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Five-Year Review Report

Fifth Five-Year Review Report for the Idaho Pole Co. Site

Bozeman,

Gallatin County, Montana

September 2020

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Fifth Five-Year Review Report – 2020

Idaho Pole Co. Site

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List of Acronyms

ARAR	Applicable or Relevant and Appropriate Requirements
ARM	Administrative Rules of Montana
BFEG	Barkfill Extraction Gallery
BFIG	Barkfill Injection Gallery
bgs	Below ground surface
BNSF	Burlington Northern Santa Fe Railway Company
CCC	Calgon Carbon Corporation
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CGWA	Controlled Groundwater Area
CL	Confidence Level
COC	Contaminant of Concern
DO	Dissolved Oxygen
COV	Coefficient of Variance
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FS	Feasibility Study
FFS	Focused Feasibility Study
ft^2/d	Square feet per day
ft MSL	Feet above mean sea level
GAC	Granular activated carbon
GIS	Geographic Information System
gpd/ft	Gallons per day per foot
gpm	Gallons per minute
GRS	Groundwater recovery system
HASP	Health and Safety Plan
HHRA	Human Health Risk Assessment
HHS	Human Health Standards
HQ	Hazard quotient
I-90	Interstate 90
IC	Institutional Control
IPC	Idaho Pole Company
K_{oc}	Carbon-water partition co-efficient
LNAPL	Light non-aqueous phase liquid
LTU	Land treatment unit
MCL	Maximum Contaminant Level
MDEQ	Montana Department of Environmental Quality
mg/kg	Milligrams per kilogram
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ng/kg	nanograms/kilogram
NPL	National Priorities List
NWE	NorthWestern Energy

O&M	Operation and Maintenance
ORP	Oxidation reduction potential
OU	Operable Unit
PAHs	Polycyclic aromatic hydrocarbons
PCP	Pentachlorophenol
pg/L	Picograms/liter
PPEG	Pressure Plant Extraction Gallery
PPIG	Pressure Plant Injection gallery
ppb	Parts per billion
ppm	Parts per million
ppt	Parts per trillion
P&T	Pump and Treat
PRB	Permeable Reactive Barrier
PRG	Preliminary Remediation Goal
PRP	Potentially Responsible Party
QA/QC	Quality Assurance/Quality Control
RA	Remedial Action
RAO	Remedial Action Objective
RBSL	Risk-based screening level
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RfD	Reference dose
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RSE	Remediation System Evaluation
RSL	Regional Screening Level
SC	Specific Conductance
TCDD	2,3,7,8-tetrachlorophenol dibenzo-p-dioxin
TCDD-TEQ	Sum of toxicity equivalents for individual polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs), expressed as concentration of 2,3,7,8-tetrachlorophenol dibenzo-p-dioxin (TCDD)
TEF	toxicity equivalence factor
TEH	Total Extractable Hydrocarbon
TEQ	toxicity equivalence
TPH	Total Petroleum Hydrocarbons
µg/L	Micrograms per liter
µg/kg	Microgram per kilogram
UAO	Unilateral Administrative Order
USACE	U.S. Army Corps of Engineers
VISL	Vapor Intrusion Screening Level
WHO	World Health Organization
WQB	Water Quality Bulletin

Idaho Pole Co. Site

Fifth Five-Year Review Report

I. Introduction

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this five-year review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP)(40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the fifth FYR for the Idaho Pole Co. Superfund Site (the Site). The triggering action for this statutory review is the completion date of the previous FYR. The FYR has been prepared because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site consists of one operable unit (OU), addressed in this FYR. OU1 consists of soil and groundwater remedies. The Site Five-Year Review was led by Roger Hoogerheide, EPA Remedial Project Manager (RPM). Participants included Lisa DeWitt, Montana Department of Environmental Quality (MDEQ) Project Officer. The relevant entities such as the potentially responsible party (PRP) was notified of the initiation of the five-year review. The review began on 10/1/2019.

The cleanup at the Idaho Pole Co. Superfund Site is currently protective of human health and the environment. Excavation, on-site treatment, and on-site disposal have addressed the contaminated soils. Land use restrictions prevent the use of specific areas of the site for residential use, where needed. The Montana Division of Natural Resources has named a Controlled Groundwater Area which does not allow there to be wells on the site except for the cleanup. To be protective over time, the following actions are needed: install and sample additional wells in the downgradient portion of the plume; complete the Focused Feasibility Study and modify the cleanup to address the source of the remaining contamination affecting the groundwater; and update the operation and maintenance plan to include current and anticipated future site activities.

Site Background

The Site is associated with a previous wood-treating facility located near the northern limits of Bozeman, Montana, and occupies approximately 87 acres in the east half of Section 6 and the west half of Section 5, Township 2S, Range 6E of Gallatin County. **Figure 1** illustrates key map features in the vicinity of the Site. The Site is bounded by railroad tracks to the south, L Street to the west and Rocky Creek to the east and north of the Site. Interstate 90 (I-90), Bohart Lane and Cedar Street traverse the Site in a southeast-northwest direction.

Wood treating infrastructure was historically located south of I-90, though soil and groundwater have been contaminated both north and south of I-90 from surface releases, infiltration in the subsurface soils and migration of non-aqueous phase liquid via the groundwater. All former wood-treating infrastructure was dismantled in 1999. Contaminated groundwater flows to the northeast towards Rocky Creek. Rocky Creek, which is located north of I-90, also receives water from Mill Creek (located south of I-90) through a culvert that runs below I-90 in the eastern portion of the Site. Further downstream (northwest of the Site) Rocky Creek combines with Bozeman Creek (which is located west of the Site) to form the East Gallatin River.

SITE IDENTIFICATION		
Site Name: Idaho Pole Co.		
EPA ID: MTD006232276		
Region: 8	**State:** MT	**City/County:** Bozeman/Gallatin
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name (Federal or State Project Manager): Roger Hoogerheide		
Author affiliation: EPA		
Review period: 10/01/2019 – 6/30/2020		
Date of site inspection: 10/15/2019 – 10/16/2019		
Type of review: Statutory		
Review number: 5		
Triggering action date: 9/30/2015		
Due date *(five years after triggering action date)*: 9/30/2020		

II. Response Action Summary

Basis for Taking Action

As part of the remedial investigation and feasibility study, human health and ecological risk assessments were completed. The risk assessments indicate that the principal threats stem from subsurface soils, oily wood-treating fluid, and to a lesser extent, surface soils. The low-level threats stem from ditch and creek sediments. This determination is based on concentrations and estimated volumes of contaminated media.

The primary pathways are ingestion of and direct contact with contaminated ground water, ingestion of or direct contact with soils, and inhalation of air entrained soils; secondary pathways are ingestion of and direct contact with surface water and ingestion of vegetation. Potentially affected receptors include human beings and terrestrial and aquatic biota.

The contaminants of concern (COCs) for the soils, sediment and groundwater are pentachlorophenol (PCP), polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (dioxins and furans). The PCP was historically dissolved in a carrier fuel similar in consistency to a diesel range organic with a carbon fraction between C_{10} and C_{28}. While carrier fuel is not a contaminant of concern identified in the Record of Decision (ROD), PAHs are typically associated with the carrier fuels and can be used as indicator constituents for the carrier fuel that has undergone weathering, while dioxins and furans normally form in the incomplete combustion during PCP manufacturing. The primary groundwater COC is PCP, with sporadic detections of PAHs and polychlorinated biphenyls that appear to be limited to the source area south of I-90.

Response Actions

In 1978, the Montana Department of Fish, Wildlife and Parks notified the MDEQ of a suspected release of oily wood-treating fluid from the facility. MDEQ found evidence of a release in ditches near the facility and near Rocky Creek. Consequently, MDEQ issued a compliance order on September 29, 1978, notifying the Idaho Pole Company (IPC) of statutory violations and directing the company to stop uncontrolled releases and to clean up spilled treating fluid. To slow or eliminate movement of the oily wood-treating fluid through ground and surface water and into private wells, IPC installed and operated an interceptor drain with a sump and an interceptor trench adjacent to and south of I-90. Light non-aqueous phase liquid (LNAPL) was collected with an oil skimmer placed in a sump connected to the drain. An unknown quantity of LNAPL was collected from the drain and trench. Absorbent pads were placed in the culverts and ditches to intercept and collect oily wood-treating fluid. Culverts under I-90 were also dammed to prevent runoff of contaminated surface water to Rocky Creek.

In 1984, IPC conducted a remedial investigation without MDEQ or EPA oversight to identify the sources and extent of contamination at the Site. IPC drilled monitoring wells to collect groundwater samples. They also collected soil and surface water samples. MDEQ and EPA concluded that IPC's remedial investigation was insufficient to identify contaminant sources and to characterize the nature and extent of contamination.

EPA proposed the Site for the National Priorities List (NPL) in 1984, and the listing was final in 1986. In March 1989, MDEQ requested and received the lead agency role for a fund-financed Remedial Investigation/Feasibility Study (RI/FS) for the Site.

Remedy Objectives and Cleanup Levels

The 1992 ROD established one OU that included a soil, sediment and groundwater remedy. The ROD did not expressly identify “Remedial Action Objectives,” but those objectives can be discerned from the text. For instance, the “Cleanup Levels” section of the ROD indicates the following:

> *The purpose of this response action is to control risks posed by direct contact, ingestion and inhalation of soils and groundwater and to minimize migration of contaminants to ground and surface water and air[1]. Concentrations of contaminants in sediments, soils and groundwater remaining after Site cleanup will correspond to lifetime cancer risks*

[1] Evaluated with respect to inhalation of air entrained soil particles as part of the soil remedy.

within the acceptable range of 1 x 10^{-4} to 1 x 10^{-6}. The cleanup levels for compounds having noncarcinogenic effects will result in a collective health hazard index below 1.0. Since no federal or state chemical-specific applicable or relevant and appropriate requirements (ARARs) exist for soil or sediments, soil cleanup levels were determined through site-specific risk analysis. Groundwater cleanup levels were established at the final Maximum Contaminant Level (MCL) for pentachlorophenol, benzo(a)pyrene and 2, 3, 7, 8 – TCDD (dioxin) and at proposed MCLs for other carcinogenic PAHs.[2]

Table 13 of the ROD set forth Site cleanup levels for soil and groundwater, which are presented in **Table 1**, below. "B2 PAHs" refer to a class of PAHs that are probable carcinogens, and "Total D PAHs" refer to a class of PAHs that are not classifiable with respect to cancer impacts.

Table 1: Cleanup Levels from Table 13 of the ROD

	Constituent	Cleanup Level	Basis
Soil and Sediments (mg/kg)	PCP	48	Risk
	Total B2 PAHs	15	Risk
	Total D PAHs	145	Hazard quotient
	TCDD TE*	0.001	Risk
Groundwater (µg/L)	PCP	1.0	MCL
	B2 PAHs:		
	Benzo(a)pyrene	0.2	MCL
	Benz(a)anthracene	0.1	Proposed MCL
	Benzo(b)fluoranthene	0.2	Proposed MCL
	Benzo(k)fluoranthene	0.2	Proposed MCL
	Chrysene	0.2	Proposed MCL
	Dibenz(a,h)anthracene	0.3	Proposed MCL
	Indeno(1,2,3-CD)pyrene	0.4	Proposed MCL
	Total D PAHs	146	Hazard quotient
	2,3,7,8-TCDD (Dioxin)	3.0 x 10^{-5}	MCL

mg/kg = milligrams per kilogram
µg/L = micrograms per liter
**refers to sum of toxicity equivalents for individual polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs), expressed as concentration of 2,3,7,8-tetrachlorophenol dibenzo-p-dioxin (TCDD)*

The selected remedy in the 1992 ROD included components for soil, sediment and groundwater treatment, plus Institutional Controls (ICs), as described below:

- Soil and sediment components of the remedy selected in the ROD included:
  - Excavation and surface land biological treatment of contaminated soils and sediments from: 1) the Pasture Area north of I-90 including the substation ditch; 2) the area between Cedar Street and I-90 including the Cedar Street ditch; and 3) the former roundhouse area (**Figure 3**)
  - Hot water and steam flushing of soils underlying the facility and I-90 in order to recover hazardous substances
  - Separation and disposal of oily wood-treating fluid extracted from soils

[2] EPA guidance says the Five-Year Review should include a review of any changes in ARAR standards, and a review of potentially changed standards was done during this review.

    - Closure of on-site treatment units in compliance with Resource Conservation and Recovery Act (RCRA) Subtitle C
- Groundwater components of the remedy selected in the ROD included:
    - Groundwater cleanup using groundwater extraction wells, biological treatment, and return of treated water to the aquifer to enhance in-situ biological degradation and to control potential migration of contaminants
    - Treatment of contaminated residential wells exceeding MCLs or risk-based concentrations, at the point of distribution, in addition to ICs preventing new access to contaminated groundwater
    - Continued residential and groundwater monitoring
- ICs identified in the "Institutional Controls" section of the ROD included:
    - Posting of areas where active remediation is occurring to prevent unauthorized access to contaminated media or to remedial action areas
    - Prevention of domestic or commercial water-well drilling in the contaminated groundwater plume area to prevent additional receptors of contaminated groundwater or an expansion of the plume
    - Land use and deed restrictions for the closed land-treatment units to preserve the integrity of the closed land-treatment units

Explanation of Significant Differences (1996 and 1998)

There have been two Explanations of Significant Differences (ESD) amending the remedy selected in the 1992 ROD:

- An ESD in 1996 included the following elements:
    - Removed the hot water and steam flushing component of the soil remedy
    - Clarified the areas of soil contamination to be excavated
    - Determined that sediments in the substation ditch no longer required remediation because samples collected post-ROD did not exceed ROD cleanup levels (**Table 1**)
    - Clarified how the land-treatment unit (LTU) for soils would be dismantled (eliminating the need for the RCRA cap specified in the ROD)
    - Described how treated soils would be disposed of on site (including the isolation of any such soils containing dioxins/furans above ROD cleanup levels from groundwater and from direct contact)
    - Changed the groundwater treatment process from biological treatment to granular activated carbon (GAC)
    - Indicated that a first phase of the groundwater remedy would include the extraction and treatment of groundwater on the south side of I-90 in the Barkfill and Pressure Plant Areas, plus in-situ treatment of the dissolved plume (i.e., downgradient of these extraction wells) by injection of treated groundwater; a second phase would include modifications as necessary to achieve ROD goals, based on results of the first phase
    - Identified that ambient temperature water would be used for flushing the area beneath I-90, rather than hot water or steam

A second ESD was issued in 1998 after active wood treating operations were terminated in 1997, allowing areas that had previously been considered inaccessible for soil remediation to then be remediated. This ESD specified that contaminated soils from all such areas be excavated and treated. This added approximately 5,000 more cubic yards of soil for treatment.

Status of Implementation

Soil and Sediments

IPC began the soil excavation portion of the cleanup in 1995. The company dug up soils and constructed an LTU on site. Contaminated soils were excavated from six areas at the Site: the Pressure Plant Area, beneath Cedar Street, the Barkfill Area, the Roundhouse Area, the Cedar Street Ditch and the Pasture Area. In summer 1999, the company demolished and disposed of structures and excavated contaminated soil from underneath the demolished structures. Approximately 19,000 cubic yards of contaminated soil were excavated and placed in the LTU for treatment. LTU operations continued through October 2000.

The LTU was dismantled in 2002. In addition to the excavated areas south of Cedar Street, two pits were excavated on site near these excavated areas. Treated soil with PAH and PCP concentrations below the ROD soil cleanup standards, along with the filter sand from the LTU, were placed in the excavated areas (Barkfill and Pressure Plant Areas) and the two pits. However, these soils also contain dioxins and furans above the soil cleanup standards identified in the ROD (**Table 2**). Therefore, the treated soil was placed above historic high groundwater levels and covered with 12 to 18 inches of clean soil to prevent direct human contact with treated soils. This "Treated Soils Area" is illustrated on **Figure 4**. All the construction requirements for treatment of the soils have been met as described in the 2002 *Remedial Action Completion Report*. Based on pre- and post-treatment sample analysis, the minimum amount of PCP mass removed by soil treatment is estimated at approximately 10,000 pounds.

A *Soils Management Plan* was approved by EPA and MDEQ in March 2011. If site soils must be disturbed, and approval has been granted by EPA and MDEQ, the *Soils Management Plan* provides guidance as to the general health and safety precautions that must be in place to protect human health and the environment. Within the Controlled Groundwater Area (CGWA), no excavation shall be allowed, where that excavation reaches saturated soil or groundwater, unless authorization is obtained from the EPA and MDEQ and a soils and groundwater management plan specific to the activities is approved by EPA and MDEQ. Since the *Soils Management Plan* was approved by the Agencies in 2011, there have been eight instances where the plan was activated including four during this review period.

Since the soils remedial action was completed, a number of investigation activities have occurred and are summarized below:

- In 2014, an investigation to determine the nature and extent of residual wood-treating fluids that remain in subsurface soils in the Barkfill Area (**refer to Figure 5**) and determine the need for additional source or groundwater remediation efforts was conducted. The investigation efforts found that PCP concentrations in subsurface soil ranged from non-detect to 57 milligram per kilogram (mg/kg) and total petroleum hydrocarbons (TPS) ranged from non-detect to 7,200 mg/kg. Based on these results and the accompanying groundwater concentrations, two pilot studies were conducted.
- Five soil composite samples collected at depth in 2017 from the Treat Soils Area (TSA) and analyzed for dioxins and furans. Samples collected at four of the five sample locations exceeded the ROD cleanup standards of 1.0 µg/kg (**Figure 6**). Values ranged from 0.69 µg/kg to 2.9 µg/kg. These results support the need to continue to have Institutional Controls and a protective cover in place, as well as a robust inspection and maintenance program, to ensure that soil remedy remains protective of human health and the environment.
- Soil samples were also collected in 2018 (**Figure 7**) from 0 to 6 inches for dioxin analysis because the Agencies determined that additional analyses of dioxins were needed to compare to recently

revised EPA Regional Screening Levels (RSLs) for residential and industrial use. The results of these samples for specific areas were:

- Former Roundhouse Area sample (IPC-SS-RHS) = 0.57 ug/kg;
- TSA sample (IPC-SS-TSA) = 0.19 ug/kg;
- Former LTU Area sample (IPC-SS-LTU) = .02 ug/kg; and
- Residential Area sample (IPC-SS-RES) = 0.12 ug/kg.

Based on a review of the historical site record and recently collected soil samples, the Agencies determined that the soils have been well characterized and proceeded with issuing a Notice of Intent of Partial Deletion of the surface and unsaturated subsurface soils outside of the 4.5 acre Treated Soils Area from the National Priorities List. The Notice of Intent to Partial Deletion was placed in the Federal Register on July 19, 2019, under Docket Identification No. EPA-HQ-SFUND-1986-0005.

Concerns were raised during the partial deletion public comment period that the soils were not appropriately characterized to allow for partial deletion. Additional soil samples were collected from 0 to 6 inches from the former roundhouse, the LTU area and Treat Soils Area on September 30, 2019, and analyzed for PCP and PAHs (**Figure 8**). Two additional samples were also taken from the ditch along the south side of Bohart Lane between monitoring wells GM-4 and GM-5 from the 0 to 6 inch and 6 to12 inch intervals. Analytical results were below cleanup levels established in the 1992 ROD and appropriate chemical contaminant RSLs for industrial use (**Table 1**). The Notice of Partial Deletion was published in the Federal Register in January 2020 that included a responsiveness summary and supporting material that addressed the public comments received.[3]

The soil remedy is considered complete. No further or ongoing soil remediation is required other than maintaining ICs and ensuring that a protective cover remains over areas where treated soils have been placed. It is the responsibility of the Idaho Pole Company, their successors and assigns to ensure that the integrity of the soil component of the remedial action is maintained as long as the treated soils at the Site do not allow for unlimited use and unrestricted exposure.

Sediment contamination in the Cedar Street ditch, the substation ditch, the L Street ditch, a small stretch of Rocky Creek, and portions of the Bohart Lane ditch were identified as areas of concern and were investigated during the Remedial Investigation. However, only two ditches were identified for remediation in the ROD: the substation ditch and Cedar Street ditch. The other ditches investigated, along with Rocky Creek sediments, did not have COCs exceeding the ROD cleanup levels. Further investigations conducted during Remedial Design and documented in the *Additional Studies and the Design Basis Report Remedial Design/Remedial Action* indicated that only the sediments in Cedar Street ditch required remediation. An Explanation of Significant Differences was issued in May 1996 eliminating the substation ditch from further remediation as samples collected during Remedial Design did not exceed cleanup levels.

Groundwater

"Phase 1" of the groundwater remedy began in February 1997. Pursuant to the 1996 ESD, "Phase 1" extracted and treated groundwater on the south side of I-90 in the Barkfill and Pressure Plant areas. The 1996 ESD indicated that a second phase of the groundwater remedy would include modifications of this remedy as necessary to achieve ROD goals, based on results of the first phase. "Phase 2" began in early

[3] The partial deletion only pertains to the surface and unsaturated subsurface soils outside of the 4.5 acre Treated Soils Area. Groundwater, sediments and saturated subsurface soils as well as the 4.5 acre Treated Soils Area are still on the Final NPL.

2010. Results of optimizations and other reviews recommended discontinuation of extraction from the Pressure Plant Extraction Gallery (PPEG), increased extraction at the Barkfill Extraction Gallery (BFEG), and changes to the groundwater monitoring and performance monitoring programs.

Treatment of groundwater was conducted at the Site from 1997 through 2016 by the GRS and injected downgradient (Barkfill Injection Gallery (BFIG)) and up gradient (Pressure Plan Injection Gallery (PPIG)) of the source areas. Over 624 million gallons of groundwater were treated by the groundwater recovery system (GRS) from 1997 to 2016 with no reported exceedances of discharge limits. Approximately 60 pounds of total PAH compounds and 290 pounds of PCP were removed by the GRS during operations.

An additional component of the Phase 1 groundwater remedy was an oil recovery interceptor trench located on the north side (i.e., the downgradient side) of I-90. The occurrence and volume of oil diminished significantly since 2012. Operation of the trench ceased in October 2015 when the trench was closed and reclaimed per the EPA-approved *Trench Closure Work Plan.*

In addition to the selected remedy, two pilot tests were completed during this review period. The first pilot test involved the injection of nitrate rich nutrients (CBN™). The objective of the test was to evaluate aerobic and anaerobic biodegradation of PCP and residual diesel-range total petroleum hydrocarbons (TPH) by providing additional food source for bacteria in the areas where the highest concentrations of PCP and TPH were detected in groundwater. Results indicated that conditions were favorable for bioremediation, and PCP concentrations initially increased in wells but then declined or remained stable during the April 2016 semi-annual sampling event (Figure 9 and Attachment 7).

For the Phase II Pilot Study, the same nutrients (CBN™) plus a bio-surfactant (PetroSolv™) were injected with the treated water into the Barkfill Source Area via the BFIG, six designated injection wells and 18 direct push boreholes **(Figures 10 and 11)**. The objective of the test was to evaluate potential aerobic and anaerobic biodegradation of PCP and TPH by providing additional food source for bacteria in the areas where the highest concentrations of PCP and TPH impacts are present in groundwater.

Results of the 2015 and 2016 pilot studies indicate PCP concentrations were reduced in source area wells for a short period until all bio-amendments were consumed, at which time PCP concentrations rebounded at source area wells although at a lower level in 5-A and P-4.

Based on the results of the pilot studies, EPA approved the decommissioning of the GRS. Dismantling of the GRS treatment building, including pumps and carbon filters, was performed in August 2018 through Agency approval of the *Groundwater Recovery System Decommissioning Workplan.* IPC contracted Montana Crane Service to complete the dismantling and decommissioning of the GRS. The building and its foundation remained intact after all equipment was removed.

With the termination of the Groundwater Recovery System, the Statement of Work that accompanied the Unilateral Administrative Order (UAO) was amended in August 2019 to require screening of technologies and process options and development of remedial alternatives to address the remaining groundwater contamination at the Site. A *Focused Feasibility Study* **(**FFS) was submitted to the Agencies on February 28, 2020, and is currently undergoing review at the time of the issuance of this Five-Year Review Report.

Institutional Controls (ICs) Summary

A *Notice of Institutional Controls* that was recorded in Gallatin County, September 9, 2010, and restated and amended on August 15, 2016, includes the following restrictions:

- Construction (other than surface paving, landscaping curbs, light standards, traffic signs and

greenways) is prohibited in the Treated Soils Area, except as authorized by EPA and MDEQ or provided in the Remedial Action;
- Excavation deeper than 12-inches is prohibited in the Treated Soils Area, except as provided in the Remedial Action;
- Excavation within the Controlled Groundwater Area (CGWA) is prohibited without EPA and MDEQ authorization;
- Groundwater use or development within the CGWA (which presumably includes dewatering) is prohibited, except as provided in the Remedial Action or authorized by EPA and MDEQ; and
- No residential development or residential use of the property is allowed, unless approved by EPA and MDEQ.

The *Notice of Institutional Controls* that was restated and amended on August 15, 2016, prohibits residential development or residential use of the property owned by Idaho Pole Company. This restriction was determined to be overly restrictive for the two properties designated as sub-district Agriculture Suburban in the Gallatin County-Bozeman Area zoning district north of I-90, and the *Notice of Institutional Controls* was restated and amended on August 30, 2017, to allow for residential use on these properties. The 1992 *Human Health Risk Assessment* evaluated risk to a future off-site resident residing on these properties. The exposure media evaluated were soils and consumption of garden produce using municipal water while the exposure routes evaluated were ingestion, direct contact and inhalation of particulates. The corresponding cancer risk to the future off-site resident was within EPA's acceptable risk management range of 10^{-4} and 10^{-6} while the noncancer hazard quotient was < 1. The Record of Decision also did not contain language that restricts future residential use on the Site. Therefore, the Agencies allowed for relaxation of this restriction on these properties. However, to ensure continued protection of human health and the environment, should these properties be redeveloped, the *Notice of Institutional Controls* includes prohibitions on groundwater use or development and excavation within the CGWA (3rd and 4th bullet above) without EPA and MDEQ approval. Land use restrictions filed with the Gallatin County Clerk and Recorder are included as **Attachment 9**.

A CGWA designation was issued by the Montana Division of Natural Resources (Decision 41H-114172) in 2001 pursuant to Section 85-2-506 and 508, ARM, as amended. The Gallatin City-County Board of Health was the petitioner for the CGWA designation. This CGWA restricts use of groundwater within the CGWA for any purpose except as provided in the remedial action or as otherwise authorized by EPA and MDEQ. The CGWA process allows for a description of the restrictions, and the restriction provided reads as follows: "*No new wells within CGWA except for remedial action activities. Complete restriction of groundwater use within the area except for remedial activities.*" The CGWA does not distinguish between shallow and deeper groundwater. Additional information on the CGWA is included in **Attachment 9**.

Table 2: Summary of Planned and/or Implemented ICs

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Soils	Yes	Yes	Idaho Pole Company property	Preserve the integrity of the closed land treatment units	Notice of Institutional Controls

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Groundwater	Yes	Yes	Idaho Pole Company property and buffer zone	Restrict use of groundwater	2001 CGWA designation

Systems Operations/Operation & Maintenance

With the GRS shutdown, a revised groundwater monitoring work plan was submitted and reviewed by the Agencies and approved on July 20, 2018. The purpose of this work plan is to present: 1) existing site data and an evaluation of the natural attenuation processes occurring at the Site; 2) a plan for the continued monitoring and evaluation of contaminant concentration trends, and 3) decisions to be made based on PCP concentrations trends and trigger values. Contingency remedy and monitoring decision were also developed that provide (**Figure 13**) for:

- The process for expanding or reducing groundwater monitoring
- Establishing contingency triggers and the process for initiating a contingency remedy

A total of 54 groundwater-monitoring wells (including piezometers) are currently in place at the Site (**Figure 17**). Per the monitoring plan, approximately half of the monitoring wells are sampled on a semi-annual basis (spring and fall), and well 5-A in the source area is sampled annually for PAHs. There are also eight residential wells that are sampled for PCP during the fall sampling event. The remaining wells are sampled every five years, including a subset of wells that are sampled for dioxins (19-A, 5-A, 5-B and GM-4).

In early 2017, the PRPs approached the Agencies regarding the abandonment of some wells on site that were no longer needed. A *Well Abandonment Workplan* was submitted to the Agencies. Twenty-three monitoring wells were recommended for abandonment at the Site. Most of the select wells are located south of Cedar Street, upgradient of the Barkfill Source Area. The remainder of the 23 wells are cross gradient of the current and/or historic PCP plume (**Figure 12**) and/or are redundant with other wells for monitoring purposes. Many of these wells were not routinely monitored and had not been for many years. The Agencies agreed to allow abandonment of 18 of the 23 wells. All wells were abandoned in July 2017.

NorthWestern Energy Upgrades to East Gallatin Substation

During the Five-Year Review reporting period, the soil and groundwater management requirements outlined in the *Soils Management Plan* were invoked by NorthWestern Energy (NWE) three times for emergency repairs and system upgrades to the East Gallatin Substation. In 2016, an underground feeder cable at the East Gallatin Substation failed and NWE worked with EPA and MDEQ to perform an emergency installation of a new cable. The required conduit for the new feeder cable was installed at an approximate depth of 42 inches bgs, which was above the current groundwater elevation and therefore required no dewatering. However, at the Agencies' request, a holding pit was constructed in the same general location of the conduit and drop pole to retain water and excavated materials on NWE property as a precaution.

In January 2019, NWE upgrades included 11 new pier-type foundations in the southeast quarter with several foundations placed in groundwater along with 10 new conduit runs in the east half of the substation. All work was completed in late winter 2019. No dewatering was necessary for installation of the foundations since the concrete was poured directly into the holes dug for each foundation and allowed to settle without displacing the water. Soil spoils remaining from the excavation were surface spread within the fenced substation area. The required conduit runs were installed at an approximate depth of 42 inches bgs, which was above the existing groundwater elevation and therefore required no dewatering. However, a holding pit was constructed on NWE property at the Agencies' request to retain water and excavated materials as a precaution.

In April 2020, NWE completed installation of an additional 13 foundations and required conduit runs. Four of the 13 foundations extended 54 inches bgs above the groundwater table, 7 foundations extended 60 inches bgs, and 2 foundations extended 14.5 feet bgs. The shallow excavations did not require any dewatering. For the deeper excavations, NWE used a standard trash pump with suction line lowered into the 14.5-foot deep excavations and discharge line extending to a shallow holding pond. Immediately before placement of the reinforcing bar and concrete for the deep foundation, the trash pump removed the water from the excavation. The water removed from the excavation was pumped to one of two 20-foot long, by 20-foot wide, by 1-foot deep holding ponds and allowed to infiltrate into the subsurface. Immediately after removal of the water from the excavation, the reinforcing bar for the foundation was placed and the concrete poured.

III. Progress Since the Last Five-Year Review

This is the Fifth Five-Year Review conducted for the Site. This section presents the conclusions of the previous Five-Year Review (September 2015) and summarizes progress addressing recommendations from that review.

Protectiveness Statement from the Previous (Fourth) Five-Year Review

This section includes the protectiveness determinations and statements from the 2015 FYR and 2019 FYR Addendum as well as the recommendations from the five-year review and the current status of those recommendations.

Table 3: Protectiveness Determinations/Statements from the 2015 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1	Protectiveness Deferred	A protectiveness determination of the OU1 remedy cannot be made until further information is obtained. While dioxin was identified as a contaminant of concern for groundwater, no dioxin groundwater samples have been taken since the Record of Decision was issued, and sampling is necessary. Recently discovered residual NAPL groundwater sources need to be addressed. Although institutional controls are in place, including a deed restriction on the property and a CGWA that restricts potable use of the groundwater, residual source material continues to impact groundwater. It is expected that the groundwater dioxin sampling and residual

OU #	Protectiveness Determination	Protectiveness Statement
		source area remediation actions will take approximately three years to complete, at which time a protectiveness determination will be made.
Sitewide	Protectiveness Deferred	A protectiveness determination of the OU1 remedy cannot be made until further information is obtained. While dioxin was identified as a contaminant of concern for groundwater, no dioxin groundwater samples have been taken since the Record of Decision was issued, and sampling is necessary. Recently discovered residual NAPL groundwater sources need to be addressed. Although institutional controls are in place, including a deed restriction on the property and a CGWA that restricts potable use of the groundwater, residual source material continues to impact groundwater. It is expected that the groundwater dioxin sampling and residual source area remediation actions will take approximately three years to complete, at which time a protectiveness determination will be made.

Table 4: Status of Recommendations from the 2015 FYR

Issue	Recommendations	Current Status	Current Implementation Status Description*	Completion Date (if applicable)
Potential residual source material in the area of BFEG.	Perform pilot testing to remediate residual source material	Completed	To analyze the effectiveness of the pilot study and determine if groundwater extraction and treatment could be terminated, groundwater sampling for dioxins, PCP, PAHs, and TPHs was conducted after the 2015 and 2016 injections events. In summary, analytical results throughout the plume did not indicate an increase in groundwater concentrations in the source area. In addition, samples from downgradient sentinel wells did not exceed the established concentration criteria. Groundwater results collected during the temporary GRS shutdown indicated that COC concentrations continued to decrease or had stabilized and there was no significant migration of dissolved COCs	10/30/2019

Issue	Recommendations	Current Status	Current Implementation Status Description*	Completion Date (if applicable)
			beyond the source area wells. The GRS was dismantled in August 2018.	
Dioxin analysis of groundwater	Sample shallow aquifer for dioxin analysis	Completed	Groundwater samples were collected for dioxin analysis in January and March 2016 from four wells. Sample results for the two sampling events were below the ROD cleanup standards for dioxin calculated as TEQs. Wells 5-A, 5-B, P-2 and 19-A were also sampled in October 2019. All sample results were below laboratory detection limits for 2,3,7,8-TCDD except for 5-A which had an estimated concentration of 2.39 pg/L. The results discussed above provide analytical evidence that the residual dioxins in the groundwater within the Barkfill Source Area are below the ROD cleanup standards and are not contributing significantly to groundwater impacts.	10/1/2019

FYR addendum

Based on the resolution of issues, a FYR addendum was completed in 2019.

Table 5: Protectiveness Determinations/Statements from the 2019 FYR Addendum

OU #	Protectiveness Determination	Protectiveness Statement
1	Protective	The remedy at OU1 is protective of human health and the environment
Sitewide	Protective	The remedy at OU1 is protective of human health and the environment

Two additional issues were identified since the 2015 Five-Year Review was issued and were noted as resolved in the 2019 FYR Addendum:

1) *Residential Wells Downgradient of Source Area Have Not Been Sampled for Polycyclic Aromatic Hydrocarbons.* During a meeting with the Gallatin City-County Board of Health (Board) on March 1, 2018, the Board expressed concerns that while residential wells located downgradient of the source area are sampled annually for PCP, these wells have not been sampled for PAHs. Groundwater samples from

five residential wells located within the controlled groundwater area were collected in April 2018 and analyzed for PAHs. All PAH compounds were below laboratory detection limits in the five samples. These residential wells will continue to be sampled annually for PCP.

2) *Soil Used As Backfill Was Not Sampled for Dioxins.* As part of a thorough document review to support partial deletion of the soils from the National Priorities List, it was determined that no dioxin samples were collected of the soils that were used as backfill. Therefore, five-point composite soil samples were collected from four locations in June 2018 and analyzed for dioxin. Dioxin TEQs calculated for the four composite surface soil samples ranged from 12 ng/Kg to 570 ng/Kg, all of which are below the ROD clean up level of 1,000 ng/Kg. Therefore, the backfill does not contain dioxin at levels that would question the protectiveness of those implemented actions.

VI. Five-Year Review Process

Community Notification, Involvement & Site Interviews

Site Inspection

A site visit for the FYR was conducted on October 15 and 16, 2019. Individuals who participated in the site visit on October 15, 2019, are listed on **Table 6**. Roger Hoogerheide completed the inspection of groundwater monitoring wells outside the Barkfill Source Area on October 16, 2019. A completed site inspection checklist is provided in **Attachment 1**. Based on this inspection, EPA concluded that the Site is well maintained. Minor issues were raised with respect to site operations including one well that was not locked, another well whose well casing did not allow for the well to be locked and another well that required a new cap. The remaining monitoring wells were capped and locked, and no damage was noted. The monitoring wells with issues were discussed with the site operator on October 16, 2019, and addressed the week the site inspection occurred.

Table 6: Individuals Present for October 15, 2019 Site Visit

Name	Affiliation
Lisa DeWitt[4]	MDEQ
Roger Hoogerheide	EPA Region 8
Fran Costanzi	EPA Region 8
Yueh Chuang[5]	Burlington Northern Santa Fe Railway (BNSF)
Les Lonning	Nordic Technical Services
Heidi Kaiser	Hydrometrics
Mark Engdahl	BNSF
Alan Stine	Olympus Technical Services
Alisa Hefner	Skeo
Miranda Maupin	Skeo

[4] Lisa DeWitt retired from MDEQ in February 2020
[5] Yueh Chuang retired from BNSF on January 3, 2020

No damage to any of the fences or the water treatment plant building were noted during the inspection. There was no evidence of trespass at the Site during the site inspection although anecdotal information was provided by IPC representatives that transient individuals had broken into the administrative office south of I-90 in 2019 and occasionally camp on IPC property north of I-90.

The Treated Soils Area is not fenced but is capped and revegetated. It was noted during the review that there is no formal schedule for inspection of the Treated Soils Area and that woody vegetation may be growing on the edges of the Treated Soils Area. It is recommended that an Operation and Maintenance Plan be revised to include a formal schedule for inspection and how any identified deficiencies will be addressed.

Community Notification and Involvement (Including Interviews)

Public notices announcing the beginning of the fifth five-year review were published in the Bozeman Daily Chronicle on October 30, 2019, and November 3, 2019 (included in Attachment 4). Upon final concurrence, this report will be placed in the information repositories for the Site. Once this report is approved, a fact sheet will also be distributed discussing the findings of the Five-Year Review and announcing the availability of the fifth Five-Year Review report at the information repositories. A public notice will be published in the Bozeman Daily Chronicle announcing the completion of the Five-Year Review and its findings. Site repositories are the Bozeman Public Library (220 East Lamme Street, Bozeman, Montana 59715) and the U.S. EPA Montana Office (Federal Building, Suite 3200, 10 West 15th Street, Helena, Montana 59626). The report will also be placed on EPA's website at https://www.epa.gov/superfund/idaho-pole.

Interviews were conducted by Roger Hoogerheide, EPA. Interview forms are included as **Attachment 3**, and information obtained during the interviews is briefly summarized below.

Heidi Kaiser and Alan Stine (Consultants for IPC and BNSF, respectively) said the site remediation is going well. The responsible parties are actively trying to achieve treatment standards and are evaluating additional methods to remediate the residual impacts. They thought the site activities have had minimal impacts on the surrounding community and have had a positive effect shrinking the plume and deleting the soil component. They are aware that the Gallatin City-County Board of Health is concerned about the release of hydrocarbons at the Site.

Mark Engdahl (Manager Environmental Remediation, BNSF) said the remediation is making good progress with regards to protection and achieving cleanup at the Site within a reasonable timeframe. This is further evidenced by the partial deletion of the soils and that pump and treat remedy is completed and pilot testing of groundwater was successful. He is unaware of any negative effects on the surrounding community but feels there are positive effects with the partial deletion, transitioning the groundwater remedy from pump and treat, as well as potential redevelopment opportunities leading to an increased tax base and jobs for the community. Mark is aware that the Gallatin City-County Board of Health has expressed concerns about the Site over the last couple of years but feels most concerns have been addressed at Board meetings or in subsequent communications with the Board.

Les Lonning (Consultant for Idaho Pole Company) said the project is progressing nicely and seems to be headed in the right direction, although it has taken a long time to get to where we are today. He felt that site activities have had minimal impact on the surrounding community. Les also stated that the Gallatin City County Board of Health continues to raise concerns about the cleanup even though numerous meetings and responses have been held with the Board of Health over the past couple of years. He also

recommended that more frequent updates may be appropriate and suggested annual site updates over the next couple of years as the groundwater remedy transitions and site redevelopment occurs.

Ben Sorensen (Environmental Engineer, NorthWestern Energy) said that he believes that the Site has come together very nicely over the last five years, thanks largely to the technical guidance and commonsense approach that he has seen implemented by EPA's project manager. On-going cooperation and open dialogue between NWE and EPA/MDEQ have allowed NWE to complete emergency work as well as on-going expansion work in a very efficient and timely manner. Ben is unaware of community concerns and feels deletion of the soil component is positive because of the amount of soil-disturbing activities involved with NWE upgrades to electric substation components, electric transmission/distribution systems, and upgrades to the natural gas transmission/distribution systems within the site boundaries.

Lisa DeWitt (Former MDEQ Project Officer) said that the remedy has made significant progress toward cleanup over time. The soils component of the remedy was completed in approximately 2002, and appropriate institutional controls were put in place to protect the covered treated soils that remain onsite. With that, and with other sampling conducted to confirm that no additional soils needed excavation, the soils component has been removed from the NPL. Additionally, work is underway to appropriately modify the groundwater remedy to more effectively address the contamination that remains. The actual site activities/operations have had minimal impact on the community of Bozeman. Since the closure of the Land Treatment Unit, the only active operations at the Site have been groundwater remediation activities. Residents of the community off L Street periodically have concerns about potential for exposure, and their wells are sampled annually by the responsible party to ensure that they are not drinking contaminated water. Over the last two years in particular, there have been many concerns expressed primarily by the local water quality district, the Gallatin City-County Health Department, and the City of Bozeman. These concerns have centered around the perception that significant quantities of unrecovered petroleum remain in the groundwater. Based on the sampling results received by MDEQ and EPA, there is no evidence that significant quantities of petroleum remain, and further research into the Remedial Investigation showed that the contention that petroleum was in the groundwater was later shown to be incorrect. Regardless, this perception remains.

Several common themes were identified during the community interviews, including the following:

- Several individuals suggested a need for improved communication regarding the Site, including that EPA and MDEQ need to be more responsive when asked to provide information or updates.
- There is general recognition that the Gallatin City-County Board of Health and Local Water Quality District continues to express concerns about the site cleanup.
- There is a general recognition that redevelopment will occur at the Site but needs to be done in a way that is protective of human health and the environment.

Written comments were also received from Matt Kelley, Gallatin City-County Health Department Health Officer, the Local Water Quality District and others during the review period. Because of the extensive nature of these comments, EPA chose to consider these written comments in lieu of conducting community interviews with local officials. The comments with the Agency response are included in **Attachment 2** and many of the concerns raised through these comments are discussed in the Data Review Section in this report as well as in the Responsiveness Summary contained in Notice of Partial Deletion that was published in the Federal Register on January 31, 2020.

Data Review

1. *Groundwater Recovery System Influent and Effluent Concentrations*

During the last five years there has been limited extraction of groundwater from the BFEG with approximately 42 million gallons of water treated during the review period before the GRS was shut down in December 2016. The influent PCP concentration was less than 10 µg/L while B2 PAH compounds were observed at or above detection limits for inlet (SP-2) samples collected during 2016. Total D PAH compounds were detected but were well below the ROD cleanup level (146 µg/L). All outlet PCP and PAH concentrations (SP-7) were less than the detection limit. Analytical results indicated that the GRS adequately treated the recovered groundwater before the GRS was shutdown.

2. *PCP Concentrations in Source Area Wells and Immediately Downgradient*

Following temporary shutdown of the GRS in December 2016, five wells were monitored for PCP and TPHs on a monthly basis until December 2017 as requested in the Agencies' December 5, 2016, letter approving the shutdown. The wells included 5-A, P-4, and EW-1 located in the source area and P-2 and GM-4, located downgradient. Semi-annual groundwater monitoring has continued since December 2017 consistent with site-wide monitoring requirements. Time series graphs of PCP concentrations at the five wells are included on **Figure 9**. TPH concentrations are included on this figure for wells 5-A and P-2.

The highest PCP concentrations are found in the "A" (shallowest) interval near the BFEG (south of I-90) such as the most recent result of 442 µg/L at 5-A in a duplicate sample collected in October 2019, with similar results (438 ug/L) in a duplicate sample collected in May 2020 (**Table 7**). Significant PCP concentrations (on the order of 100 µg/L) have historically been observed in the "A" interval at GM-4, which is just north of I-90, although samples analyzed since the GRS shutdown in December 2017 from GM-4 show PCP concentrations ranging between 1.4 and 9.1 µg/L with the highest concentrations detected during the latest sampling event (May 2020).

Concentrations between 100 µg/L and 1,970 µg/L have also been detected at IW-1 and EW-1 since 2015 (**Table 8**). P-1 is cross-gradient of the source area and has had concentrations between non-detect to 6.1 µg/L. P-2 is immediately downgradient of the BFIG and has demonstrated an increase in concentrations since nutrient enriched water stopped being injected in the BFIG. Further downgradient wells GM-4, GM-5 and GM-6 are significantly lower concentrations, indicating localized contamination near well P-2.

Table 7. PCP Concentrations in Groundwater (µg/L) at Selected Wells, 2012 to May 2020

	Upgradient of BFEG		Immediately Downgradient of BFIG	North of I-90 (Downgradient from Source Area)		
Sample Date	**5-A**	**P-4**	**P-2**	**GM-4**	**GM-5**	**GM-6**
Apr-12	1,000			14	5.8	3.2
Sep-12	1,000			33	4.6	4.8
Apr-13	120[6]			75	16	3.4
Jul-13	31	400	53	96	7	
Sep-13	38	2,000	56	84	6.8	5.6

[6] The decrease in concentrations corresponds with an increase in the amount of water extracted from extraction well BE-5 near well 5-A.

	Upgradient of BFEG		Immediately Downgradient of BFIG	North of I-90 (Downgradient from Source Area)		
Sample Date	5-A	P-4	P-2	GM-4	GM-5	GM-6
Apr-14	110	260	3.7	2.1*	<0.25	2.0
Aug-14		2300	31	0.53		
Sep-14	580	310	39	38	0.5	0.6
Apr-15	130	720**	9.8	120**	<0.25	
Sep-15	2,100	800	110	35	0.34	4.8
Apr-16	560	560***	5.5	6.4	<0.25	1.8
Sep-16	1,450	377	139	79.8	<0.25	2.8
Apr-17	1,570	23.3	166	<0.25	<0.25	<0.25
Sep-17	2,790	171^	114	12.6	0.39	2.23
May-18	64.2	<0.25	<2.5	5.87	37.1	<0.25
Sep-18	328	144	58.4	1.41	<0.25	2.04
May-19	59.4^^	95.2	155	5.4^^	<0.25	0.31
Oct-19	230^^^	122	76.6^^^	6.84	<0.25	<0.25
May-20	408+	22.6	70.5	9.09+	<0.25	<0.25

* Sampled again in June 14 and December 14 with a value of 8 µg/L and 18 µg/L, respectively
** Duplicate sample had a value of 760 ug/L (P-4) and 130 ug/L (GM-4)
*** Duplicate sample had a value of 560 ug/L
^ Duplicate sample had a value of 107 ug/L
^^ Duplicate sample had a value of 56.2 ug/L (5-A) and 4.05 (GM-4)
^^^ Duplicate sample had a value of 442 ug/L (5-A) and 74.4 (P-2)
+ Duplicate sample had a value of 438 ug/L (5-A) and 7.65 ug/L (GM-4)

Table 8: Additional Results From Monitoring Wells Located in Barkfill Source Area (2015 – May 2020)

Sample Date	IW-1	IW-2^^	IW-3^^	EW-1	P-1	
Apr-15	97	25	16	93	1.4*	
Sep-15	140**	7.4	2.3	25	0.46	
Apr-16	140	15	19	74	<0.25	
Sep-16	114	5.48	7.27	400	<0.25*	
Apr-17	240	13.5	2.86	306	<0.25	
Sep-17	1970	26.4	5.77	23.9	-	
Apr-18	<0.25	-	-	7.39^	6.1	
Sep-18	866	-	-	77.9	0.37	
Apr-19	204	-	-	243	4.96	
Oct-19	737	-	-	135	0.63	
May-20	998	-	-	170	2.19	

* Duplicate sample had a value of 1.9 ug/L (April 2015) and 7.48 ug/L (Sept 2016)
** Duplicate sample had a value of 10 ug/L
^ Duplicate sample had a value of 2.62 ug/L
^^ Wells no longer sampled as part of *2018 Groundwater Monitoring Workplan*

3. *PCP Concentrations in "A" and "B" Interval Wells in Downgradient Wells North of I-90 Since Discontinuing GRS Operations*

As part of the 2015 FYR, a Mann-Kendall statistical evaluation concluded that downgradient PCP concentrations had declined so low that there was little chance of exceeding cleanup levels for PCP in groundwater at the downgradient CGWA boundary. Since the last FYR, the Spring 2018 PCP result at A-Zone well 27-A (downgradient portion of plume) had the highest reading in more than 10 years at 103 µg/L when sampled on April 27, 2018. When resampled on May 21, 2018, the PCP concentration at 27-A was <0.25 µg/L and the 2019 result was <0.25 µg/L while the May 2020 result was 0.4 µg/L.[7]

The B-Zone PCP concentrations observed after the GRS discontinued water treatment in 2016 is best illustrated by PCP data at select B-Zone wells. **Table 9** summarizes PCP concentrations at the selected B-zone locations (9-B, 16-B, 24-B, 25-B, 26-B, 27-B, and RES-8), plus shallow well GM-8 (near RES-8). **Table 9** is based on results provided in the *2019 Groundwater Assessment Report* and preliminary data received from IPC for the May 2020 sampling event.

The data provided in **Table 9** support the concept that PCP concentrations have declined in the downgradient portion of the plume since remediation began; however, over the last five years and following the discontinued GRS in 2016, transient increases of PCP impacts occur in groundwater north of I-90 and downgradient of the source area. Following spikes in concentrations in 2018 in wells 25-B, 26-B and 27-B, concentrations have stabilized. Ongoing semi-annual monitoring will continue and trends in these wells will be assessed. If necessary, additional investigations will be conducted to determine the cause of increased concentrations. The concentration detected in 27-A in 2018 were relatively strong due to higher-than-normal spring precipitation and groundwater elevations as shown in the monthly precipitation and groundwater elevation data presented in **Table 10**. It is possible the water table in Spring 2018 rose into portions of the subsurface that are not as well flushed. However, groundwater use restrictions such as the CGWA are in place to ensure that these seasonal increases do not result in unanticipated human health exposure to the groundwater.

Table 9: Pentachlorophenol Concentrations in Select Downgradient Wells

Sampling Dates	9-B	16-B	24-B	26-B	27-B	25-B	RES-8	GM-8
Screened Interval	26-28	10.5-11.5	25-30	28-33	22-27	27-32	??	5-15
August 1990	<5,900	<5,900	-	-	-	-	< 7.4	-
November 1990	16.3	< 7.4	<7.4	<7.4	38.5	< 7.4	< 7.4	-
March 1991	750	340	250	24.3	600	830	27.6	-
June 1991	-	-	218	54	647	927	99	-
September 1991	750	-	-	-	-	-	-	-
September 1994	480	-	-	-	-	-	-	-
April - June 1998	-	-	-	-	-	340	110	< 0.25
August - September 1998	-	-	-	-	-	210	97	<0.25

[7] While the detected increase in 2018 corresponds with a period of higher than normal spring groundwater elevations (as noted in the *2018 Groundwater Assessment Report*), it is also important to note that semi-annual sampling events do not always capture the highest water levels that actually occur each year because water levels fluctuate seasonally.

Sampling Dates	9-B	16-B	24-B	26-B	27-B	25-B	RES-8	GM-8
December 1998	-	-	-	-	-	-	90	-
March 1999	-	-	-	-	-	270	75	<0.25
June 1999	-	-	-	-	-	-	120	-
August 1999	-	-	-	-	-	280	180	<0.25
December 1999	-	-	-	-	-	-	73	-
March 2000	-	-	-	-	-	170	62	<0.25
June 2000	-	-	-	-	-	-	77	-
September 2000	-	-	-	-	-	160	130	<0.25
December 2000	-	-	-	-	-	-	96	-
March 2001	-	-	-	-	-	160	61	<0.25
June 2001	-	-	-	-	-	-	45	-
September 2001	-	-	-	-	-	88	99	<0.25
December 2001	-	-	-	-	-	-	68	-
April 2002	-	-	-	-	-	-	-	<0.25
September 2002	-	-	-	-	-	80	71	<0.25
April 2003	-	-	-	-	-	80	27	<0.25
September 2003	-	-	-	-	-	92	71	<0.25
April 2004	-	-	-	-	-	100	15	<0.25
September 2004	-	-	-	-	-	76	37	<0.25
April 2005	-	-	-	-	-	96	2.8	<0.25
September 2005	-	-	-	-	-	72	37	<0.25
April 2006	-	-	-	-	-	40	2.8	<0.25
September 2006	-	-	-	-	-	67	5.5	<0.25
April 2007	-	-	-	-	-	49	12	<0.25
September 2007	-	-	-	-	-	46	28	<0.25
April 2008	-	-	-	-	-	45	1.6	<0.25
September 2008	-	-	-	-	-	49	16	<0.25
April 2009	-	-	-	-	-	47	0.6	<0.25
September 2009	26	46	9.7	7.6	43	42	4.20	< 0.25
April 2010	25	16	10	1.9	42	41	< 0.25	< 0.25
September 2010	30	44	14	2	42	45	< 0.25	< 0.25
April 2011	9.4	24	12	< 0.25	37	35	< 0.25	< 0.25
September 2011	13	33	3	3.6	38	33	< 0.25	< 0.25
April 2012	18	22	1.3	0.29	35	29	0.65	< 0.25
September 2012	16	35	9.8	0.61	38	36	5.2	11
April 2013	5.9	26	9.9	< 0.25	17	30	< 0.25	< 0.25
September 2013	8.7	31	4.1	< 0.25	27	28	0.36	< 0.25
April 2014	< 0.25	10	2.5	< 0.25	0.46	< 0.25	< 0.25	< 0.25
September 2014	12	21	2.6	< 0.25	< 0.25	< 0.25	-	< 0.25
April 2015	< 0.25	1.6	3.1	< 0.25	0.46	< 0.25	< 0.25	< 0.25
September 2015	8.2	20	3.7	< 0.25	< 0.25	< 0.25	-	< 0.25
April 2016	0.33	0.62	3.8	0.3	< 0.25	< 0.25	< 0.25	0.68
September 2016	9.69	19.5	4.31	< 0.25	< 0.25	< 0.25	-	< 0.25
April 2017	15.6	< 0.25	2.1	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25

Sampling Dates	9-B	16-B	24-B	26-B	27-B	25-B	RES-8	GM-8
September 2017	12.4	16.4	5.7	< 0.25	< 0.25	< 0.25	< 0.25	< 0.25
April 2018	14.3	< 0.86	2.5	< 0.25	40.9	5.79	-^	-
September 2018	12.4	14.8	4.12	4.31	17.3	15.1	-	-
May 2019	10.8	9.85	4.93	5.56	17.1	17	-	-
October 2019	11.7	14.9	3.65	2.43	15.2	12.7	-	-0.38
May 2020	9.97	11.1	4.49	4.2	15.5	14.9	-	< 0.25

^ Res-8 was abandoned in 2017 per Agency approval of the *Idaho Pole Site– Request for Well Abandonment Workplan*

Table 10: Monthly Precipitation and Groundwater Elevation Data

3/25/2019

Monthly Total Precipitation for BOZEMAN GALLATIN FIELD AP, MT

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2000	0.56	0.33	1.06	0.99	2.85	2.24	0.48	0.62	1.27	1.16	0.75	0.37	12.68
2001	0.35	0.17	0.54	1.29	0.41	3.84	1.34	T	0.48	1.34	0.15	0.50	10.41
2002	0.64	0.31	0.42	1.16	3.07	3.05	0.73	0.80	1.12	0.29	0.51	0.07	12.17
2003	1.36	0.63	0.96	3.19	2.39	1.03	0.53	0.33	0.06	0.54	0.30	0.70	12.02
2004	0.31	0.54	0.26	1.28	2.87	2.61	1.77	1.56	1.43	1.22	0.21	0.23	14.29
2005	0.18	0.27	0.87	1.65	1.44	3.19	0.64	1.23	0.89	1.84	1.21	0.68	14.09
2006	0.44	0.08	0.73	2.61	1.32	2.67	0.65	0.72	1.02	2.86	0.21	0.27	13.58
2007	0.14	0.94	0.41	1.87	2.76	2.31	0.11	0.92	1.18	2.06	0.82	0.23	13.75
2008	0.32	0.27	0.51	2.14	2.78	2.89	0.69	0.53	0.34	0.33	0.95	0.63	12.38
2009	0.11	0.26	1.65	1.27	1.32	2.27	1.65	2.15	0.41	0.98	1.12	0.10	13.29
2010	0.34	0.39	0.59	0.81	2.67	4.15	0.24	1.90	1.48	0.54	1.55	0.46	15.12
2011	0.12	0.30	0.82	1.34	1.92	3.20	0.88	0.47	0.29	0.84	0.31	0.40	10.89
2012	0.10	0.31	1.25	2.02	1.60	0.94	0.38	0.23	0.21	0.59	1.02	0.70	9.35
2013	0.24	0.07	0.20	0.68	2.70	3.10	0.30	1.00	2.47	0.36	0.36	0.32	11.80
2014	0.29	0.66	1.35	0.94	1.54	4.08	0.38	2.93	1.30	0.39	0.95	M	M
2015	0.22	0.15	0.47	1.79	3.33	0.60	1.78	0.73	1.05	1.26	1.02	0.57	12.97
2016	0.36	0.23	0.96	0.84	2.51	1.17	1.61	1.11	1.10	2.45	0.42	0.46	13.22
2017	0.30	0.27	1.28	1.98	1.72	2.57	0.13	0.14	1.71	0.41	1.66	0.88	13.05
2018	0.99	0.48	1.24	3.19	1.93	3.86	0.23	0.95	0.48	1.09	1.00	0.16	15.60
2019	0.51	1.02	M	M	M	M	M	M	M	M	M	M	M
Mean	0.39	0.38	0.82	1.63	2.16	2.62	0.76	0.96	0.96	1.08	0.76	0.43	12.81
Max	1.36 2003	1.02 2019	1.65 2009	3.19 2003	3.33 2015	4.15 2010	1.78 2015	2.93 2014	2.47 2013	2.86 2006	1.66 2017	0.88 2017	15.60 2018
Min	0.10 2012	0.07 2013	0.20 2013	0.68 2013	0.41 2001	0.60 2015	0.11 2007	T 2001	0.06 2003	0.29 2002	0.15 2001	0.07 2002	9.35 2012

In accordance with the 2018 *Groundwater Monitoring Work Plan*, after each semi-annual groundwater sampling event, IPC verifies that PCP concentrations at delineation wells (plume boundary wells) have not increased. These wells include 12-A, 13-A, 16-A, 25-B, 26-B, 27-A, 27-B and GM-5. All but three of these plume boundary wells reported PCP concentrations as either non-detect or below the remedial goal of 1 µg/L during the October 2019 sampling event. Concentrations of PCP at 25-B, 26-B and 27-B were reported above the ROD cleanup goal in the last four semi-annual sampling events. Previously, these three wells had reported concentrations below detection levels between 2014 and 2017, but all had measurable PCP since 2017 (**Figure 14 and Table 9**). Mann-Kendall statistical evaluation of the PCP concentrations at the three wells from 2014 through October 2019 indicate concentrations are increasing at 25-B (99% confidence factor) and 26-B (95.7 % confidence factor) and probably increasing at 27-B (less than 95% confidence factor) (**Attachment 10**).

The CGWA boundary extends approximately 600 feet north of RES-8. The very low PCP concentrations observed at RES-8 in recent years, coupled with declining PCP concentration trends at the other downgradient "B" interval monitoring wells indicate absence of a significant PCP plume currently migrating downgradient of the existing monitoring network. The increases observed since 2018 are low enough that PCP concentrations are expected to attenuate below cleanup levels prior to reaching the CGWA boundary. However, there are no additional downgradient wells to verify this. Therefore, IPC has agreed to install three additional wells downgradient and along the CGA boundary in the "A" and "B" intervals and sampled for PCP to determine whether additional remediation measures are necessary should the plume migrate beyond the CGWA boundary.

4. *Status of Contamination North and East of Rocky Creek*

Concerns about the status of contamination north and east of Rocky Creek were raised by the Gallatin City-County Board of Health and Gallatin Local Water Quality District in a February 15, 2018, letter to EPA (**Attachment 2**).

There are currently two wells (RES-9 and 28-B) located north and east of Rocky Creek (**Figure 17**). In August 1990, November 1990, March 1991 and June 1991, RES-9 was sampled for PAHs and PCP[8]. In March 1991, RES-9 was also analyzed for dioxins/furans. The analytical results from 1990 – 1991 showed no detectable compounds of PAHs and dioxin/furans. RES-9 had one detection of PCP in June 1991 at 0.24 ug/L. However, RES-9 has been sampled for PCP every fall since the early 1990s and has not had any other detection of PCP above laboratory detection limits since June 1991.

PAH and PCP analyses were also conducted in the 1990s at Well 28-B. Laboratory analysis of groundwater from 28-B identified PAH impacts during the November 1990 sampling event. However, PAH data from this sampling event were deemed mostly unusable due to laboratory errors discussed in Section 4.3.1 of the *Second Quarterly Contamination Report for IPC Site.* All analyses for PAHs from August 1990, March 1991 and June 1991 came back below laboratory detection limits.

PCP concentrations at 28-B have been below laboratory detection limits since 2006 with the exception of detections below the cleanup level of 1 ug/L in 2009, 2013 and 2014 (**Figure 15**). Well 28-B was being sampled semi-annually until 2018, when the schedule was revised to every five years as part of the *2018 Groundwater Monitoring Work Plan*. The PCP concentrations were below laboratory detection limits during the October 2019 Five-Year Review sample event, which is the last time this well was sampled.

Res-9 and 28-B were also sampled for PAH compounds during the April 2018 groundwater monitoring event because of the concerns raised by the Gallatin City-County Board of Health and Gallatin Local Water Quality District. All analytes were reported below laboratory detection limits. There has never been a detection of dioxins in groundwater above the 1992 ROD-based cleanup level in any on-site well north of I-90. Therefore, no additional samples have been collected and analyzed for dioxins in wells north and east of Rocky Creek since the Remedial Investigation.

5. *Distribution of Wood-Treating Fluids North of I-90*

[8] Appendices A and F of the annual *Groundwater Assessment Reports* is supposed to contain all historical groundwater data collected to date. However, in reviewing historic data to prepare for this response, the data collected in 1991 were not included in Appendices A and F of the annual *Groundwater Assessment Report* and RI quarterly progress reports had to be reviewed. It was also noted that the data collected for the 2015 and 2016 pilot tests were also not included in the appendices. The Agencies have requested that all groundwater data collected as part of the remedial investigation and subsequent pilot tests be included in Appendices A and F in the annual Groundwater Assessment Reports going forward.

Concerns about residual wood-treating fluids north of I-90 have been raised by the Gallatin City-County Board of Health and Gallatin Local Water Quality District several times during the Five-Year Review period (**Attachment 2**).

No recent evidence of LNAPL has been observed in the pasture area either during operation of interceptor trench through 2015 or during geotechnical sampling from test pits excavated to groundwater during April 2019 that were excavated as part of a potential purchaser determining the structural integrity of the subsurface soils (**Figure 16)**.

6. Vapor Intrusion Pathway

Concerns about the vapor intrusion pathway were raised by the Gallatin City-County Board of Health and Gallatin Local Water Quality District as well as during the partial deletion public comment period (**Attachment 2**). Therefore, a screening-level vapor intrusion risk evaluation was conducted to determine if vapor intrusion is potentially a completed exposure pathway (**Table 11**).

To provide a conservative vapor intrusion assessment, the most current validated groundwater data, collected in October 2019, were evaluated with the EPA's Vapor Intrusion Screening-Level (VISL) calculator. The maximum detected concentrations of semi-volatile COCs were used in the VISL calculator along with default residential exposure assumptions. As shown in **Table 12**, the cumulative cancer risks fall within or below EPA's risk management range of 1×10^{-4} to 1×10^{-6} and the sum of the noncancer hazard quotient (HQ) is below 1.0. These results indicate this pathway is not of concern.

Table 11: Screening-Level Vapor Intrusion Evaluation- 2019 Groundwater

COC	2019 Maximum Groundwater Concentration in Zone A[a] (µg/L)	VISL Calculator[b] Residential	
		Cancer Risk	Noncancer HQ
Acenaphthene	8.67	--	--
Anthracene	1.43	--	--
Benzo(a)anthracene	0.19	6×10^{-9}	--
Fluorene	7.03	-	--
Naphthalene	1.31	3×10^{-7}	0.008
Pyrene	1.23	-	--
TCDD	2.39×10^{-6}	7×10^{-8}	0.0001
Total		4×10^{-7}	0.008

Notes:
a. Data from well 5A obtained from October 2019 Semi-Annual Groundwater Report; concentration selected is the higher of the primary/duplicate sample and qualified data were used at the values stated.
b. VISL calculator accessed 2/14/2020 at https://epa-visl.ornl.gov/cgi-bin/visl_search using default assumptions.
-- = cancer risk or noncancer hazard could not be calculated; toxicity values not established

7. Screening Risk Review to Determine if Residential Use is Appropriate on Property South of I-90

Since the last Five-Year Review, several prospective purchasers have approached EPA about purchasing the property south of I-90 and asking whether residential use of these properties is allowed. In 2018 and 2019, soil samples were collected to evaluate residual contamination in the surface soils in support of deleting the soils portion of the Site and to address questions raised during the partial deletion public

comment period (**Attachment 2**). Five-point composite surface soil samples (0-6") were collected from four different areas where soils had been remediated:

- Former Roundhouse Area
- Soil cap on the TSA south of Cedar Street
- Former LTU Area
- Pasture area north of I-90

The results were compared to EPA's RSLs for a default residential exposure (Table 12).

The following screening-level residential risk conclusions can be made for the 2018 and 2019 soil sample results:

- Cancer risk - concentrations from all four areas fall within EPA's risk management range.
- Noncancer HQ - dioxin samples from the former Roundhouse Area and the TSA result in noncancer HQs that exceed the threshold of 1 with HQs of 11 and 4, respectively. HQ exceedances are hypothetical since the land use restrictions are in place**.**
- The default residential exposure is not equivalent to a building in a mixed-use area where the first floor is commercial use and second floor is residential use. Under a mixed-use scenario, there would likely be limited to no exposure to soil since building foundations, parking lots, and landscaped areas would prevent direct exposure to soil.

Table 12: Residential Screening-Level Risk Evaluation of 2018 and 2019 Soil Data

COC	Maximum Detection in 2018 and 2019 (mg/kg)	Residential RSL[a] (mg/kg)		Cancer Risk[b]	Noncancer HQ[c]
		1 x 10^{-6} Risk	HQ=1.0		
Former Roundhouse Area					
Benzo(a)pyrene (BaP)	2.763	0.11	18	3 x 10^{-5}	0.2
Noncarcinogenic PAHs[d]	3.043	-	1,800	NA	0.002
Dioxin	0.00057	4.8 x 10^{-6}	5.1 x 10^{-5}	1 x 10^{-4}	**11**
PCP	0.443	1.0	250	4 x 10^{-7}	0.002
			Total	1 x 10^{-4}	**11**
TSA Area					
Benzo(a)pyrene (BaP)	0.221	0.11	18	2 x 10^{-6}	0.01
Pyrene	0.214	-	1,800	NA	0.0001
Dioxin	0.00019	4.8E-06	5.1E-05	4 x 10^{-5}	**4**
PCP	0.238	1.0	250	2 x 10^{-7}	0.001
			Total	4 x 10^{-5}	**4**
Former LTU Area					
Benzo(a)pyrene (BaP)	0.083	0.11	18	8 x 10^{-7}	0.005
Pyrene	0.078	-	1,800	NA	0.00004
Dioxin	0.00002	4.8E-06	5.1E-05	4 x 10^{-6}	0.4
PCP	0.0269	1.0	250	3 x 10^{-8}	0.0001
			Total	5 x 10^{-6}	0.4
Residential Area and Pasture Area					
Benzo(a)pyrene (BaP)	0.092	0.11	18	8 x 10^{-7}	0.005
Pyrene	0.152	-	1,800	NA	0.00008
Dioxin	0.000012	4.8E-06	5.1E-05	3 x 10^{-6}	0.2
PCP	0.0258	1.0	250	3 x 10^{-8}	0.0001
			Total	4 x 10^{-6}	0.2

COC	Maximum Detection in 2018 and 2019 (mg/kg)	Residential RSL[a] (mg/kg)		Cancer Risk[b]	Noncancer HQ[c]
		1 x 10^{-6} Risk	HQ=1.0		

Notes:

a. Current EPA RSLs, dated November 2019, are available at http://www2.epa.gov/risk/risk-based-screening-table-generic-tables (accessed 2/18/2020).

b. The cancer risks were calculated using the following equation, based on the fact that RSLs are derived based on 1 x 10^{-6} risk:
cancer risk = (maximum detected concentration ÷ cancer-based RSL) × 10^{-6}.

c. The noncancer HQ was calculated using the following equation:
HQ = maximum detected concentration ÷ noncancer-based RSL.

d. Summed the noncarcinogenic PAHs and used the most stringent toxicity value for pyrene to evaluate HQs.

mg/kg = milligrams per kilogram

NA = not applicable as noncancer toxicity criteria have not been established.

Bold = concentration exceeds 1 x 10^{-4} cancer risk or a noncancer HQ of 1.0.

8. Status of Sediments

A member of the public at the August 2019 partial deletion public meeting stated that he observed a sheen on the surface of water near the Bohart Lane road ditches north of I-90 and in the center line of L Street north of I-90 during spring high-groundwater conditions. To determine if the sheen observed by a member of the public is impacting surface and unsaturated subsurface soils of the Bohart Lane ditch, two five-point composite samples were collected in the ditch between Bohart Lane and I-90 from 0-6 and 6-12 inches and analyzed for PCP and TPHs in September 2019 to determine if the surface water sheen was impacting the Bohart Lane ditch soils. An additional sample was also collected from 0-6 inches in the Pasture Area in the wetlands area and analyzed for PCP and PAHs. All results came back below ROD cleanup levels for PCP and PAHs, EPA RSLs for industrial use and below the State of Montana risk-based screening levels (RBSLs) for fractionated petroleum hydrocarbons (TPHs). While these samples should not be considered sediment samples as defined by EPA, since the samples were collected when water was not present, they can be considered surrogate samples since water is periodically present in the ditch and Pasture Area wetlands during the Spring.

Although the 2019 samples were collected to address concerns raised during the partial deletion public comment period, they do not address the question raised by the Gallatin City-County Board of Health and Gallatin Local Water Quality District in a February 15, 2018, letter to EPA about the current status of sediment in Rock Creek. While current groundwater monitoring results indicate that there is no significant groundwater plume in the "A" interval that extends into Rocky Creek (**Attachment 6**), no monitoring of Rocky Creek sediments has been conducted since the RI to verify that sediments are currently not impacted in Rocky Creek. This is an area of concern that was raised by the Gallatin City-County Board of Health and Gallatin Local Water Quality District the February 15, 2018, letter (**Attachment 2**). Therefore, it is recommended that additional samples be collected from Rocky Creek as well as the L Street and substation ditches and analyzed for the PCP, PAHs and dioxins to ensure no further remediation is necessary.

9. Wetlands Delineation North of I-90

An aquatic resources delineation and survey for the Idaho Pole property located along the east and west sides of L Street and north of the I-90 overpass was completed in 2016 by Spanish Peaks Engineering and Consulting LLC under an IPC contract. This delineation is not an issue as it pertains to the remedy; the delineation provides IPC and potential buyers of the property with a conservative estimate of wetland acreages and locations, linear feet of non-wetland waterways and locations, an estimate of City of Bozeman watercourse setbacks along all delineated aquatic resources, and an estimate of buildable

property. Nevertheless, the information will be useful for EPA and MDEQ during future redevelopment of Idaho Pole properties north of I-90.

Six wetlands were delineated within the delineation boundary totaling 4.2 acres (**Attachment 8**). All wetlands would likely be considered jurisdictional by the United States Army Corps of Engineers (USACE) because they are immediately adjacent to the East Gallatin River (wetland-1), are connected to the adjacent East Gallatin wetland (wetlands-2, 5, and 6), or are within 100 feet of the river or its fringe wetlands (wetlands-3 and 4). Impacts to jurisdictional wetlands such as redevelopment of IPC property north of I-90 would require a Section 404 Permit. As this is outside of the Superfund process, the USACE would make the final jurisdictional determination during the permitting process. Because of the likely positive jurisdictional status of all wetlands, a 50-foot setback would also be required by the City of Bozeman along the boundaries of wetlands 3, 4, 5 and 6 should the properties north of the Pasture Area be incorporated into the City of Bozeman. Wetland-1 is along the East Gallatin River; therefore, the setback would be 100 feet from the edge of wetland or river where there is no wetland fringe. Wetland-2 is in the borrow ditch along the south side of L Street; the City does not require a setback along borrow ditches.

10. The Current Status of Petroleum Hydrocarbons (carrier oil) in the Subsurface

The Gallatin City-County Board of Health and Gallatin Local Water Quality District raised concerns about the status of petroleum hydrocarbons in the subsurface during the Five-Year Review period (**Attachment 2**). The current extent of wood-treating constituents containing petroleum hydrocarbons in the subsurface soils is known to be limited to a small area south of I-90 in the Barkfill Area (**Figure 5**).

As part of the Phase II Pilot Study, bio-amendments and a biosurfactant were injected into the subsurface in 2015 and 2016, and groundwater was sampled for PCP, PAHs, dioxin/furans and petroleum hydrocarbon fractions (TPHs). Groundwater samples collected from 14 monitoring wells at various times during the study were also analyzed for TPHs. Seven of the wells were located south of I-90 in the Treatment Study Area and the other seven wells were located north of I-90, immediately down-gradient of the Barkfill Source Area. **Figure 18** shows the historical extent of PAHs detected in groundwater and the PAH results from sampling conducted in 2017 and 2019. The bullets below summarize the soil and groundwater investigation results.

1. 2014 Subsurface Soil Investigation in Barkfill Area
    a. Ten soil samples collected from four borings for TPH analysis from depths of 5 to 23 feet. Five samples from three of those borings contained TPH fraction concentrations > MDEQ RBSLs (200 mg/kg). All samples that had TPH Fraction concentrations > MDEQ RBSLs were in saturated soils.
    b. The borings are all located within the Barkfill Source Area south of I-90 where Institutional Controls are in place to prevent direct contact.
2. 2019 Surface Soil Sampling North of I-90
    a. Two surface soil samples were collected from the ditch on the south side of Bohart Lane between monitoring wells GM-4 and GM-5 in response to a citizen report of a sheen in this area.
    b. The samples contained petroleum hydrocarbon screen concentrations of 133 and 98 mg/kg. These results are < MDEQ RBSLs (200 mg/kg), indicating minimal health risks from the petroleum hydrocarbons in this area.
3. 2016 Phase II Petroleum Hydrocarbon Groundwater Monitoring Pilot Study
    a. Groundwater samples from 14 monitoring wells were analyzed for TPHs. Seven of the wells were located south of I-90 in the Treatment Study Area. Seven of the wells were located north of I-90, immediately down-gradient of the Barkfill Source Area, where

saturated soil samples collected in 2014 contained TPH fractions above the MDEQ RBSLs.

b. Samples collected from two of the seven wells located within the Phase II Pilot Study contained petroleum hydrocarbon concentrations above the concentation at which MDEQ has established for additional fractionation (1000 ug/L). Additional fractionation was not completed as part of this pilot study because the objective of the sampling was to determine the presence of TPHs so that biosurfactants and bioamendments could be introduced in that area.

c. The analytical results from samples collected north of I-90 were below the concentration at which MDEQ has established for additional fractionation (1,000 µg/L), with the exception of one of the four samples collected from well 9-A, which was slightly above the fractionation level. That sample was collected immediately following injections of a biosurfactant and bioamendments into the subsurface and subsequent samples collected from well 9-A did not contain detectable concentrations of hydrocarbon fractions.

4. October 2019 Petroleum Hydrocarbon Groundwater Monitoring
    a. Samples were collected from monitoring wells 5-A, P-4, GM-4, 9-A, 9-B, 11-A, 10-A, 24-A1, 24-B, 25-A, 25-B, 26-A, 26-B, RES-3, RES-4, RES-7, 27-A and 27-B in October 2019 and analyzed for petroleum hydrocarbon fractions. Three of the 18 wells (5-A, P-4, and GM-4) reported detectable petroleum hydrocarbon fractions during the sample event (**Table 13**).
    b. Only one well in the Barkfill Source Area (5-A) reported petroleum hydrocarbon fractions above the MDEQ fractionation level of 1000 ug/L. Fractionation of this sample indicated the composition to be primarily weathered diesel range organics.

11. Proposed Remedy Duration versus ROD Estimate

The 1992 ROD estimated that the time needed to achieve groundwater remediation levels would be from 10 to 15 years. Along with reduction of source material through soil excavation, the GRS operated between 1996 and 2016. However, remediation levels have not been achieved within the time period estimated in the 1992 ROD.

During development of the *2018 Groundwater Monitoring Work Plan*, concentration vs. time rate constants for PCP concentrations at five monitoring wells were calculated using the methodology described in EPA's 2002 guidance *Calculation and Use of First-Order Rate Constants for Monitored Natural Attenuation Studies*. The natural log of PCP concentrations measured during the fall semi-annual sampling events since 2007 was plotted against time (years). Only the fall data were used for regression analysis because PCP concentrations are typically higher in the fall than the spring, making this the most conservative analysis.

This analysis was updated with 2018 and 2019 PCP data from wells GM-4, GM-6, 9-B, 23-A, and 16-B. Graphs generated from this exercise are included in **Attachment 10**. Based on the analysis using 2018 and 2019 PCP data, the estimated year and length of time for PCP concentrations in groundwater to reach 1 µg/L downgradient of the residual impacted materials in the Barkfill Source Area ranges from less than a year to 27 years as listed below. Although a regression analysis was not performed on source area wells as part of this review, it is anticipated that groundwater in the Barkfill Source Area will take much longer to achieve clean up goals.

- GM-4 = 2025 or 5 years
- GM-6 = 2020 or 0 years
- 23-A = 2020 or 0 years

- 9-B = 2047 or 27 years
- 16-B = 2036 or 16 years

The Agencies intend to use an updated regression analysis to include 2020 data and including additional wells (i.e., 5-A) within the Barkfill Source Area to estimate a new, more accurate time frame in which remediation levels may be achieved. A *Draft Focused Feasibility Study* was submitted to the Agencies on February 28, 2020 and is currently undergoing review at the time of the issuance of this Five-Year Review Report. The purpose of this FFS is to develop and evaluate remedial alternatives that address the remaining contaminants in groundwater and remedy duration is also being developed as part of this FFS.

12. Dioxins and PAHs in Groundwater

All samples collected for dioxin analysis during the Five-Year Review reporting period reported detections below the ROD cleanup level. However, using the calculated TEQ, all samples collected in January and March 2016 from 5-A/source (51,000 pg/L and 1,340 pg/L), P-4/source (34 pg/L and 20.1 pg/L) and GM-4/downgradient (28 pg/L and 6.1 pg/L) exceed the DEQ-7 criteria. In addition, the March background well 19-A/background (5.32 pg/L) and field blank (18.9 pg/L) also exceed the DEQ-7 criteria. The samples collected at 5-B (3.02 pg/L and 8.41 pg/L) and P-2 (5.35 pg/L and 3.93 pg/L) in July and August 2016 also exceed the DEQ-7 criteria, as do the samples collected from 5-A (279 pg/L and 198 pg/L) and 5-B (8.3 pg/L) in October 2019.

For benzo(a)pyrene the DEQ-7 standard is 0.05 µg/L, versus the ROD cleanup criterion and MCL of 0.2 µg/L. **Table 13** contains all PAH data collected between 2014 and 2019 from 5-A which is the only well that has continuous detections of PAHs and is sampled every September (**Figure 18**). Benzo(a)pyrene concentrations exceeded both standards following the 2016 pilot test but only exceeded the DEQ-7 human health standard in the sample collected in 2019. Note that the ROD standards are less stringent than the DEQ-7 standard.

Table 13: Comparison of PAH concentrations collected from 5-A with ROD and 2019 Montana DEQ-7 Criteria

Constituent	ROD Cleanup Level (µg/L)	2019 DEQ-7 Criteria (µg/L)	Sept 2014 (µg/L)	Sept 2015 (µg/L)	Sept 2016* (µg/L)	Sept 2017 (µg/L)	Sept 2018 (µg/L)	Oct 2019 (µg/L)
B2 PAHs[9]:								
Benzo(a)pyrene	0.2	0.05	0.36	0.18	7.69	1.62	0.29	0.11
Benz(a)anthracene	0.1	0.5	0.69	0.38	15	2.88	0.52	0.19
Benzo(b)fluoranthene	0.2	0.5	0.39	0.2	7.7	1.99	0.33	0.14
Benzo(k)fluoranthene	0.2	5.0	0.21	0.11	4.23	1.01	0.19	<0.1
Chrysene	0.2	50.0	0.81	0.44	16.9	3.28	0.66	0.25
Dibenz(a,h)anthracene	0.3	0.05	<0.1	<0.1	<0.1	0.27	<0.1	<0.1
Ideno(1,2,3-CD) pyrene	0.4	0.5	0.14	<0.1	1.47	0.74	0.11	<0.1
Total D PAHs	146							
Naphthalene		100	2.4	6.2	8.9	7.0	1.62	1.2
Fluorene		50	5.2	6.7	37.7	<0.1	6.64	1.4
Phenanthrene		-	0.53	7.3	87.3	<0.1	9.18	8.07
Anthracene		2100	1.3	1.6	22	4.3	1.97	1.41
Fluoranthene		20	3.0	2.2	51.3	8.81	2.55	1.4
		20	2.9	2.9	40.1	8.88	2.34	1.23

[9] The ROD cleanup criteria for B2 PAHs are also the federal maximum contaminant levels.

Constituent	ROD Cleanup Level (µg/L)	2019 DEQ-7 Criteria (µg/L)	Sept 2014 (µg/L)	Sept 2015 (µg/L)	Sept 2016* (µg/L)	Sept 2017 (µg/L)	Sept 2018 (µg/L)	Oct 2019 (µg/L)
Pyrene		-	0.17	<0.1	<0.1	0.18	0.18	<0.1
Benzo(g,h,i)perylene								

*Sept 2016 sample taken right after injections of nutrients and biosurfactants
Exceeds ROD Cleanup Level and 2019 DEQ-7 Human Health Standards
Exceeds ROD Cleanup Level
Exceeds 2019 DEQ-7 Human Health Standards

VII. Technical Assessment

Question A: Is the remedy functioning as intended by the decision documents?

The soil component of the remedy is functioning as intended. Excavation, on-site treatment, and off-site disposal have addressed contaminated soils and, where needed, ICs prevent the use of specific areas of the Site for residential purposes. The groundwater component of the remedy is not functioning as intended. Although remediation activities completed to date have reduced groundwater PCP and PAH concentrations, residual soil and groundwater contamination in the source area continue to feed a plume that is migrating downgradient. In the interim, the current CGWA is enough to ensure groundwater is not being used in this downgradient area.

With the termination of the Groundwater Recovery System, the Statement of Work that accompanied the UAO was amended in August 2019 to require screening of technologies and process options and development of remedial alternatives to address the remaining groundwater contamination at the Site. An FFS was submitted to the Agencies on February 28, 2020, and is currently undergoing review at the time of the issuance of this Five-Year Review Report. The purpose of this FFS is to develop and evaluate remedial alternatives that address the remaining contaminants in groundwater. If a modification to the remedy is necessary, EPA will record the modification in a decision document.

PCP concentrations in groundwater have decreased significantly in the downgradient portion of the plume and continue to decline in general, but elevated concentrations of PCP remain in monitoring wells 25-B, 26-B and 27-B since 2017. EPA plans to install and sample three additional wells in the downgradient portion of the plume and along the boundary of the CGWA to determine whether additional remediation measures are necessary should the plume migrate beyond the CGWA boundary.

While the areas where treated soils have been left in place are not fenced, there is a vegetative cap on this area which was determined to be in good condition during the site inspection. It was noted during the review that there is no formal schedule for inspection of the Treated Soils Area and that woody vegetation may be growing on the edges of the Treated Soils Area. EPA recommends that an operation and maintenance plan be developed that identifies a formal schedule for inspection and how any identified deficiencies will be addressed.

In addition, the Agencies approved a *Soils Management Plan* in 2011 which requires submittal of a workplan for review and approval prior to any excavation in the Treated Soils Area and excavations that encounter saturated soils and/or groundwater in the CGWA. Since the Soils Management Plan was approved by the Agencies in 2011, there have been eight instances when the plan was activated and followed, including four during this review period.

Although sampling was conducted in 2019 to address concerns raised during the partial deletion public comment period, they do not address the question raised by the Gallatin City-County Board of Health and Gallatin Local Water Quality District in a February 15, 2018, letter to EPA about the current status of sediment in Rock Creek. Therefore, it is recommended that additional samples be collected from Rocky Creek, as well as the L Street and substation ditches, and analyzed for the PCP, PAHs and dioxins to ensure no further remediation is necessary.

The CGWA and groundwater use restrictions placed on IPC property restrict the drilling of new supply wells into contaminated groundwater and potable use of contaminated groundwater, which ensures that the remedy remains protective. In addition, if there are exceedances of PCP beyond the current CGWA boundary, there are no known users of potable water immediately downgradient. A Notice of Institutional Controls restricts excavation in the Treated Soils Area and CGWA except as approved by EPA and MDEQ. Evaluation of 2018 and 2019 soil samples indicate exceedance of EPA's risk management range and noncancer HQ. These samples are in areas with land use restrictions in place. In addition, the default residential screening level is not equivalent to a building in a mixed-use area where the first floor is commercial use and second floor is residential use. Under a mixed-use scenario, there would likely be limited to no exposure to soil since building foundations, parking lots, and landscaped areas would prevent direct exposure to soil.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?

The ROD's risk-based cleanup level for soil and sediment at the Site was based on a site-specific risk assessment and remains valid. For groundwater, the ROD cleanup levels were compared to current Montana DEQ-7 numeric water quality criteria and federal maximum contaminant levels (MCL) for Site COCs. **Table 14** compares the ROD cleanup levels for groundwater to the 2019 Montana WQB-7 Standards. EPA is currently reassessing all groundwater standards as part of the Focused Feasibility Study and is using the more stringent maximum contaminant level or DEQ-7 human health standards as preliminary remediation goals to compare the various alternatives against. Any revisions to the groundwater cleanup standard changes will be discussed in the Proposed Plan that identifies the revised groundwater remedy.

Table 14: Comparison of Groundwater Cleanup Criteria in ROD, 2019 and 2012 Montana DEQ-7 Criteria, and 2004 Montana WQB-7 Criteria

Constituent	ROD Cleanup Level (µg/L)	ROD Cleanup Level Basis	2019 DEQ-7 Criteria (µg/L)
PCP	1.0	MCL	1.0
B2 PAHs:			
Benzo(a)pyrene	0.2	MCL	0.05
Benz(a)anthracene	0.1	Proposed MCL	0.5
Benzo(b)fluoranthene	0.2	Proposed MCL	0.5
Benzo(k)fluoranthene	0.2	Proposed MCL	5.0
Chrysene	0.2	Proposed MCL	50.0
Dibenz(a,h)anthracene	0.3	Proposed MCL	0.05
Indeno(1,2,3-CD) pyrene	0.4	Proposed MCL	0.5
Total D PAHs	146	Hazard quotient	
Naphthalene			100
Fluorene			50

Constituent	ROD Cleanup Level (µg/L)	ROD Cleanup Level Basis	2019 DEQ-7 Criteria (µg/L)
Phenanthrene			-
Anthracene			2100
Fluoranthene			20
Pyrene			20
Benzo(g,h,i)perylene			-
2,3,7,8-TCDD (Dioxin)	3.0×10^{-5}	MCL	2.0×10^{-6}

While the ROD cleanup value for dioxins established in the 1992 ROD is the same as the MCL for dioxins, the DEQ-7 Human Health Standard for dioxins is based on a calculated TEQ.

For benzo(a)pyrene the DEQ-7 standard is 0.05 µg/L, versus the ROD cleanup criterion and MCL of 0.2 µg/L.

For D-PAHs, the ROD criteria pertain to the sum of individual D-PAH (acenaphthene, acenaphthylene, anthracene, fluoranthene, fluorene, naphthalene, phenanthrene, pyrene) concentrations. Some of these parameters have specific DEQ-7 criteria, and as noted on Table 15, the ROD criteria (146 µg/L) is much lower than the sum of the DEQ-7 criteria for those compounds (2,290 µg/L). Four of these constituents (fluoranthene, fluorene, naphthalene and pyrene) have criteria that are lower than the ROD criteria (which are based on the sum). A review of recent groundwater data indicates that fluoranthene and pyrene exceeded the DEQ-7 human health standard in 2016 right after the injections of nutrient and a biosurfactant but have been below DEQ-7 criteria since. The 2016 event was also the only time that D-PAHs exceeded the ROD cleanup criteria during this review period. It appears that the parameter-specific criteria for fluoranthene and phenanthrene are not an issue because of these low groundwater concentrations. (It appears that there are not significant groundwater impacts for these constituents.)

The ROD cleanup level for dioxin in soil and sediment is 1,000 parts per trillion (ppt) TCDD-TEQ[10]. The EPA released the final Agency-wide noncancer dioxin reassessment on February 17, 2012, publishing a noncancer toxicity value, or reference dose (RfD), for 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) (EPA 2012). Since its issuance, a revised dioxin Regional Screening Level (RSL) of 727 ppt has been calculated using the 2012 RfD and incorporating the new commercial/industrial default exposure assumptions released by the EPA in February 2014. (*Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors, OSWER Directive 9200.1-120, February 6, 2014*).

Samples collected at four of the five locations exceeded the revised RSL and ROD cleanup standards of 0.727 and 1.0 microgram per kilogram (µg/kg), respectively. Values ranged from 0.69 µg/kg to 2.9 µg/kg. While the dioxin levels in the Treated Soils Area are above the RSL and ROD cleanup level, EPA and MDEQ have determined that the dioxins in the treated soils do not pose a risk to human health because institutional controls prevent human exposure.

Soil samples also were collected in 2018 from the surface (0 to 6 inches) for dioxin analysis The following screening-level residential risk conclusions can be made for the 2018 soil sample results:

- Cancer risk - concentrations from all four areas fall within EPA's risk management range.

[10] The ROD's risk-based cleanup level for dioxin in soil at the Site, expressed as equivalent concentration of TCDD (TCDD-TEQ), is 0.001 mg/kg (ppm), is equivalent to 1 ppb or 1000 ppt.

- Noncancer HQ[11] - dioxin samples from the former Roundhouse Area and the TSA result in noncancer HQs that exceed the threshold of 1 with HQs of 11 and 4, respectively.

In addition, the potential health risks and risk of release that would be created by additional excavations at the Site (i.e., outside the treated soils areas) to address the revised TCDD-TEQ of 727 ppt would outweigh the potential benefit of removing soils impacted with TCDD-TEQ values greater than 727 ppt that conceptually would not have been addressed by the previous remedial actions. The release of the EPA's final noncancer dioxin reassessment and new commercial/industrial default RSLs do not appear to change the effectiveness or protectiveness of the Site soil remedy components.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No new information.

VIII. Issues/Recommendations

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
N/A

Issues and Recommendations Identified in the Five-Year Review:

OU: 1	Issue Category: Remedy Performance			
	Issue: PCP concentrations in groundwater have decreased significantly in the downgradient portion of the plume and continue to decline in general, but there has been an increase in PCP detected in monitoring wells 25-B, 26-B and 27-B since 2017.			
	Recommendation: Install and sample three additional wells in the downgradient portion of the plume and along the boundary of the CGWA to determine whether additional remediation measures are necessary should the plume migrate beyond the CGWA boundary.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	9/1/2021

[11] HQ exceedances are hypothetical since land use restrictions are in place that restrict residential use.

OU: 1	Issue Category: Remedy Performance			
	Issue: Residual soil and groundwater contamination in the source area continue to feed a plume that is migrating downgradient.			
	Recommendation: Complete the FFS and modify the remedy to address residual source area contamination.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	9/1/2021

OU: 1	Issue Category: Operations and Maintenance			
	Issue: There is no formal schedule for inspection of the Treated Soils Area and that woody vegetation may be growing on the edges of the Treated Soils Area.			
	Recommendation: Revise the operation and maintenance plan which identifies a formal schedule for inspection and how any identified deficiencies will be addressed.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	9/1/2021

Other Findings

The following are findings and/or recommendations that were identified during the Five-Year Review but do not affect current and/or future protectiveness of the remedy:

- Increased communication between EPA, MDEQ and other stakeholders: Several people interviewed stated that EPA and MDEQ could do a better job of informing the community about site progress. The Idaho Pole environmental manager even suggested annual updates may be appropriate. These updates could include mailing a fact sheet, a public meeting, or participating in a site tour. The EPA also needs to periodically update the webpage to provide up-to-date site information. During the public comment period (June 2019 – March 2020) associated with the partial deletion, EPA's webpage was viewed almost 2100 times. These numbers show that the public is accessing the webpage to get the latest site information. Activities that are anticipated in the next 18 months to increase communication include the following:
    - Once this report is approved, a fact sheet will be distributed discussing the findings of the Five-Year Review and announcing the availability of the fifth Five-Year Review report at the information repositories;
    - A public notice will be published in the Bozeman Daily Chronicle announcing the completion of the Five-Year Review and its findings;

- It is anticipated that the Focused Feasibility Study will be finalized in 2021 at which time EPA will issue a Proposed Plan identifying proposed alternatives. A public meeting will be held in Bozeman to discuss the proposed remedial alternatives, and the public will be provided ample time to submit public comments on the preferred alternative; and
- EPA and MDEQ will participate in all public meetings that will be held regarding redevelopment of the former IPC property.

- Interest from prospective purchasers of the property south of I-90 exists for a multi-story redevelopment project that includes commercial use on the ground floor and residential use on the upper floors: The 1992 *Human Health Risk Assessment* evaluated risk to a future on-site resident that would reside on these properties. The exposure media evaluated were soils and consumption of garden produce using municipal water; the exposure routes evaluated were ingestion, direct contact and inhalation of particulates. The corresponding cancer risk to the future on-site resident was within EPA's acceptable risk management range of 10^{-4} and 10^{-6} while the noncancer hazard quotient was < 1. There is also no explicit mention of restricting residential use in the Record of Decision or subsequent Explanation of Significant Differences. However, the mixed-use residential scenario was not contemplated in the *Human Health Risk Assessment*. EPA will work with any prospective purchaser to clarify whether residential use is an appropriate future land use for portions of the Site south of I-90 including, but not limited to, collecting additional surface and subsurface soil samples, conducting a more comprehensive risk evaluation, and updating the Soils Management Plan.

- Additionally, the Record of Decision as described above did not contain language that restricts future residential use on the Site. However, to ensure continued protection of human health and the environment, should these properties be redeveloped, the *Notice of Institutional Controls* includes prohibitions on groundwater use or development and excavation within the CGWA (3rd and 4th bullet above) without EPA and MDEQ approval. The Record of Decision will be updated to include this institutional control as a remedy component.

- Update the groundwater Site database to include all historic site data: During the development of this Five-Year Review, it was determined that the historic groundwater databases that are included as Appendices A and F in the annual Groundwater Assessment Reports do not include the data collected during the Remedial Investigation nor the data collected during the 2014 – 2017 pilot tests. EPA has requested that these appendices be updated to include all groundwater site data collected to date.
- Re-evaluate groundwater standards during the upcoming *Focused Feasibility Study* and *Proposed Plan*: New groundwater standards have been issued by the State of Montana for dioxins, benzo(a)pyrene, and dibenzo(a,h)anthracene that are more stringent than the ROD groundwater standards. EPA is currently reassessing all groundwater standards as part of the *Focused Feasibility Study* and is using the more stringent maximum contaminant level or DEQ-7 human health standards as preliminary remediation goals to compare the various alternatives against. Any revisions to the groundwater cleanup standard changes will be discussed in the *Focused Feasibility Study* as well as the *Proposed Plan* that identifies the preferred alternative for a revised groundwater remedy.
- The Pasture Area fence can be dismantled: The Pasture Area fence was installed as an engineering control to minimize trespassing near the interceptor trench that was historically used to recover wood-treating fluids. Product that accumulated in the trench was removed using absorbent pads, as needed. Operation of the trench ceased in October 2015, and the trench was closed and reclaimed per the EPA-approved *Trench Closure Work Plan*. It has been determined

during this Five-Year Review that the fence is no longer needed as an engineering control and can be taken down to facilitate redevelopment of the property.

- Sediment require sampling: It is recommended that additional samples be collected from Rocky Creek, as well as the L Street and substation ditches, and analyzed for PCP, PAHs and dioxins to ensure no further remediation is necessary before making a determination of whether the sediment component is eligible for deletion from the NPL.
- Well maintenance: Minor issues were raised with respect to site operations including one well that was not locked, another well whose well casing did not allow for the well to be locked, and another well that required a new cap.

IX. Protectiveness Statement

Protectiveness Statement(s)	
Operable Unit: 1	*Protectiveness Determination:* Short-term Protective
Protectiveness Statement: The remedy currently protects human health and the environment because institutional controls are in place such as a deed restriction on IPC property and a CGWA that restricts potable use of the groundwater. In order to be protective in the long term, the following actions are needed: install and sample additional wells in the downgradient portion of the plume; complete the FFS and modify the remedy to address residual source area contamination; and revise operation and maintenance plan which identifies a formal schedule for inspection and how any identified deficiencies will be addressed.	

Sitewide Protectiveness Statement
Protectiveness Determination: Short-term Protective
Protectiveness Statement: The remedy currently protects human health and the environment because institutional controls are in place such as a deed restriction on IPC property and a CGWA that restricts potable use of the groundwater. In order to be protective in the long term, the following actions are needed: install and sample additional wells in the downgradient portion of the plume; complete the FFS and modify the remedy to address residual source area contamination; and revise the operation and maintenance plan which identifies a formal schedule for inspection and how any identified deficiencies will be addressed.

X. Next Review

Because contamination has been left on site above levels that allow for unlimited use and unrestricted exposure, this Site requires ongoing Five-Year Reviews. The next review will be conducted five years after the completion of this Five-Year Review report.

XII. References

The following Site-specific documents were reviewed:

- *2014 Subsurface Soil Investigation in Barkfill Area Analytical Summary Report* (Energy Laboratories, June 2014
- *Idaho Pole Company Proposed In-Situ Enhanced Biodegradation Phase II Pilot Study Work Plan* (Hydrometrics, Inc.), June 2016
- *2016 Phase II Pilot Study Report Idaho Pole Company Site, Bozeman, Montana* (Hydrometrics, Inc.), March 2017
- *Idaho Pole Company Site Bozeman, Montana – Results of Dioxin Testing in Groundwater at Select Wells – REVISED* (Hydrometrics, Inc) June 2016
- *Idaho Pole Site– Request for Well Abandonment* (Hydrometrics, Inc) August 2016
- *Idaho Pole Site Semi-Annual Progress Report – January through June 2017* (Hydrometrics, Inc) July 2017
- *Idaho Pole Site Semi-Annual Progress Report – July through December 2017* (Hydrometrics, Inc) January 2018
- *Draft Focused Feasibility Study, Idaho Pole Site, Bozeman, Montana* (Hydrometrics, Inc.), February 2020
- *2015 Groundwater Assessment Report* (Hydrometrics, Inc.), April 2016
- *2016 Groundwater Assessment Report* (Hydrometrics, Inc.), April 2017
- *2017 Groundwater Assessment Report* (Hydrometrics, Inc.), April 2018
- *2018 Groundwater Assessment Report* (Hydrometrics, Inc.), March 2019
- *2019 Groundwater Assessment Report* (Hydrometrics, Inc.), April 2020
- *Idaho Pole Company Site Bozeman, Montana – Report of Surface Soil Sampling* (Hydrometrics, Inc) June 2018
- *Addendum to Idaho Pole Company 4th Five-Year Review Report* (EPA) March 2019
- *Idaho Pole Company Site Bozeman, Montana – Trench Closure Workplan (H*ydrometrics, Inc) October 2015
- *Human Health Risk Assessment,* 1992

- *Idaho Pole Company Site Bozeman, Montana – Treated Soils Area (TSA) Dioxin Evaluation Report* (Hydrometrics, Inc) November 2017
- *Idaho Pole Company Site– Report of Surface Soil Sampling* (Hydrometrics, Inc) October 2019
- Letter from Gallatin City-County Board of Health Regarding Idaho Pole February 15, 2018
- Email from Gallatin Local Water Quality District Regarding Idaho Pole March 20, 2018
- Email from Gallatin City-County Board of Health Regarding Idaho Pole December 4, 2019
- *Soil Management Plan* (Hydrometrics, Inc.), March 2011
- *Third Five-Year Review* (EPA Region 8), September 20, 2010
- *Fourth Five-Year Review* (EPA Region 8), September 30, 2015
- *Notice of Institutional Controls* (Idaho Pole Company) including the Restated and Amended Notice of Institutional Controls, Filed with Gallatin County on September 9, 2010; August 15, 2016 and August 30, 2017
- *Montana Risk-Based Corrective Action Guidance for Petroleum Release* (Montana Department of Environmental Quality), May 2018
- *Montana Vapor Intrusion Guidance* (Montana Department of Environmental Quality), April 2011
- OSWER Technical Guide for Assessment and Mitigating the Vapor Intrusion from Subsurface Vapor Sources to Indoor Air (EPA), June 2015
- USACoE Wetlands Delineation Manual, 1987
- *Remediation System Evaluation* (GeoTrans/Tetra Tech), February 2010
- *Wetlands Delineation and Evaluation Pasture Area Idaho Pole Superfund Site, Bozeman, Montana* (United States Fish and Wildlife Service), May, 1995
- *Remedial Action Completion Report* (RETEC Group, Inc.), December 2002
- *Petition for Controlled Groundwater Area to the Department of Groundwater Resources and Conservation*, September 2000
- *Explanation of Significant Differences* (EPA Region 8), November 1998
- *Superfund Preliminary Site Close Out Report* (EPA Region 8), March 1998

- *Explanation of Significant Differences* (EPA Region 8), May 1996
- *Record of Decision* (Montana DEQ and EPA Region 8), September 1992
- *Remedial Investigation Report* (MSE, Inc.), March 1992

General documents that were referred to but do not pertain specifically to this Site are listed below.

City of Bozeman GIS Department (http://www.bozeman.net/bozeman/GIS/Default.aspx).

EPA, May 1995. Land Use in the CERCLA Remedy Selection Process (OSWER 9355.7-04).

EPA, July 1999. *A Guide for Preparing Superfund Proposed Plans, Records of Decision or Other Remedy Selection Decision Documents* (EPA EPA540-R-98-031).

EPA, June 2001. *Comprehensive Five-Year Review Guidance* (EPA 540-R-01-007).

EPA, December 2009. *Public Review Draft: Draft Recommended Interim Preliminary Remediation Goals for Dioxin in Soil at CERCLA and RCRA Sites* (OSWER 9200.3-56).

EPA, February 2010. Development of a Relative Potency Factor Approach for Polycyclic Aromatic Hydrocarbon (PAH) Mixtures (EPA/635/R-08/012A).

EPA, February 2012. *EPA's Reanalysis of Key Issues Related to Dioxin Toxicity and Response to NAS Comments, Volume 1* (EPA/600/R-10/-38F).

EPA, February 2014. *Human Health Evaluation Manual, Supplemental Guidance: Update of Standard Default Exposure Factors (OSWER 9200.1-120).*

Gallatin County GIS Interactive Mapping (http://webapps.gallatin.mt.gov/mappers/).

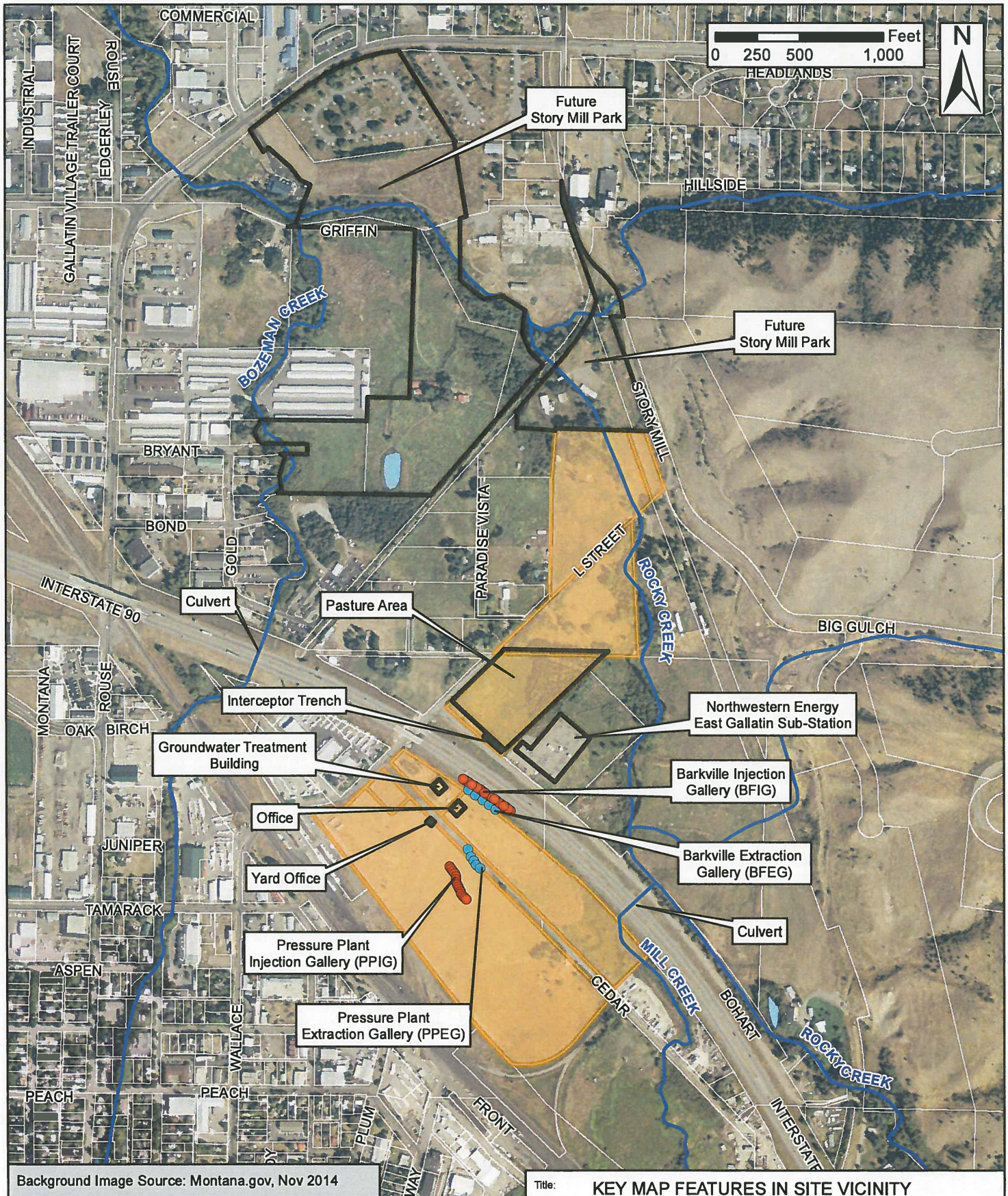
Montana Department of Environmental Quality, January 2004. *Circular WQB-7, Montana Numeric Water Quality Standards.*

Montana Department of Environmental Quality, February 2008. *Circular DEQ-7, Montana Numeric Water Quality Standards.*

Montana Department of Environmental Quality, October 2012. *Circular DEQ-7, Montana Numeric Water Quality Standards.*

Montana Department of Environmental Quality, July 2019. *Circular DEQ-7, Montana Numeric Water Quality Standards.*

Figures



Background Image Source: Montana.gov, Nov 2014

Legend

- Idaho Pole Company Parcels (Source: NRIS-Gallatin County Cadastral, Jan 2015)
- Existing Parcels (Source: NRIS-Gallatin County Cadastral, Jan 2015)
- Injection Wells (Source: Figure 3, 5-A Area Investigation Workplan, Draft July 2013)
- Extraction Wells (Source: Figure 3, 5-A Area Investigation Workplan, Draft July 2013)

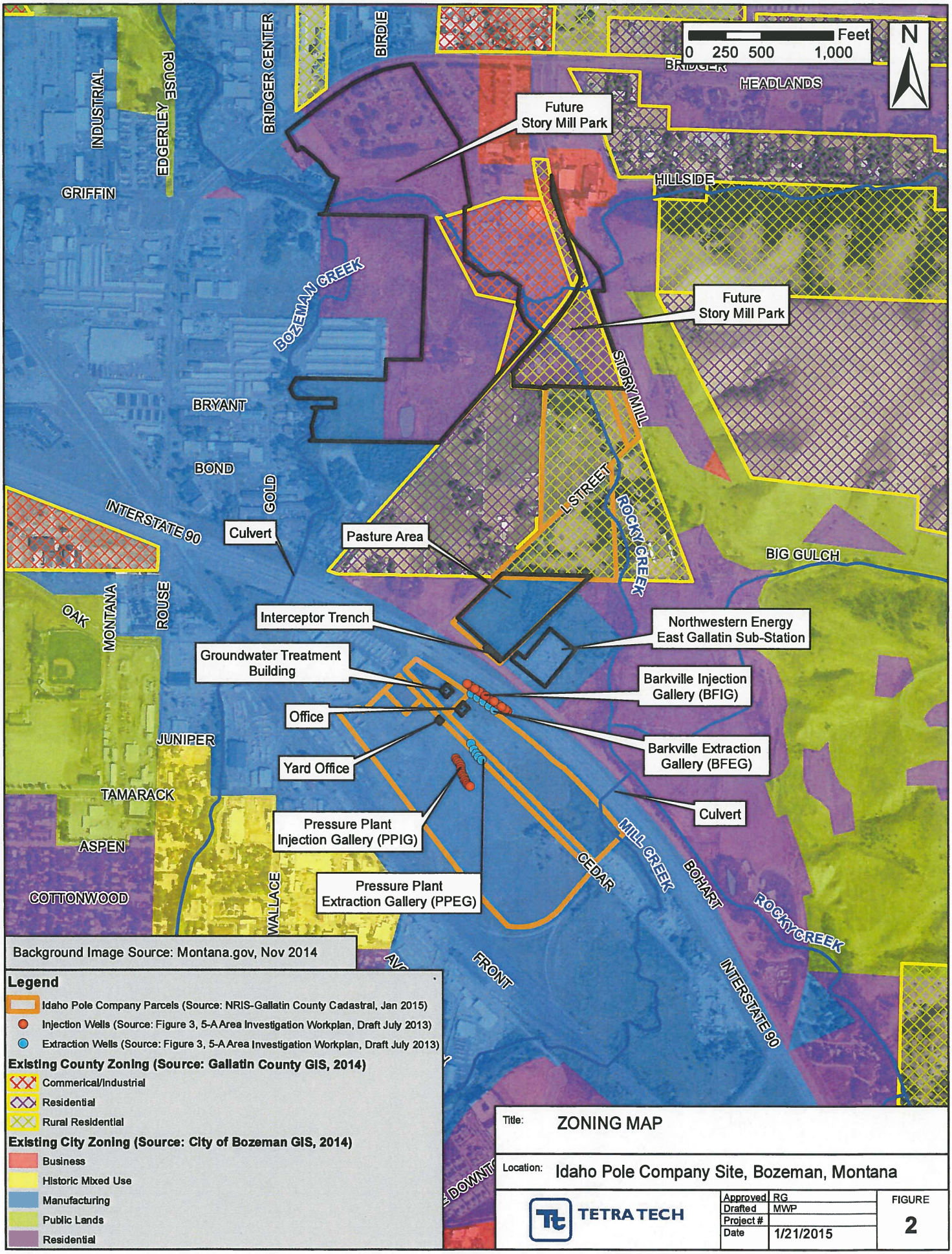
Title: KEY MAP FEATURES IN SITE VICINITY

Location: Idaho Pole Company Site, Bozeman, Montana

TETRA TECH

Approved	RG
Drafted	MWP
Project #	
Date	1/21/2015

FIGURE 1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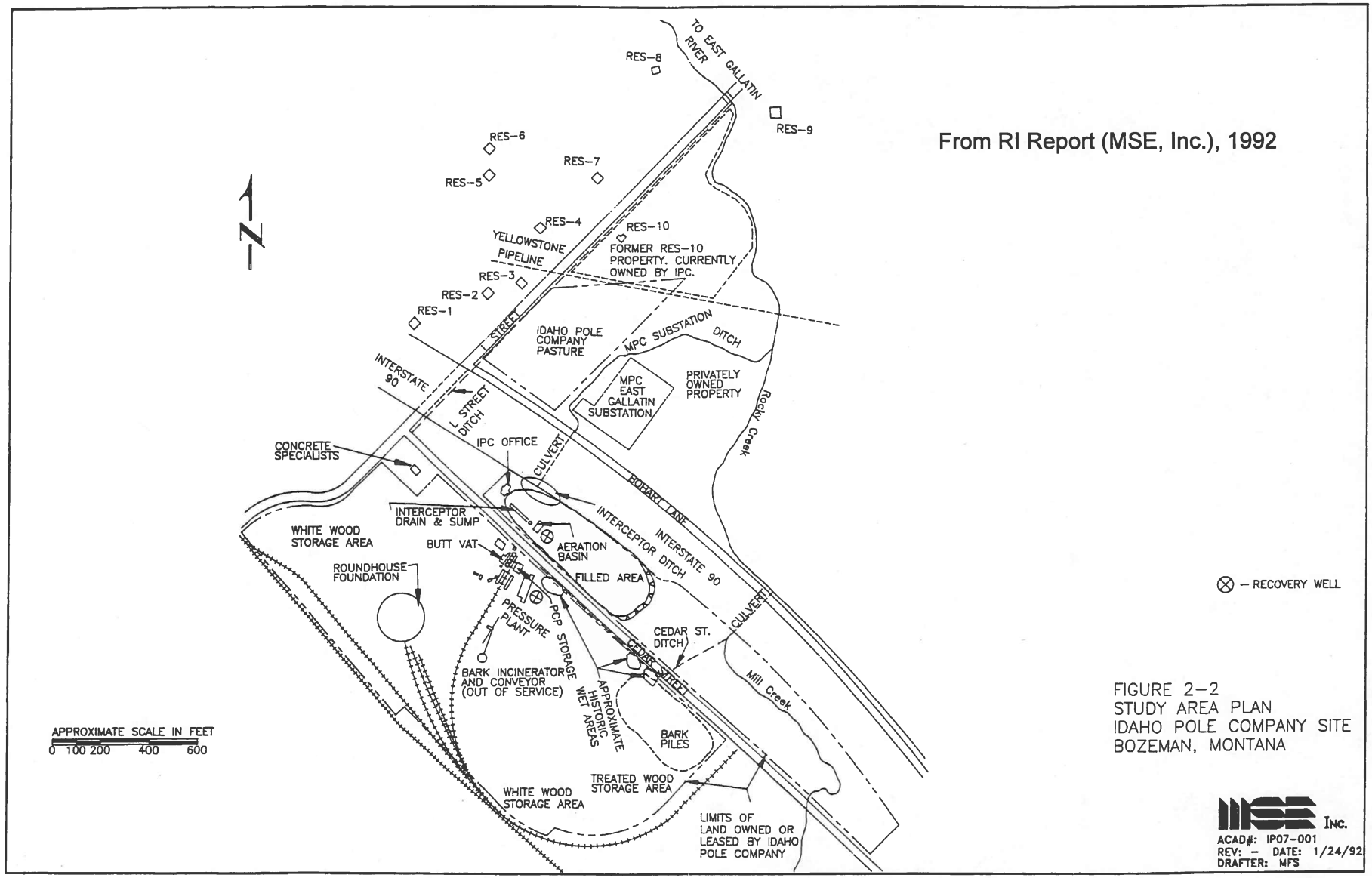
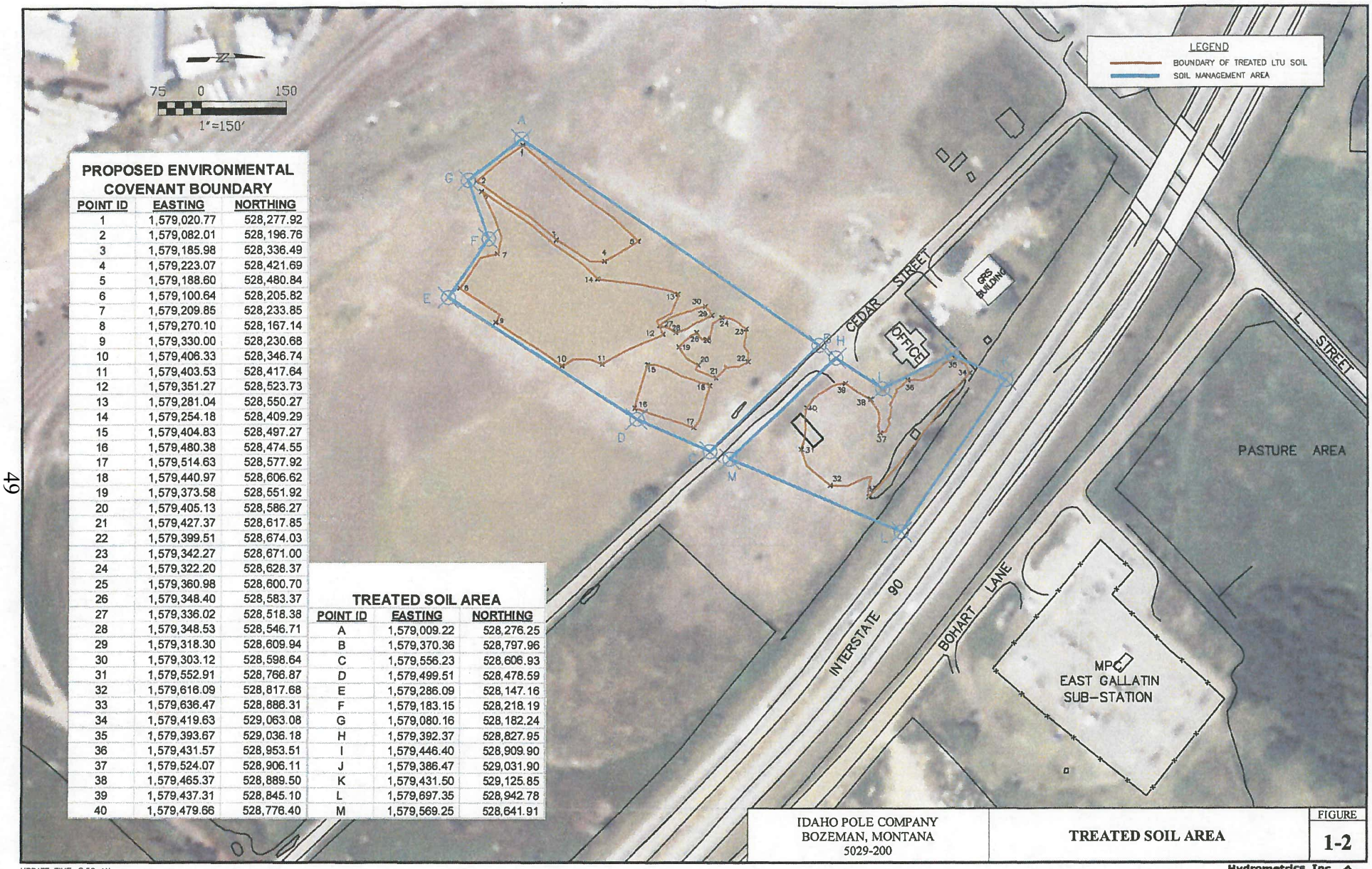
N
INDUSTRIAL
EDGERLEY
ROUSE
BRIDGER CENTER
BIRDIE
BRIDGER
HEADLANDS
Future Story Mill Park
HILLSIDE
GRIFFIN
BOZEMAN CREEK
Future Story Mill Park
STORY MILL
BRYANT
BOND
GOLD
L STREET
ROCKY CREEK
INTERSTATE 90
Culvert
Pasture Area
BIG GULCH
OAK
MONTANA
ROUSE
Interceptor Trench
Northwestern Energy East Gallatin Sub-Station
Groundwater Treatment Building
Barkville Injection Gallery (BFIG)
Office
JUNIPER
Barkville Extraction Gallery (BFEG)
Yard Office
TAMARACK
Culvert
Pressure Plant Injection Gallery (PPIG)
MILL CREEK
CEDAR
ASPEN
BOHART
ROCKY CREEK
Pressure Plant Extraction Gallery (PPEG)
COTTONWOOD
WALLACE
FRONT
INTERSTATE 90
Background Image Source: Montana.gov, Nov 2014
Legend
Idaho Pole Company Parcels (Source: NRIS-Gallatin County Cadastral, Jan 2015)
Injection Wells (Source: Figure 3, 5-A Area Investigation Workplan, Draft July 2013)
Extraction Wells (Source: Figure 3, 5-A Area Investigation Workplan, Draft July 2013)
Existing County Zoning (Source: Gallatin County GIS, 2014)
Commerical/Industrial
Residential
Rural Residential
Existing City Zoning (Source: City of Bozeman GIS, 2014)
Business
Historic Mixed Use
Manufacturing
Public Lands
Residential
Title: ZONING MAP
Location: Idaho Pole Company Site, Bozeman, Montana
TETRA TECH
Approved RG
Drafted MWP
Project #
Date 1/21/2015
FIGURE 2



2-3

Figure 3. Illustration of Historical Site Features



PROPOSED ENVIRONMENTAL COVENANT BOUNDARY

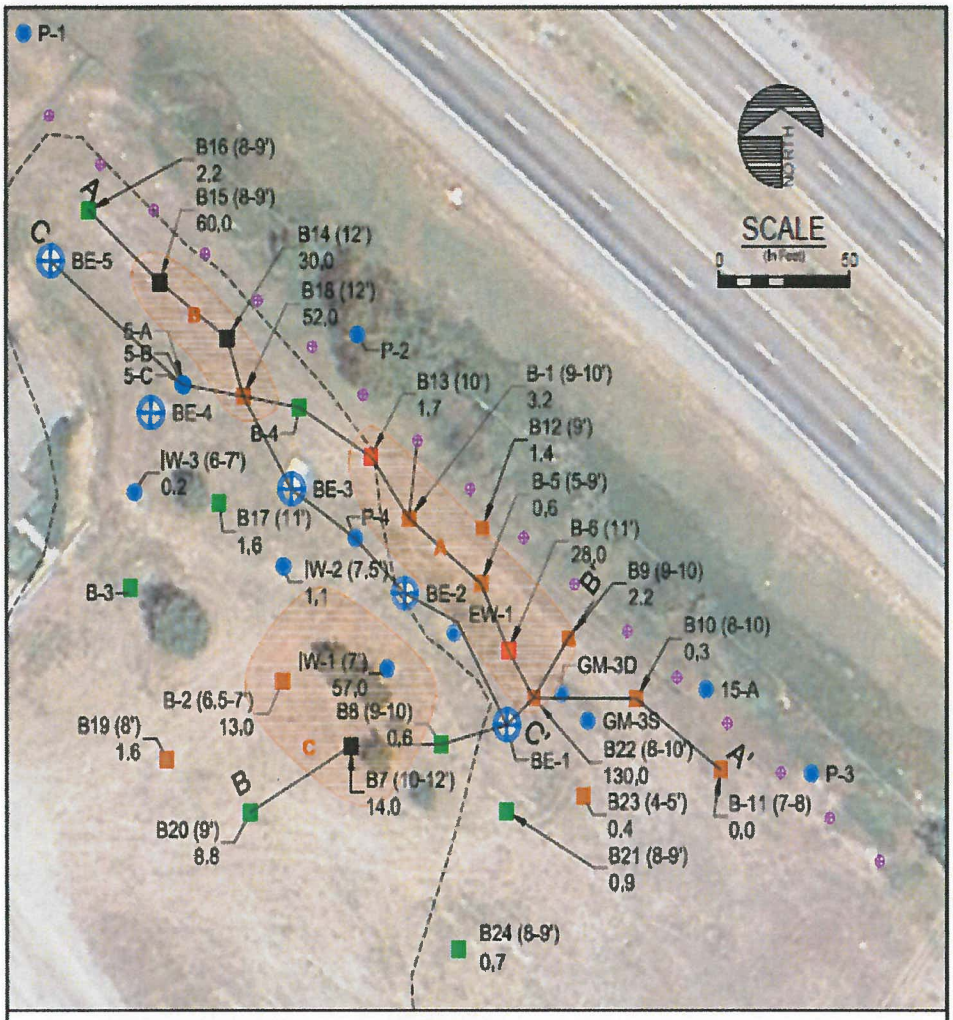
POINT ID	EASTING	NORTHING
1	1,579,020.77	528,277.92
2	1,579,082.01	528,196.76
3	1,579,185.98	528,336.49
4	1,579,223.07	528,421.69
5	1,579,188.60	528,480.84
6	1,579,100.64	528,205.82
7	1,579,209.85	528,233.85
8	1,579,270.10	528,167.14
9	1,579,330.00	528,230.68
10	1,579,406.33	528,346.74
11	1,579,403.53	528,417.64
12	1,579,351.27	528,523.73
13	1,579,281.04	528,550.27
14	1,579,254.18	528,409.29
15	1,579,404.83	528,497.27
16	1,579,480.38	528,474.55
17	1,579,514.63	528,577.92
18	1,579,440.97	528,606.62
19	1,579,373.58	528,551.92
20	1,579,405.13	528,586.27
21	1,579,427.37	528,617.85
22	1,579,399.51	528,674.03
23	1,579,342.27	528,671.00
24	1,579,322.20	528,628.37
25	1,579,360.98	528,600.70
26	1,579,348.40	528,583.37
27	1,579,336.02	528,518.38
28	1,579,348.53	528,546.71
29	1,579,318.30	528,609.94
30	1,579,303.12	528,598.64
31	1,579,552.91	528,766.87
32	1,579,616.09	528,817.68
33	1,579,636.47	528,886.31
34	1,579,419.63	529,063.08
35	1,579,393.67	529,036.18
36	1,579,431.57	528,953.51
37	1,579,524.07	528,906.11
38	1,579,465.37	528,889.50
39	1,579,437.31	528,845.10
40	1,579,479.66	528,776.40

TREATED SOIL AREA

POINT ID	EASTING	NORTHING
A	1,579,009.22	528,276.25
B	1,579,370.36	528,797.96
C	1,579,556.23	528,606.93
D	1,579,499.51	528,478.59
E	1,579,286.09	528,147.16
F	1,579,183.15	528,218.19
G	1,579,080.16	528,182.24
H	1,579,392.37	528,827.95
I	1,579,446.40	528,909.90
J	1,579,386.47	529,031.90
K	1,579,431.50	529,125.85
L	1,579,697.35	528,942.78
M	1,579,569.25	528,641.91

From Soil Management Plan (Hydrometrics, Inc.), March 2011

Figure 4. "Treated Soils Areas" Where Treated Soils Were Placed Onsite



IDAHO POLE COMPANY BOZEMAN, MONTANA	PCP SOURCE AREAS	FIGURE 5

UPDATE TIME: 11:00 AM
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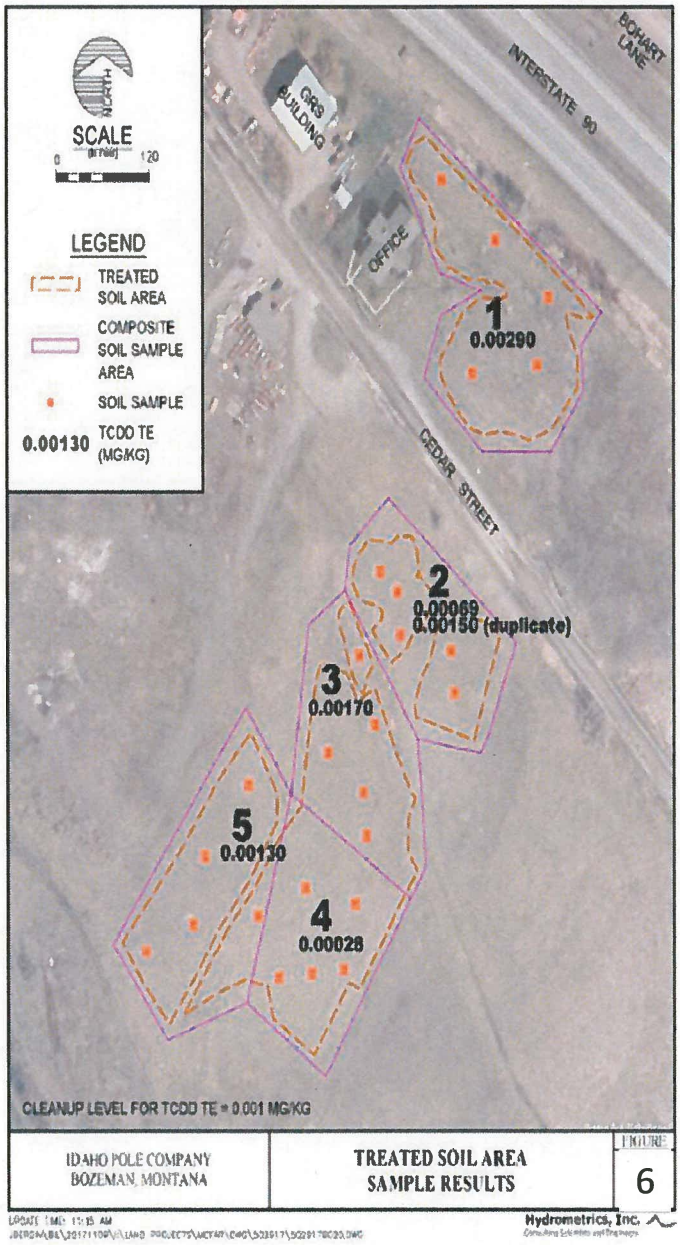
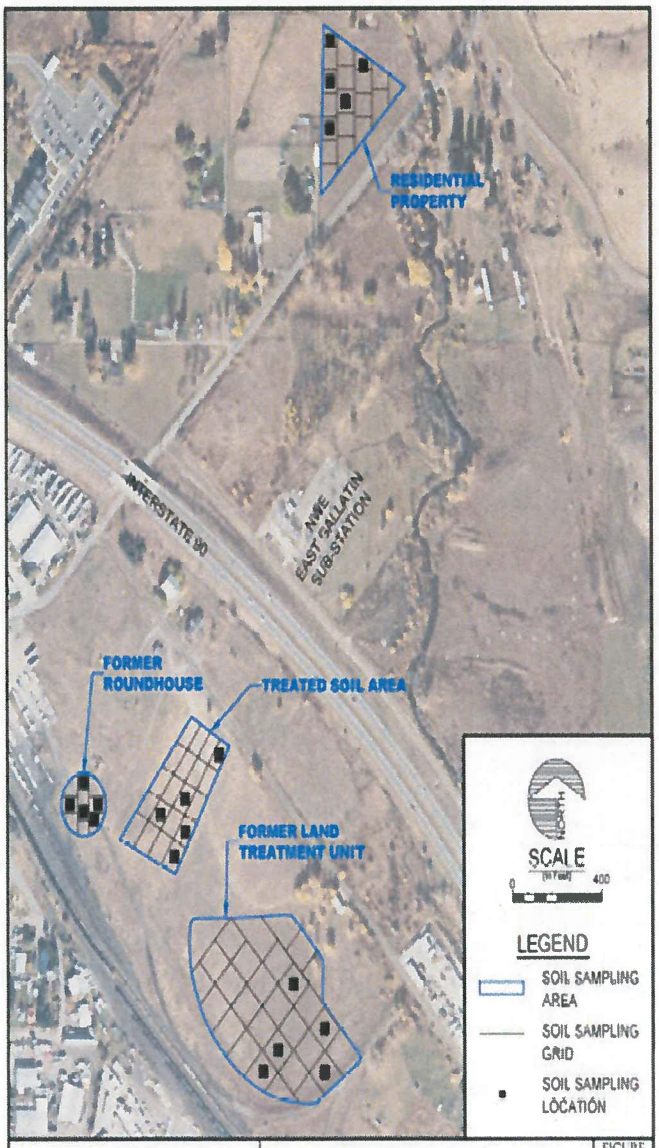
Hydrometrics, Inc.
Consulting Scientists and Engineers

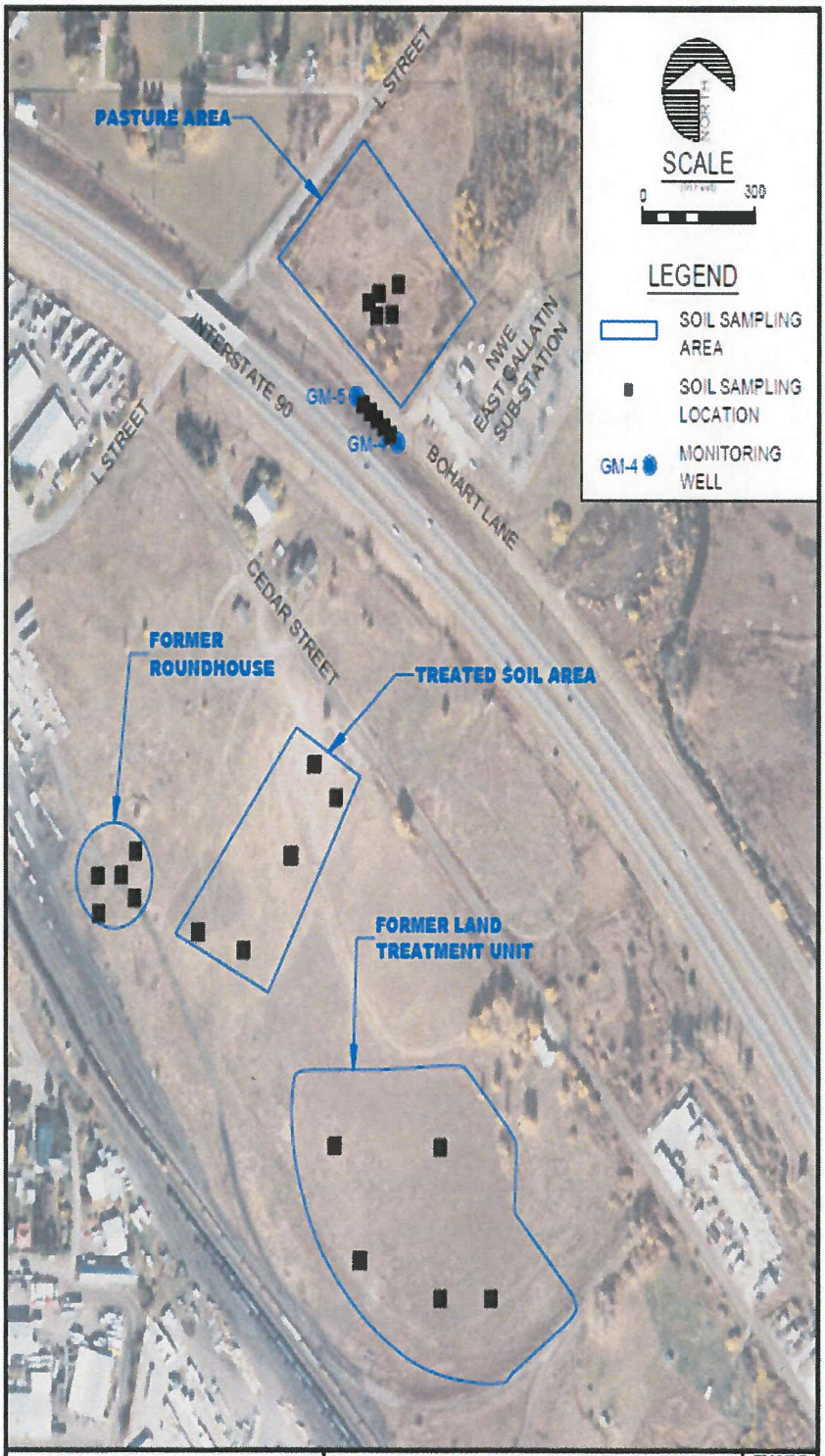

NORTH
SCALE
0
120
LEGEND
TREATED SOIL AREA
COMPOSITE SOIL SAMPLE AREA
SOIL SAMPLE
0.00130 TCDD TE (MG/KG)
BOHART LANE
INTERSTATE 90
GRS BUILDING
OFFICE
CEDAR STREET
1
0.00290
2
0.00069
0.00150 (duplicate)
3
0.00170
4
0.00028
5
0.00130
CLEANUP LEVEL FOR TCDD TE = 0.001 MG/KG
IDAHO POLE COMPANY
BOZEMAN, MONTANA
TREATED SOIL AREA
SAMPLE RESULTS
FIGURE
6
Hydrometrics, Inc.



IDAHO POLE COMPANY BOZEMAN, MONTANA	SOIL SAMPLING AREAS AND SUB-SAMPLE LOCATIONS	FIGURE 7

UPDATE TIME: 2:35 PM

Hydrometrics, Inc.



IDAHO POLE COMPANY BOZEMAN, MONTANA	SOIL SAMPLING AREAS AND COMPOSITE SAMPLE LOCATIONS	FIGURE 8

UPDATE TIME: 10:34 AM
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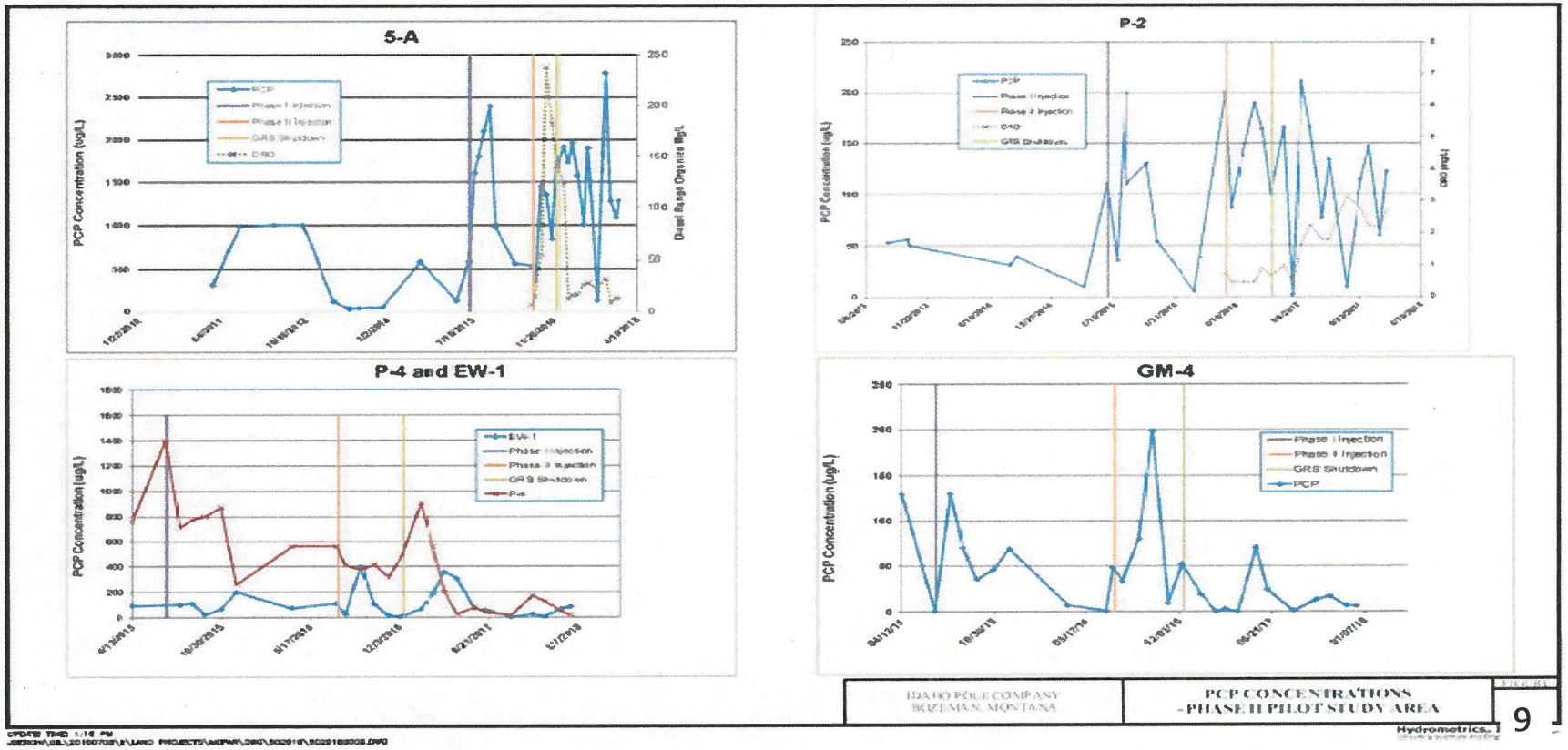
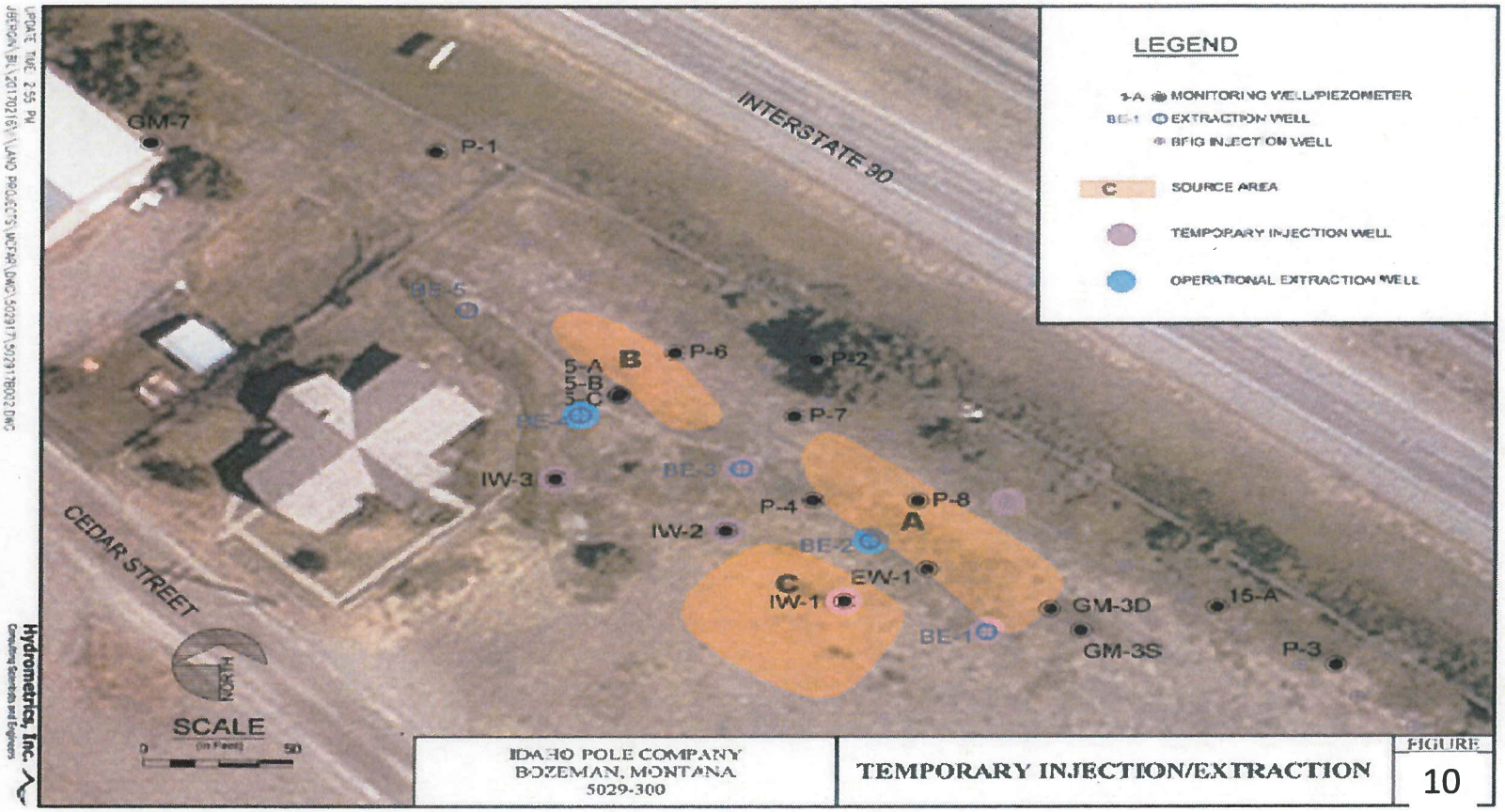
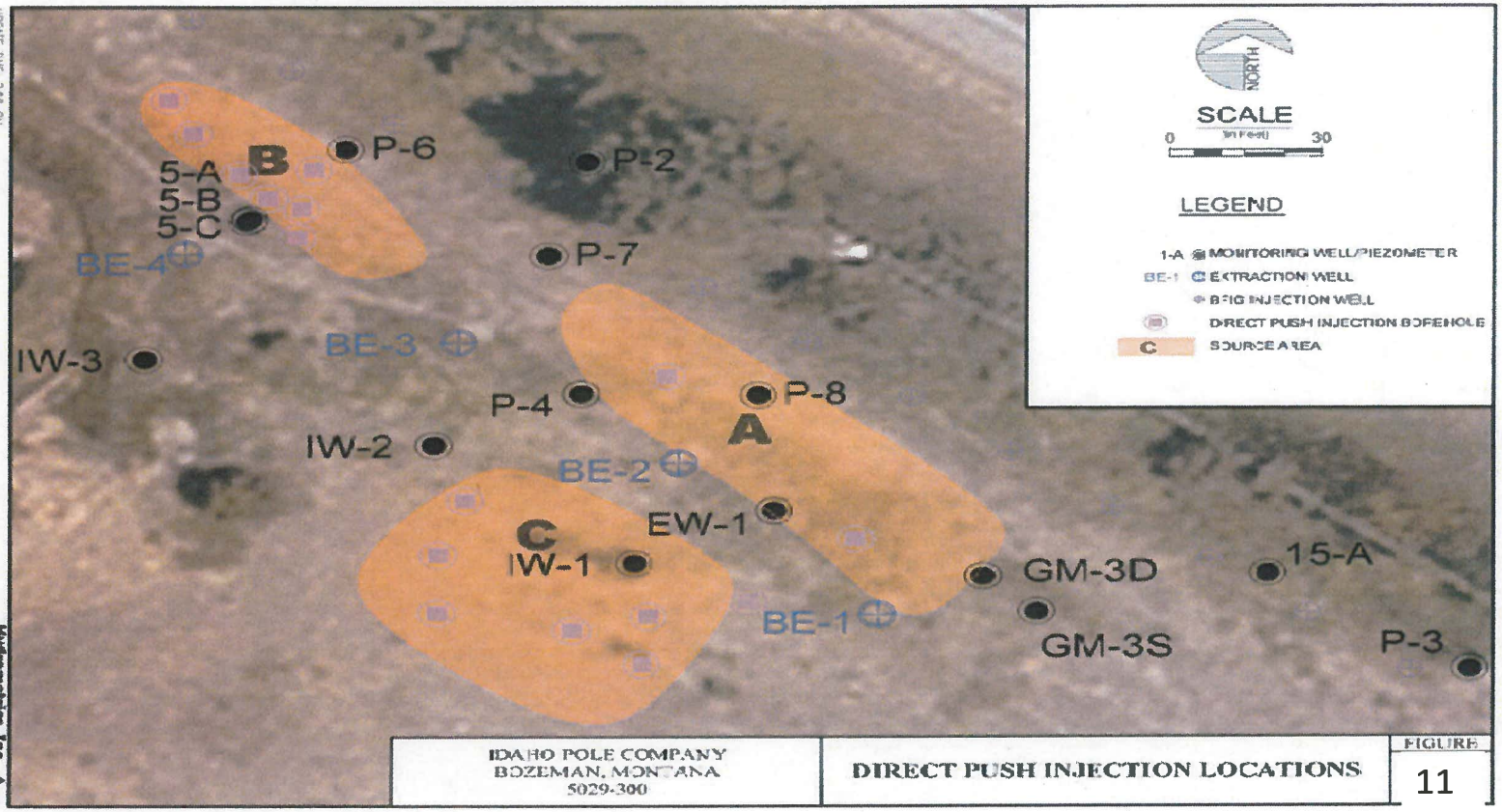
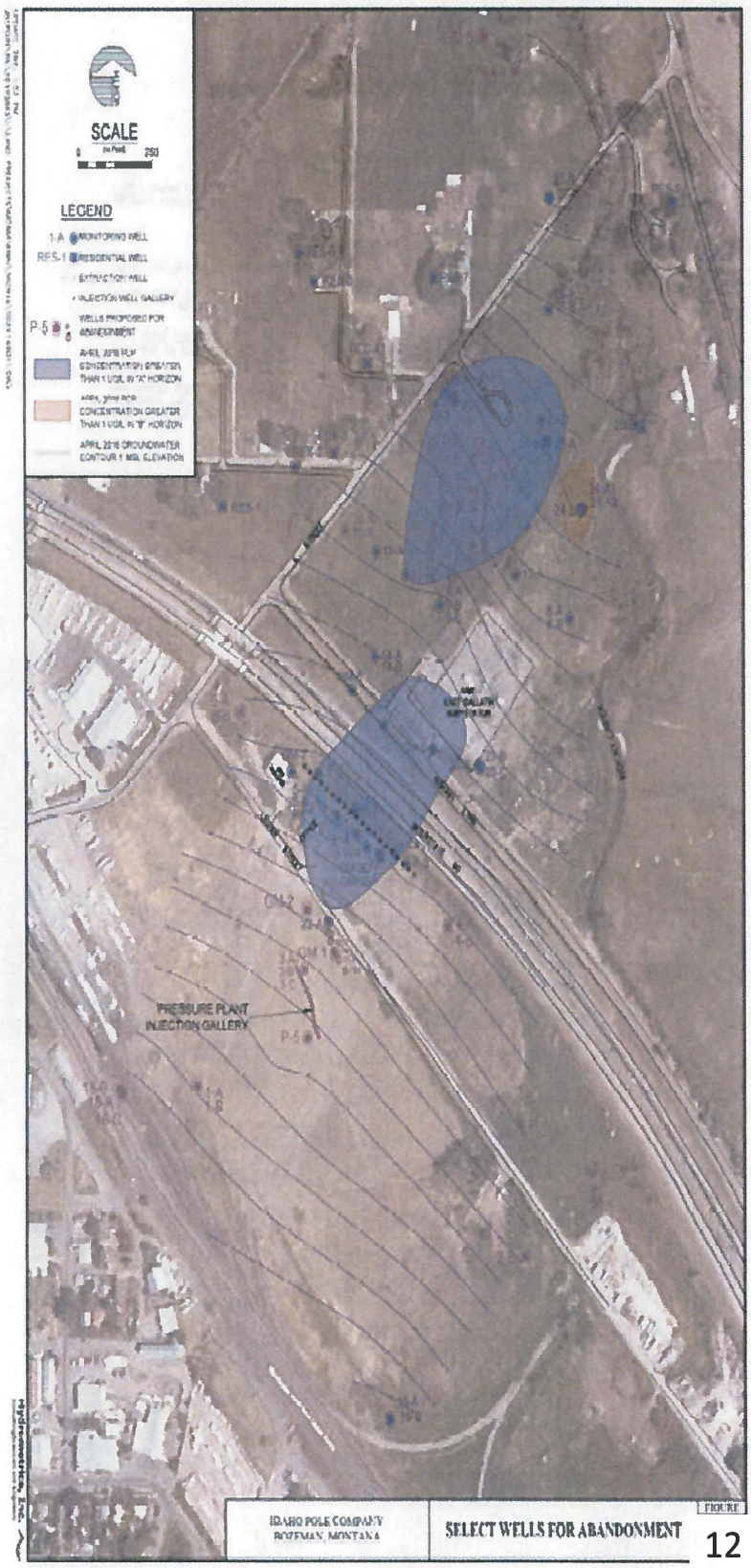
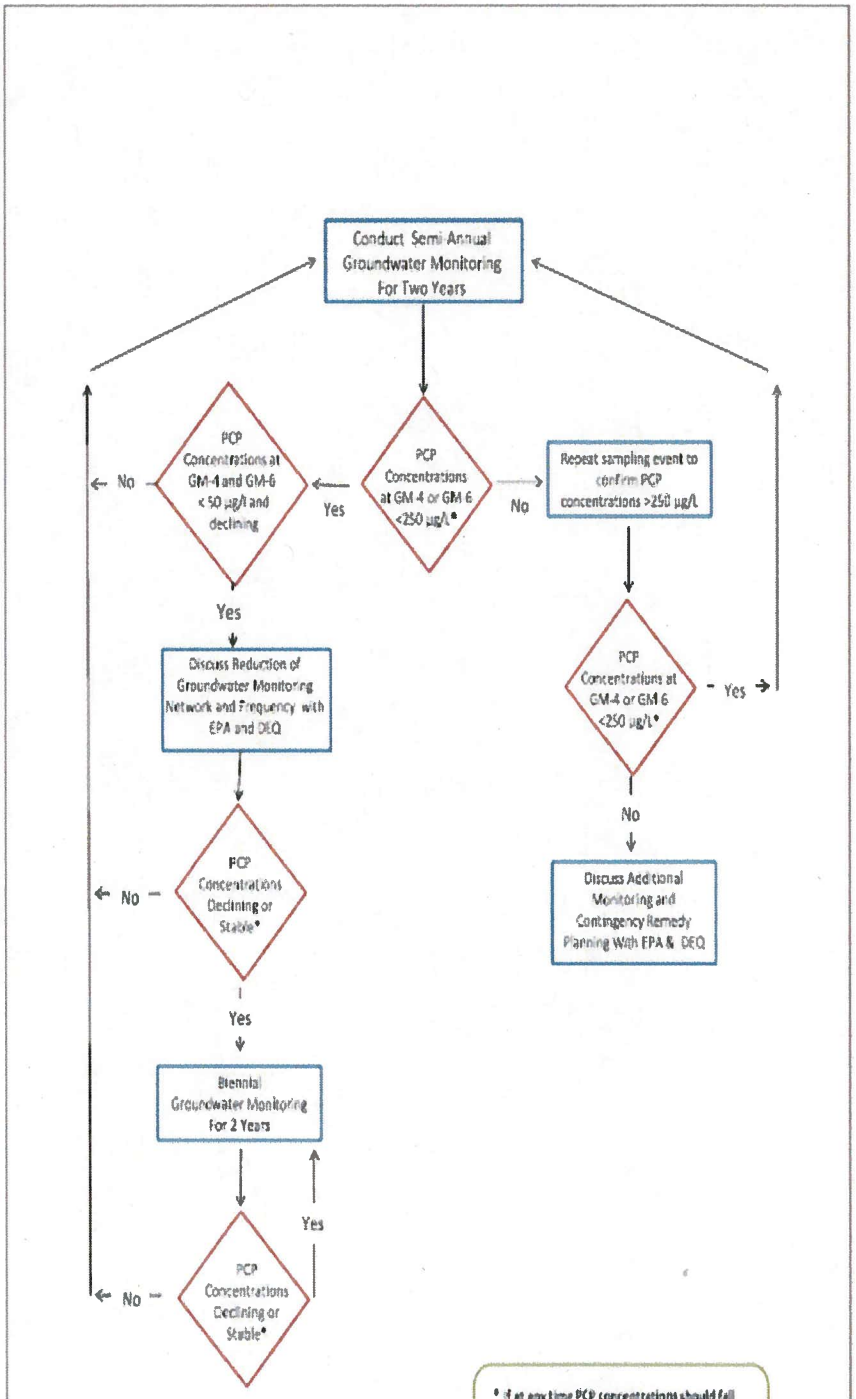
Hydrometrics, Inc.


5-A
PCP Concentration (ug/L)
Diesel Range Organics Rg/L
PCP
Phase I Injection
Phase II Injection
GRS Shutdown
DRO
P-2
PCP Concentration (ug/L)
DRO (mg/L)
P-4 and EW-1
PCP Concentration (ug/L)
EW-1
Phase I Injection
Phase II Injection
GRS Shutdown
P-4
GM-4
PCP Concentration (ug/L)
Phase I Injection
Phase II Injection
GRS Shutdown
PCP
IDAHO POLE COMPANY
BOZEMAN, MONTANA
PCP CONCENTRATIONS
- PHASE II PILOT STUDY AREA
Hydrometrics,


LEGEND
MONITORING WELL/PIEZOMETER
EXTRACTION WELL
BFIG INJECTION WELL
SOURCE AREA
TEMPORARY INJECTION WELL
OPERATIONAL EXTRACTION WELL
INTERSTATE 90
CEDAR STREET
GM-7
P-1
BE-5
B
P-6
P-2
P-7
BE-4
IW-3
BE-3
P-4
P-8
A
IW-2
BE-2
EW-1
C
IW-1
GM-3D
15-A
BE-1
GM-3S
P-3
SCALE
IDAHO POLE COMPANY
BOZEMAN, MONTANA
5029-300
TEMPORARY INJECTION/EXTRACTION
FIGURE
10
Hydrometrics, Inc.

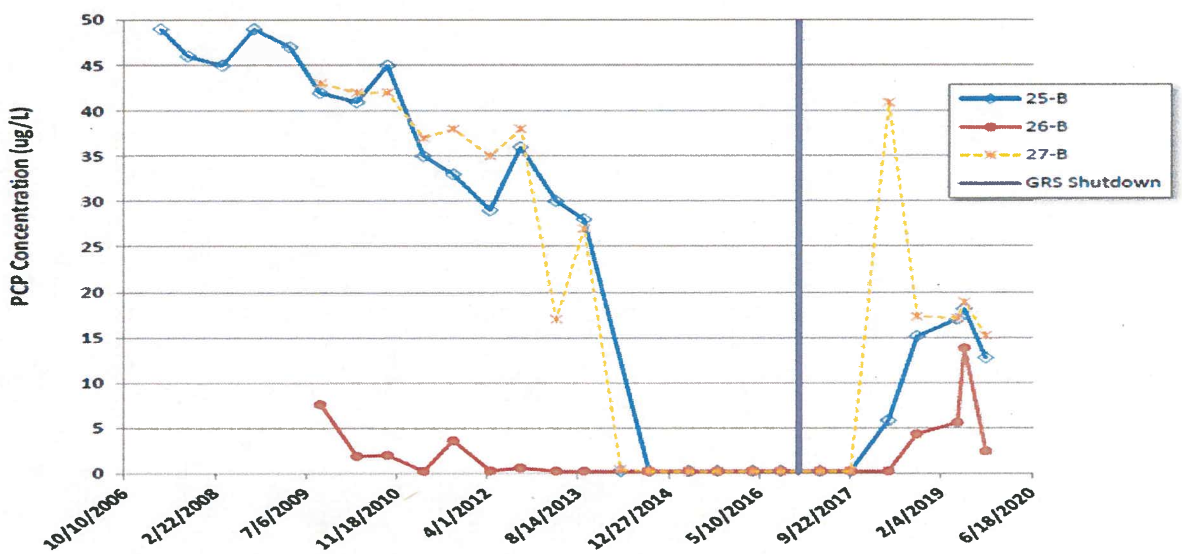

NORTH
SCALE
0
30
LEGEND
1-A MONITORING WELL/PIEZOMETER
BE-1 EXTRACTION WELL
BIG INJECTION WELL
DIRECT PUSH INJECTION BOREHOLE
SOURCE AREA
B
A
C
5-A
5-B
5-C
P-6
P-2
P-7
BE-4
BE-3
IW-3
P-4
P-8
IW-2
BE-2
EW-1
IW-1
BE-1
GM-3D
15-A
GM-3S
P-3
IDAHO POLE COMPANY
BOZEMAN, MONTANA
5029-300
DIRECT PUSH INJECTION LOCATIONS
FIGURE
11
Hydrometrics, Inc.


SCALE
0
250
LEGEND
1-A MONITORING WELL
RES-1 RESIDENTIAL WELL
EXTRACTION WELL
INJECTION WELL GALLERY
P-5 WELLS PROPOSED FOR ABANDONMENT
APRIL 2016 BENZENE CONCENTRATION GREATER THAN 1 UG/L IN "A" HORIZON
APRIL 2016 BENZENE CONCENTRATION GREATER THAN 1 UG/L IN "B" HORIZON
APRIL 2016 GROUNDWATER CONTOUR 1 MSL ELEVATION
PRESSURE PLANT INJECTION GALLERY
IDAHO POLE COMPANY
BOZEMAN, MONTANA
SELECT WELLS FOR ABANDONMENT
FIGURE
12



MNA WORK PLAN IDAHO POLE COMPANY SITE BOZEMAN, MONTANA	CONTINGENCY REMEDY AND MONITORING DECISION TREE	FIGURE 13

PCP Concentrations at Plume Boundary Wells 25-B, 26-B and 27-B

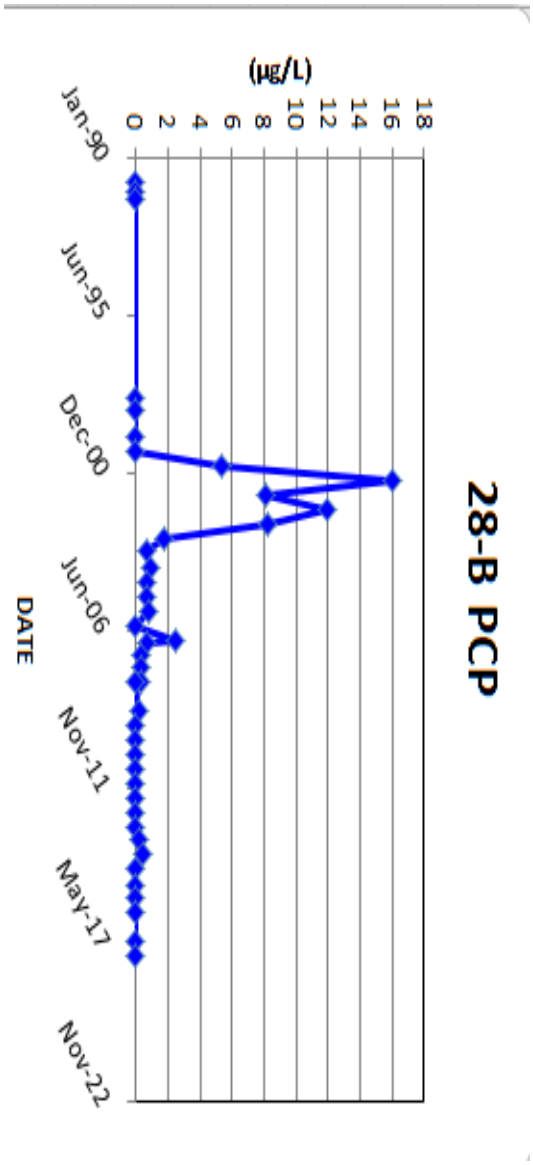


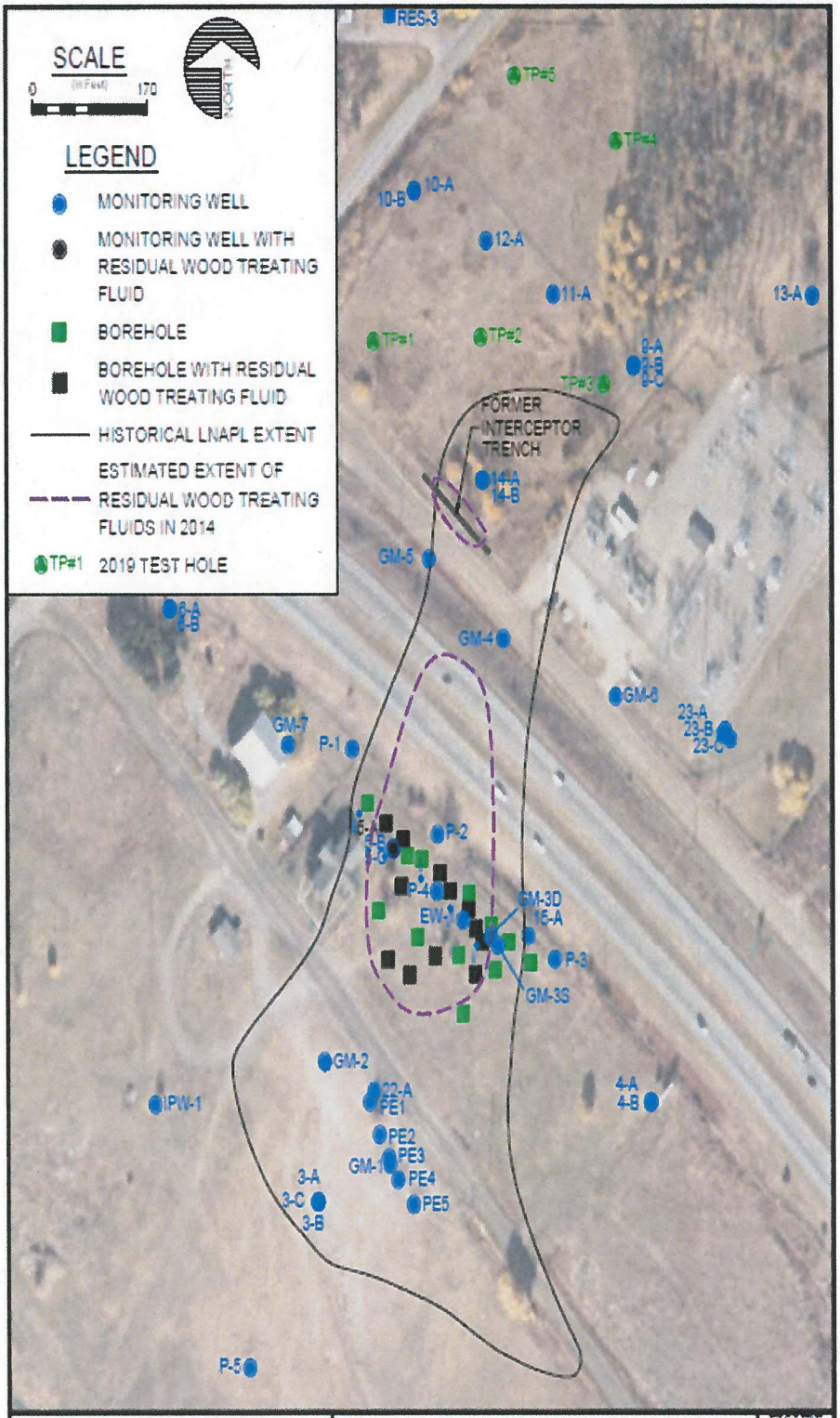
UPDATE TIME 10:06AM

Hydrometrics, Inc.
Consulting Scientists and Engineers

IDAHO POLE COMPANY Bozeman, Montana	PCP CONCENTRATIONS AT PLUME BOUNDARY	FIGURE 14

Figure 15 – PCP Concentrations in 28-B




SCALE
0
170
LEGEND
MONITORING WELL
MONITORING WELL WITH RESIDUAL WOOD TREATING FLUID
BOREHOLE
BOREHOLE WITH RESIDUAL WOOD TREATING FLUID
HISTORICAL LNAPL EXTENT
ESTIMATED EXTENT OF RESIDUAL WOOD TREATING FLUIDS IN 2014
TP#1 2019 TEST HOLE
RES-3
TP#5
TP#4
10-B
10-A
12-A
11-A
13-A
TP#1
TP#2
9-A
9-B
9-C
TP#3
FORMER INTERCEPTOR TRENCH
14-A
14-B
GM-5
6-A
6-B
GM-4
GM-6
GM-7
P-1
23-A
23-B
23-C
5-A
5-B
5-C
P-2
P-4
EW-1
GM-3D
15-A
P-3
GM-3S
GM-2
22-A
PE1
PE2
PE3
GM-1
PE4
PE5
3-A
3-C
3-B
4-A
4-B
IPW-1
P-5
IDAHO POLE COMPANY
BOZEMAN, MONTANA
HISTORICAL EXTENT OF LNAPL AND RECENT EXTENT OF RESIDUAL WOOD TREATING FLUIDS
FIGURE
16
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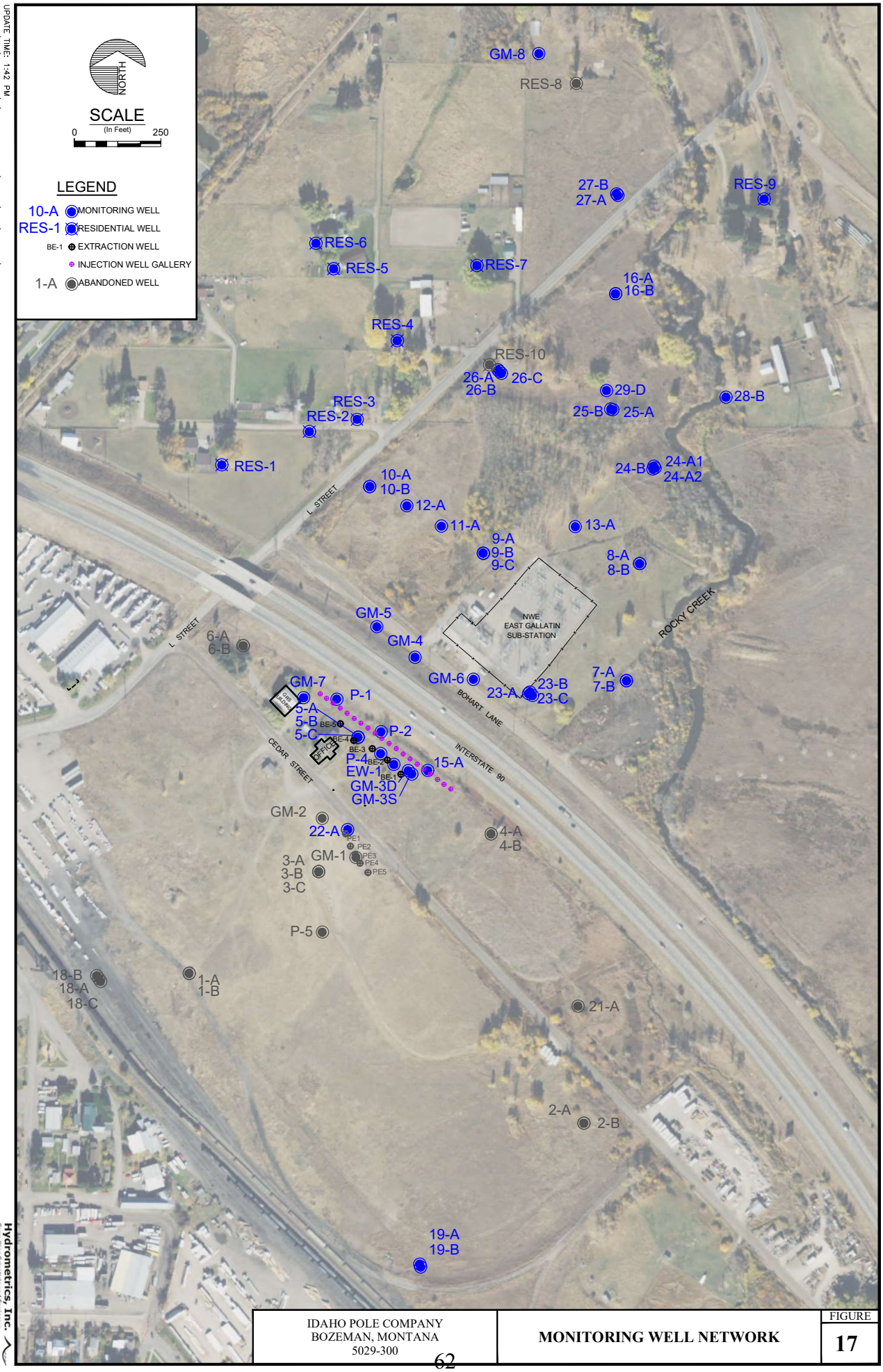
Hydrometrics, Inc.



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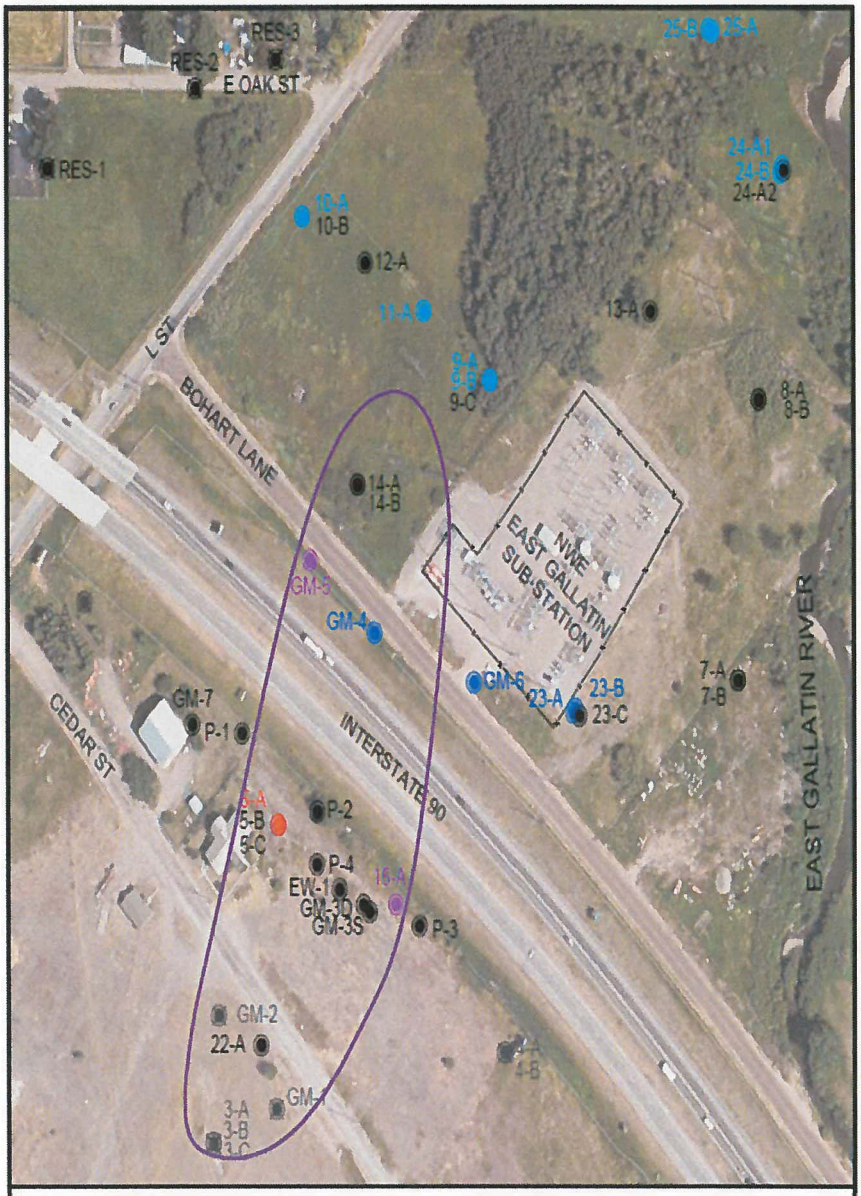
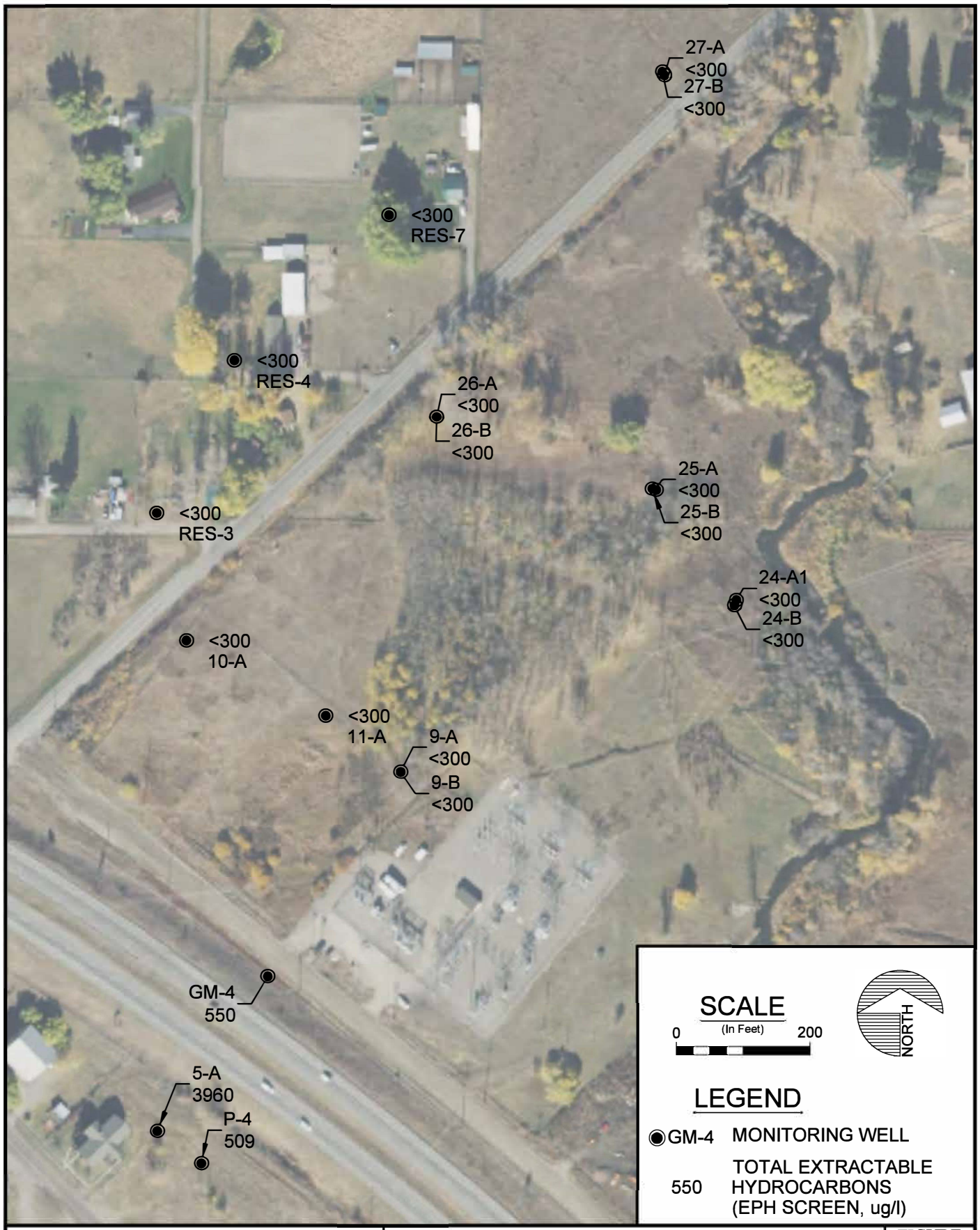
Consulting Scientists and Engineers

IDAHO POLE COMPANY
BOZEMAN, MONTANA
5029-300

MONITORING WELL NETWORK

FIGURE
17


RES-3
RES-2
E OAK ST
RES-1
25-B
25-A
24-A1
24-B
24-A2
10-A
10-B
12-A
11-A
13-A
L ST
BOHART LANE
9-A
9-B
9-C
8-A
8-B
14-A
14-B
NWE EAST GALLATIN SUBSTATION
GM-5
GM-4
GM-6
23-A
23-B
23-C
7-A
7-B
EAST GALLATIN RIVER
GM-7
P-1
CEDAR ST
INTERSTATE 90
5-A
5-B
5-C
P-2
P-4
EW-1
GM-3D
GM-3S
16-A
P-3
GM-2
22-A
GM-1
3-A
3-B
3-C
4-B
5-A MONITORING WELL WITH PAH CLEANUP LEVEL EXCEEDANCE 2017 AND 2019
16-A MONITORING WELL WITH LOW LEVEL PAH 2017
23-A MONITORING WELL WITH NON-DETECT PAH 2017
9-A MONITORING WELL WITH NON-DETECT PAH 2019
P-1 MONITORING WELL NOT SAMPLED FOR PAH
LEGEND
3-A ABANDONED WELL
1991 ESTIMATED EXTENT OF PAH'S EXCEEDING ROD CLEANUP LEVELS
NORTH
SCALE
0
200
IDAHO POLE COMPANY
BOZEMAN, MONTANA
PAH'S IN GROUNDWATER
FIGURE
18
UPDATE TIME: 3:00 PM
J:\BERGIN\BIL\20191003\J:\LAND PROJECTS\WCFAR\DWG\502918\502918B002.DWG
Hydrometrics, Inc.
Consulting Scientists and Engineers



IDAHO POLE COMPANY Bozeman, Montana	**PAH AND EPH SAMPLING NETWORK OCTOBER 2019**	FIGURE **19**