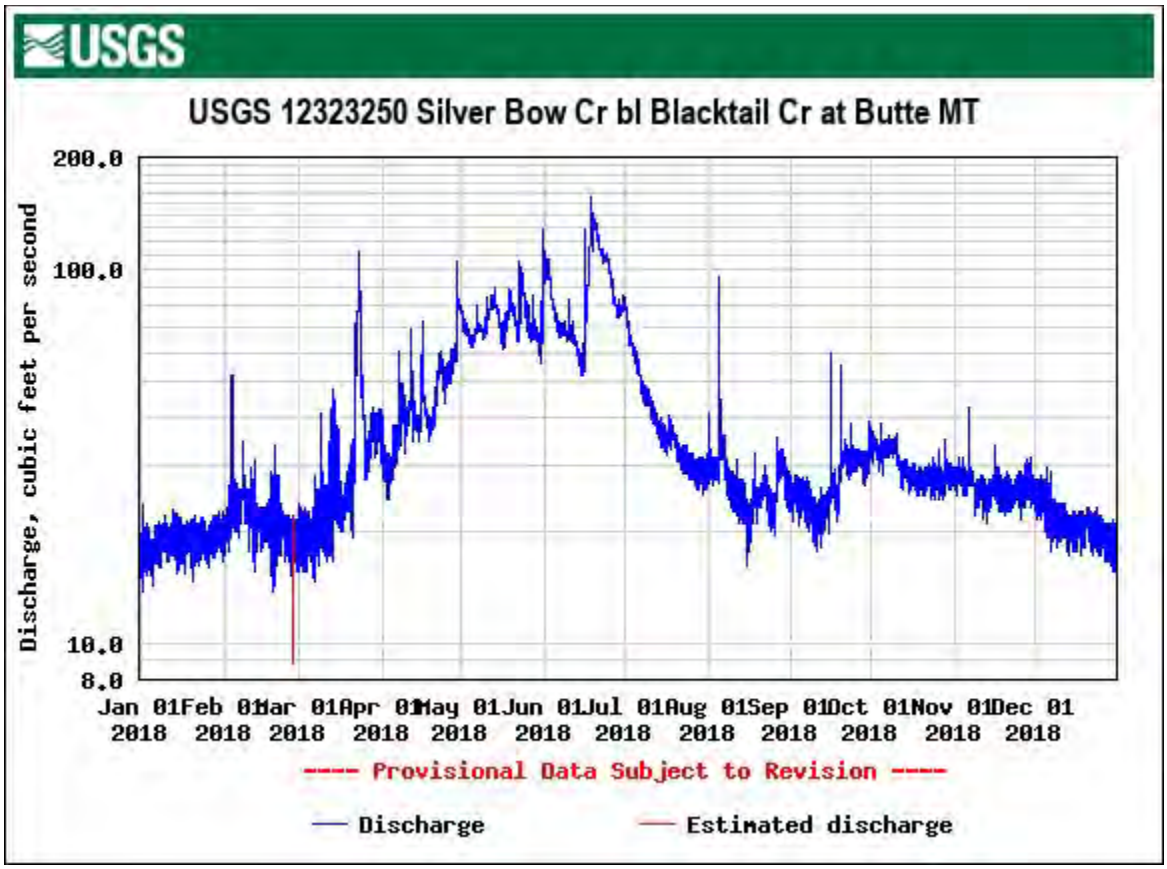
APPENDIX J

Streamflow Statistics


USGS
USGS 12323250 Silver Bow Cr bl Blacktail Cr at Butte MT
Discharge, cubic feet per second
200.0
100.0
10.0
8.0
Jan 01 2018
Feb 01 2018
Mar 01 2018
Apr 01 2018
May 01 2018
Jun 01 2018
Jul 01 2018
Aug 01 2018
Sep 01 2018
Oct 01 2018
Nov 01 2018
Dec 01 2018
---- Provisional Data Subject to Revision ----
Discharge
Estimated discharge