CDM Camp Dresser & McKee

Report

Montana Department of Health and Environmental Sciences

Final Remedial Design Work Plan
Montana Pole and Treating Plant Site
Butte, Montana

February 17, 1995

Site/O.U. Mt. Pole
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CDM

environmental engineers, scientists,
planners, & management consultants

CAMP DRESSER & McKEE INC.

1331 17th Street, Suite 1200
Denver, CO 80202
303 298-1311, Fax: 303 293-8236

February 16, 1995

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Montana Department of Health
and Environmental Sciences
ERD/Superfund

Mr. Brian Antonioli
Department of Health and Environmental Sciences
2209 Phoenix Avenue
P.O. Box 200901
Helena, Montana 59620-0901

Subject: Montana Pole and Treating Plant Final RD Work Plan

Dear Brian:

Under Task Order No. 2 of DHES Contract 450002, Camp Dresser & McKee Inc. (CDM) is submitting the above-referenced document. Per your request, CDM is submitting 30 copies to DHES and four copies to EPA.

CDM very much looks forward to working with you throughout this important project. If you have any questions or comments, please do not hesitate to contact me.

Very truly yours,

CAMP DRESSER & McKEE INC.

C. Hunter Nolen, P.E.
Project Manager

cc: Jim Harris - EPA
Project File 8469-122-TB

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List of Acronyms

ARARs	Applicable or Relevant and Appropriate Requirements
ARCO	Atlantic Richfield Company
BRA	Baseline Risk Assessment
CADD	Computer Aided Design and Drafting
CAMU	Corrective Action Management Unit
CCJM	C.C. Johnson & Malhotra, P.C.
CDM	Camp Dresser & McKee Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFSSI	Clark Fork Superfund Site Investigations
COCs	Contaminants of Concern
CSI	Construction Specifications Institute
DBE	Disadvantaged Business Enterprise
DBR	Design Basis Report
DHES	Montana Department of Health and Environmental Sciences
DM/DVP	Data Management/Data Validation Plan
EPA	U.S. Environmental Protection Agency
ERA	Emergency Removal Action
ERCS	Emergency Response Cleanup Services Contractor
ERT	Environmental Response Team
FDR	Final Design Report
FEMA	Federal Emergency Management Agency
GAC	granular activated carbon
HD	high density
HDPE	high density polyethylene
HSP	Health and Safety Plan
LAO	Lower Area One
LNAPL	light nonaqueous phase liquid
LTU	Land Treatment Unit

MBE	Minority Business Enterprise
MBMG	Montana Bureau of Mines and Geology
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MPTP	Montana Pole and Treating Plant
MT Tech	Montana College of Mineral Science and Technology
NCP	National Contingency Plan
O&M	Operations and Maintenance
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PAHs	polynuclear aromatic hydrocarbons
PCDDs	polychlorinated dibenzo-p-dioxins
PCDFs	polychlorinated dibenzofurans
PCP	pentachlorophenol
PDR	Preliminary Design Report
PE	Professional Engineer
PFDR	Pre-Final Design Report
PFDs	Process Flow Diagrams
PRPs	Potentially Responsible Parties
PST	Pacific Strike Team
QAPP	Quality Assurance Project Plan
RA	remedial action
RCRA	Resource Conservation and Recovery Act
RD	remedial design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
ROI	radius of influence
RPA	Robert Peccia & Associates
SAP	Sampling and Analysis Plan
TAT	Technical Assistance Team

TEF	toxicity equivalence factor
TM	technical memorandum
UV/oxidation	ultraviolet oxidation

Section 1
Introduction

1.1 Purpose and Scope

In September 1993, the U.S. Environmental Protection Agency (EPA) issued a Record of Decision (ROD) for the Montana Pole and Treating Plant (MPTP) Site in Butte, Montana (EPA 1993). The ROD identified contaminants of concern, affected areas of soil and groundwater, cleanup goals, and the components of the remedy selected by EPA and the Montana Department of Health and Environmental Sciences (DHES). The primary goal of the remedial design (RD) is to provide the specific, detailed methods of implementing the remedy specified in the ROD. The remedy is intended to meet the specific ROD requirements and performance standards, including risk-based cleanup goals, applicable or relevant and appropriate requirements (ARARs), and all other specified cleanup criteria.

The purpose of the RD Work Plan is to identify the tasks and the task completion schedules to be undertaken by Camp Dresser & McKee (CDM) to develop the Plans, Drawings, and Specifications, necessary to implement the remedial actions at the site. The final products of the RD process are the design documents that contain or address the design elements necessary to implement the remedial action (RA).

1.2 Project Background/Site History

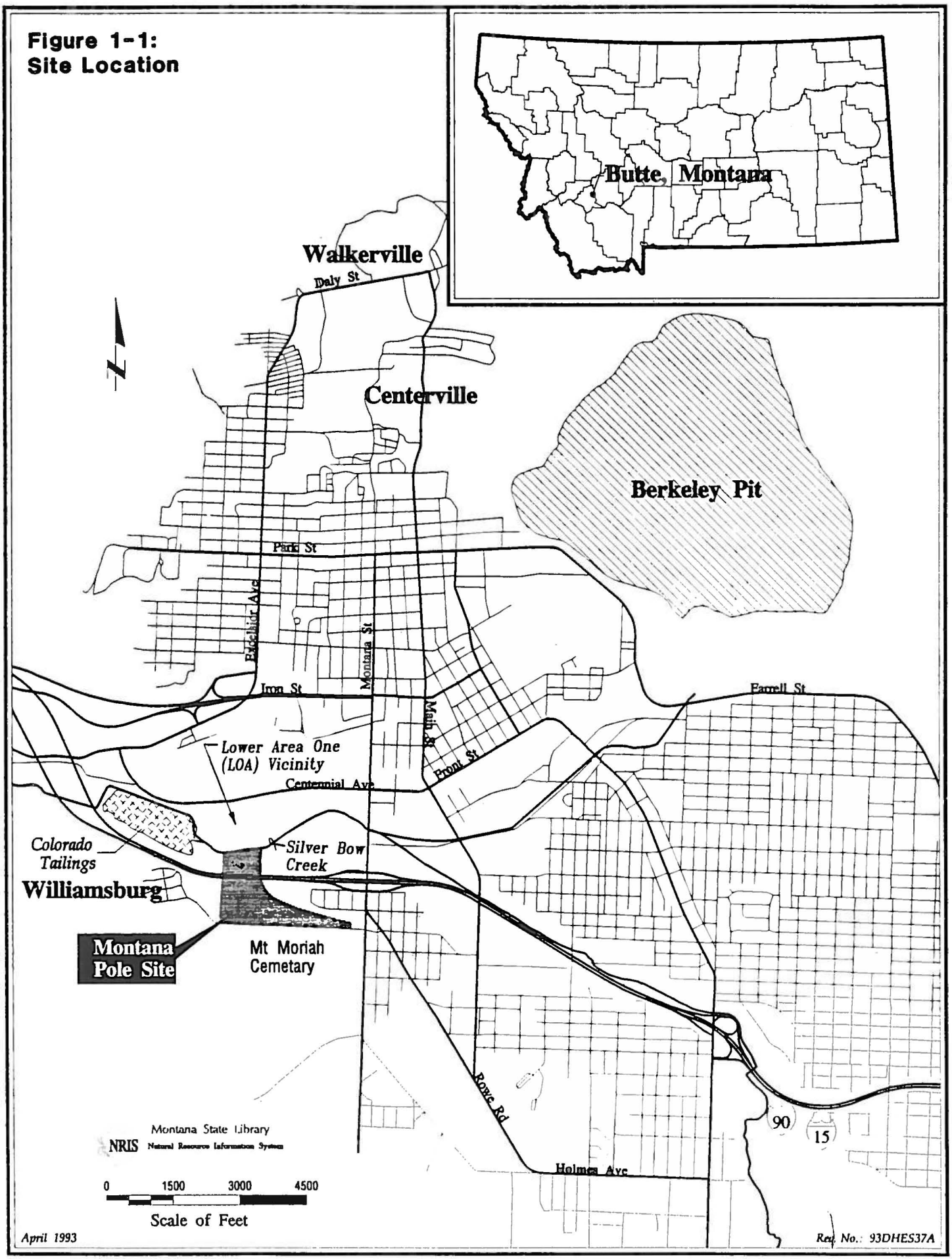
The MPTP site is located at 202 West Greenwood Avenue, immediately west of the Butte, Montana city limits in the southeast quarter, Section 24, T3N R8W (Figure 1-1). The site (see Figure 1-2) is bounded on the north by Silver Bow Creek, Greenwood Avenue to the south, and a railroad right-of-way granted to Burlington Northern to the east. The western site boundary is approximately 300 feet west of the soil storage buildings. Interstate 15/90 traverses the site in an east-west direction and partitions the site into northern and southern sections.

The plant began operations in approximately 1947 and shut down in 1987. With the exception of coal tar creosote used for a short period of time in 1969, the solution used to treat timber at the facility consisted of 5 percent pentachlorophenol (PCP) dissolved in 94 percent petroleum product (similar in characteristics and composition to diesel fuel). A detailed description of site operations is provided in the RI report (ARCO 1993a).

In March 1983, a citizen complaint was filed with the DHES that indicated that an oily seep was discharging into Silver Bow Creek near the MPTP site (E&E 1987). The DHES responded by collecting water samples from Silver Bow Creek upstream and downstream of the seep, in addition to sampling the seep itself. Results of the analyses indicated the presence of PCP and oil and grease at the seep and downstream of the seep.

EPA commenced an Emergency Removal Action (ERA) on July 10, 1985 with the U.S. Coast Guard. Removal action activities occurred during the 1985 and 1986 field seasons, and are discussed in the RI Report (ARCO 1993a). EPA excavated approximately 10,000 cubic yards of highly contaminated soils, bagged them, and placed them in storage buildings (pole barns)

Figure 1-1:
Site Location



Source: MPTP ROD (EPA, 1993)

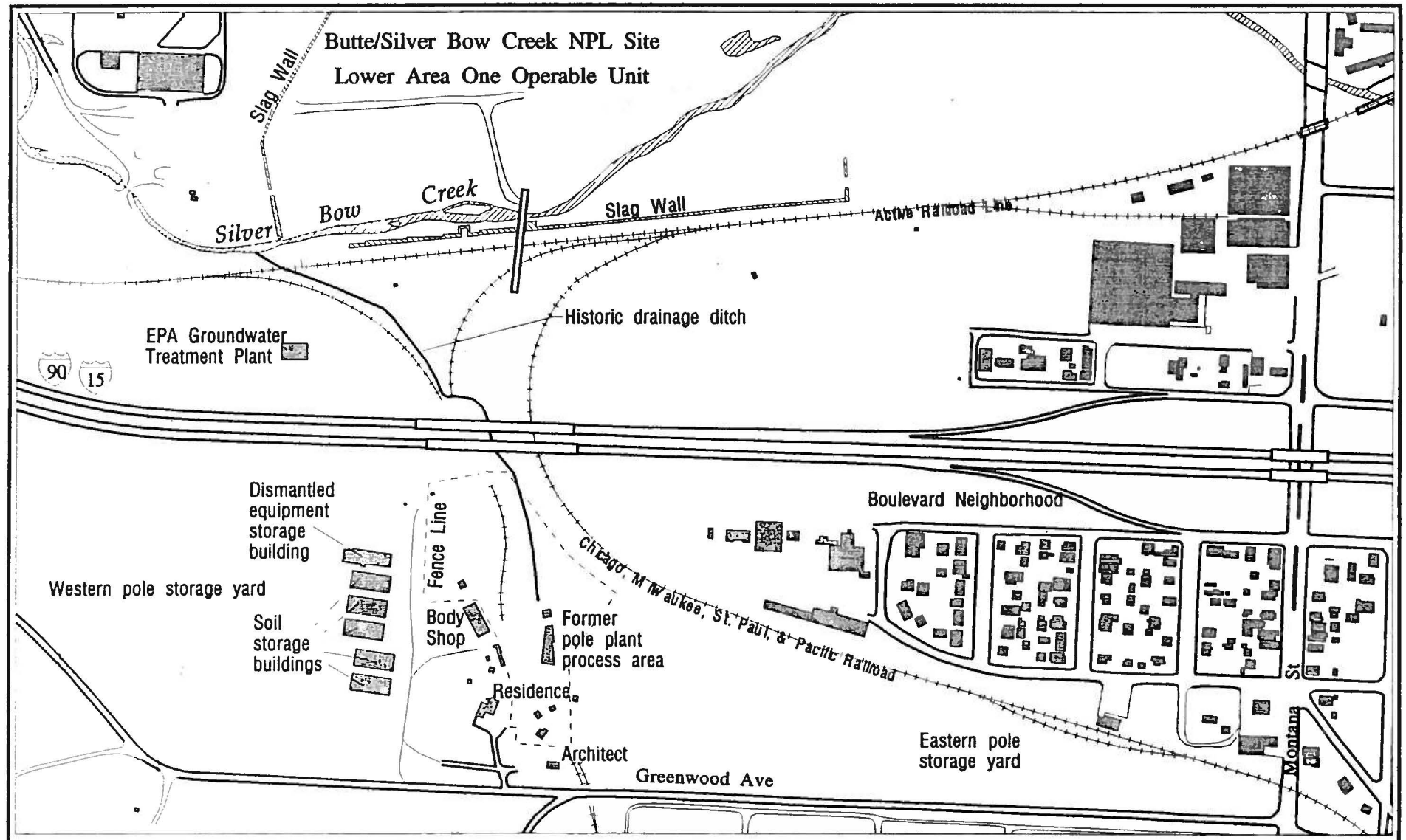


Figure 1-2: Montana Pole and Treating Plant. Site Layout and Features

Montana State Library
NRIS Natural Resource Information System

0 200 400 600 800 1000
Scale in Feet

Building
Water
Slag Wall
Paved Road
Railroad
Fence Line

April 1993 Req No: 93DHES32B

Source: MPTP ROD (EPA, 1993)

constructed onsite. Tanks, retorts, pipes, and other hardware were dismantled and stored onsite in a former sawmill building. Two groundwater interception/oil recovery systems were installed to alleviate oil seepage into the creek. Oil was recovered by physical separation, and separation underflow was reinjected to site groundwater via two infiltration galleries. Contaminated areas of the site and features of the groundwater recovery system were fenced to restrict public access. The groundwater and oil recovery system was maintained and operated by DHES until February 1993.

Between June 1992 and the present, EPA has instituted an additional ERA to control and recover the light nonaqueous phase liquid (LNAPL) found during the RI. The action included the installation of an LNAPL recovery and containment system and a water treatment facility described in more detail in Section 2.2.

1.3 Summary of Existing Data

For the purpose of discussion, the data associated with the MPTP Site have been divided into three sets: (1) data collected prior to the Remedial Investigation/Feasibility Study (RI/FS); (2) data collected as part of the RI/FS; and (3) data collected after the completion of the RI/FS.

1.3.1 Pre-RI/FS Data

Sampling activities at the MPTP Site began in March 1983. Sampling was performed by the EPA Technical Assistance Team (TAT) and Environmental Response Team (ERT), the U.S. Coast Guard Pacific Strike Team (PST), the DHES, the Montana Bureau of Mines and Geology (MBMG), Emergency Response Cleanup Services Contractor (ERCS), Riedel Environmental Services, and the Montana College of Mineral Science and Technology (MT Tech). Environmental sampling included the collection of soil, sludge, liquid, and gaseous samples for analysis.

Three theses were produced by Masters students at the Montana College of Mineral Science and Technology which provided physical information potentially important to the RD efforts. Emulsion characterization and demulsification of wood treating fluids was evaluated by J.S. McElroy (1988). Data were collected on emulsion type, droplet size-distribution, viscosity, surface tensions, interfacial tension, and emulsion stability. Low to ambient temperature cycling and centrifugation/filtration through porous media demulsification techniques were studied. D.M. Stordahl (1993) evaluated mass transfer rates of PCP from floating product into groundwater including the variables pH, temperature, ionic strength of water, and turbulence (pumping). H.R. Moore (1989) collected data on grain size analysis, porosity, specific yield/ retention, and resaturation characteristics for sands near the water table for design of the infiltration galleries.

The majority of the Pre-RI data were not validated and have limited sample documentation associated with them, but were used to some degree in the RI, and still provide some useful information for RD purposes, such as chemical and physical characteristics of oils and sludges.

Offsite sampling was completed at the Russell Refinery and Lavelle Powder sites (EPA 1989) located directly east of the Butte cemetery and south of the MPTP Site. Surface soils were collected in May 1983 for EP toxicity analysis of metals. Four surface soil samples, including one

background sample, and samples from two borings, were collected in July 1988 for analysis of volatiles, semivolatiles, and metals. This work was conducted as part of separate EPA investigations at those sites, and only provides information representative of other sites in the vicinity of the MPTP site.

1.3.2 RI/FS Data

Working as the consultant for ARCO, Keystone Environmental, Inc. performed an extensive sampling and analysis program for the RI. DHES directed the RI program, and three rounds of sampling, between June 1990 and June 1991. Priority Pollutants (both organic and inorganic) and physical parameters were analyzed for in various media including soil, groundwater, surface water, sediment, and air. The data had complete data validation, and are stored in the Clark Fork database. The RI data provide the basis for the delineation of the nature and extent of contamination at the site, the FS, the baseline risk assessment (BRA), and the ROD.

Soil and groundwater samples were collected by ARCO from properties adjacent to the Montana Pole and Treating Site in March 1991 for the purpose of determining background concentrations of site contaminants. Soils were collected from both the Blue Bird Mining Co. and Lavelle Powder Co. for a hydrocarbon scan, percent solids, and PCP. Groundwater was collected from wells on the Bontempo property and the Mt. Moriah Cemetery for analysis of BTEX, PAHs, phenolics, metals, TOC, and TDS. Water levels were also obtained from these wells.

Several treatability studies were performed as part of the FS (ARCO 1993b) to evaluate treatment technologies for soils and groundwater. Those that pertain directly to the RD work include (1) a biotreatability study, which evaluated bioslurry and land farm technologies for treatment of site and bagged soils; (2) a soil washing study; and (3) a fluidized bed bioreactor water treatment study. Data obtained during the biotreatability study pertained to addition of microbes, the use of White Rot fungi, nutrient amendment, pH adjustment, and the effect of surfactants. Data obtained during the washing study included soil grain size, organic concentrations in different soil sizes and analytical data on PCP, fuel oils, VOCs, PAHs, metals, and TCLP; as well as data pertaining to effectiveness of surfactants, various wash times, and double washings. The surfactants Olin 4750, Whitconate 1223L, Triton X-100, Triton RW-150, and Redicote E-11 were evaluated. The fluidized bed bioreactor contained activated carbon (BIFAR™ Technology) plus a microbial population from activated sludge. The process involves both adsorption and biodegradation of organics. Data were obtained to evaluate the effectiveness of the technology and the effect of temperature on reactor performance.

Though not part of the RI/FS work by ARCO, EPA conducted treatability testing and reporting of soil washing in 1992 and 1993.

1.3.3 Post-RI/FS Data

Additional data have been collected by various entities, primarily in support of ongoing litigation, since the completion of the RI/FS. EPA and its contractor, Roy F. Weston, Burlington Northern Railroad, ARCO, Inland Properties, and CDM have all collected data during the post-RI/FS period as noted in Table 1-1. Analytical parameters varied by responsible party, but included dioxins, pentachlorophenol, PAHs, semivolatile and aromatic organics, and LNAPL characteristics. Many of these data have been used in support of litigation activities, but data

TABLE 1-1
Post RI Data Currently Located in CDM's Montana Pole Database System

FILE NAME	MEDIA	SAMPLE I.D.	PARAMETERS	DATE	COLLECTED BY
ANALYSES DB	Groundwater				
		WELL	Chemical Data		
		Recovery			
		EPA-1	PCP, TPH, Metals,FE2+, pH, Hardness, Nitrogen, Misc.	Sep-92	E&E, INC.
				Oct-92	
		EPA-4	PCP, TPH, Metals,FE2+, pH, Hardness, Nitrogen, Misc.	Oct-92	E&E, INC.
		EPA-7	PCP, TPH, Metals,FE2+, pH, Hardness, Nitrogen, Misc.	Oct-92	E&E, INC.
		Onsite			
		M-4-87	PCP, PAHs,Metals,FE+2, pH, Nitrogen, Misc.	Sep-92	E&E, INC.
		W-2	PCP, PAHs,Metals,FE+2, pH, Nitrogen, Misc.	Sep-92	E&E, INC.
		W-5	PCP, TPH	Sep-92	E&E, INC.
		W-8	PCP, TPH	Sep-92	E&E, INC.
		W-10	PCP, TPH	Sep-92	E&E, INC.
		Offsite			
		RH-10	BTEX	Nov-91	Keystone
		RH-11	BTEX	Nov-91	Keystone
		RH-17	BTEX	Nov-91	Keystone
		RH-19	BTEX	Nov-91	Keystone
		RH-20	BTEX	Nov-91	Keystone
		RH-33	BTEX	Nov-91	Keystone
		RH-8	BTEX		
WATLEV DB	Groundwater			Quarterly Sampling	
		EPA-1 through EPA-10	Groundwater elevations/NAPLs	Monthly (Dec 1992 to present)	MBMG, BOR
		GW-1	Groundwater elevations/NAPLs	91 (1-4), 92 (1-2)	Montgomery 1992
		GW-2, GW-10 through GW-17	Groundwater elevations/NAPLs	91 (1-4), 92 (1-2), 93 (1-2)	BOR, MBMG, Montgomery 1992
		GW-3 through GW-9, GW-18	Groundwater elevations/NAPLs		
		GW-20A,B,C, GW-21, GW-22	Groundwater elevations/NAPLs		
		GW-23A,B, GW-24 through GW-27	Groundwater elevations/NAPLs		
		M-1-87 through M-7-87	Groundwater elevations/NAPLs	91 (1-4), 92 (1-2)	Montgomery 1992, BOR
		P-1 through P-10, PW-1	Groundwater elevations/NAPLs	92 (4), 93 (1-2)	MBMG, BOR
		PZ-1	Groundwater elevations/NAPLs	91 (3,4), 92 (1-2)	MBMG, BOR
		R-1 through R-4	Groundwater elevations/NAPLs	91 (1-4), 92 (2)	Montgomery 1992, BOR
		SE-Gallery	Groundwater elevations/NAPLs	88 (4), 89 (1-4), 90 (1-4), 91 (1-3)	Montgomery 1992
		W-1 through W-16	Groundwater elevations/NAPLs	91 (1-4), 92 (1-2), 93 (1-2)	Montgomery 1992, BOR

TABLE 1-1 :
Post RI Data Currently Located in CDM's Montana Pole Database System

FILE NAME	MEDIA	SAMPLE I.D.	PARAMETERS	DATE	COLLECTED BY
WATLEV.DB	Groundwater	(Continued)			
		W-17	Groundwater elevations/NAPLs	91 (3-4), 92 (1-2), 93 (2)	Montgomery 1992, BOR
		W-5A	Groundwater elevations/NAPLs	92(2)	Montgomery 1992, BOR
ANALYSES.DB	Process Water	Effluent	EPA-8270	Mar-93	E&E, INC.
		Influent	EPA-8270	Mar-93	E&E, INC.
		S-gallery	EPA-8270	Sep-92	E&E, INC.
		S-sep	Metals, Dioxins/Furans, PAHs,Nitrate,FE2+, pH,Misc.	Jun-92	E&E, INC.
		SE-gallery	PCP, limited PAHs	Sep-92	E&E, INC.
ANALYSES.DB	Sediment	SD0003	PCP	Sep-92	Keystone
ANALYSES.DB	Surface Water	SW001	EPA 8270	Sep-92	E&E, INC.
		SW002	EPA 8270	Sep-92	
		SW003	EPA 8270	Sep-92	
ANALYSES.DB	Surface soil	MP-SO-01 Through MP-SO-34	PCP	Jul-92 Jan-93	E&E, INC.

Notes:
1) See text for other studies not in database
2) Montgomery represents ARCO

Acronyms:

BOR	Bureau of Reclamation
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
E&E Inc	Ecology and Environment, Incorporated
Keystone	Keystone Environmental Resources, Incorporated
MBMG	Montana Bureau of Mines and Geology
NAPLs	Nonaqueous Phase Liquids
PCP	Pentachlorophenol
TPH	Total Petroleum Hydrocarbons

validation results are not universally available. Data summarized in Table 1-1 are currently part of CDM's Montana Pole database. Additional data currently housed in CDM's files include field data on LNAPL viscosity, lithologic descriptions for additional borings, and a summary of geotechnical information for the interstate bridge. Data on viscosity and specific gravity of the LNAPL was obtained by CDM on January 28, 1994 from recovery wells EPA-5 and EPA-10. Field techniques, used for analysis of these parameters, did not meet full ASTM specifications, however, the data are expected to be useful for RD purposes. Data were collected over a temperature range of 42 through 56°F.

Lithologic descriptions were logged for nine borings drilled in January 1994 by GeoTrans for ARCO. Lithologies are noted in 2.5 foot increments along with observations of odor, the presence of oil, and water table depths. Two borings were drilled beneath the highway bridge to 19 and 16.5 feet, respectively. These wells were completed as permanent wells and screened between depths of 9 to 19 and 4.5 to 16.5 feet, respectively. Logs are available in the CDM Montana Pole files.

Mr. Dave Stiller completed a report for Inland Properties that summarized geotechnical information on the Highway bridge structure. Road plans, bridge plans, construction diaries, geotechnical data, and core logs are summarized in this report dated February 1, 1993. Also included are footing plans and general layouts.

1.4 Work Plan Organization

This work plan is organized into seven sections of text and includes three appendices. The following presentation is a brief description of each section and appendix.

- Section 1, Introduction, describes the purpose and the contents of the work plan and provides background information on the site.
- Section 2, Selected Remedy, provides an overview of the selected remedy as presented in the ROD as well as a description of the remedial components that currently exist at the site.
- Section 3, Remedial Design Approach, gives a detailed description of the approach to be taken in the RD to meet the requirements of the ROD, and the unique remedial action considerations associated with the site.
- Section 4, Remedial Design Activities/Documents, describes the design components including the project documents to be prepared and submitted.
- Section 5, Project Team and Subcontractors, introduces key project personnel and lists subcontractors' responsibilities.
- Section 6, Remedial Design Schedule, presents the proposed RD schedule in bar chart format.
- Section 7, References, provides a bibliography of sources used in the preparation of this RD work plan.

- Appendix A is a preliminary Table of Contents for the Design Basis Report.
- Appendix B is the preliminary list of Drawings for the RD.
- Appendix C is the preliminary list of Specifications for the RD.

Section 2
Selected Remedy

2.1 Record of Decision Summary

2.1.1 Nature and Extent of Contamination

Hazardous substances that have been released at or from the site include, but are not limited to, the following:

- PCP and other chlorinated phenols
- Polynuclear aromatic hydrocarbons (PAHs)
- Polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs)

The ROD contains detailed information on these hazardous substances including regulatory, chemical, physical, and biological properties. The extent of surface soil contamination, surface and subsurface soil contamination, the LNAPL plume, and the PCP groundwater contamination plume at the site, are shown in Figures 2-1 through 2-4, respectively. Additionally, other media that will be addressed during the RD and RA include miscellaneous oils and sludges, and contaminated onsite equipment and debris.

2.1.2 Estimated Volumes of Contaminated Materials

In the ROD (EPA 1993), volume estimates were made of contaminated site soils, groundwater, LNAPL, oils, sludges, equipment, and debris, as presented in the following paragraphs. Per the ROD, CDM will conduct independent volume estimates for the RD. For site soils, groundwater, and LNAPL, CDM will evaluate ARCO's methods of volume estimation relative to the most recent information available, including post-RI sampling results. For oils and sludges, CDM will adjust ARCO's estimate based on estimates of additional LNAPL recovery by EPA since the ROD. For equipment and debris, the need for additional estimates is currently uncertain but, if necessary, will provide more detail on the relative volumes of different types of materials. For example, per RCRA, contaminated brick may have to be disposed of differently than contaminated wood or metal.

Contaminated Soils

The estimated volumes of contaminated soils at the site are shown in Table 2-1. These volumes include previously removed soils that are stored in pole barns at the site, in-place contaminated soils, and uncontaminated soils that would require removal to access underlying contamination. Figures 2-1 through 2-3 show the locations of in-place contaminated soils at the site, and the calculation method is presented in the FS and ROD.

The volume of previously excavated soils presently stored in onsite pole barns is approximately 10,000 yd^3. Approximately 1,200 cubic yards of excavated near-creek soils are presently stored on a plastic liner near the process buildings. Volume estimates of soils to be removed near Silver Bow Creek and soils removed for installation of a groundwater treatment system were estimated. It was estimated that about 6,000 yd^3 of soils near the creek would require excavation

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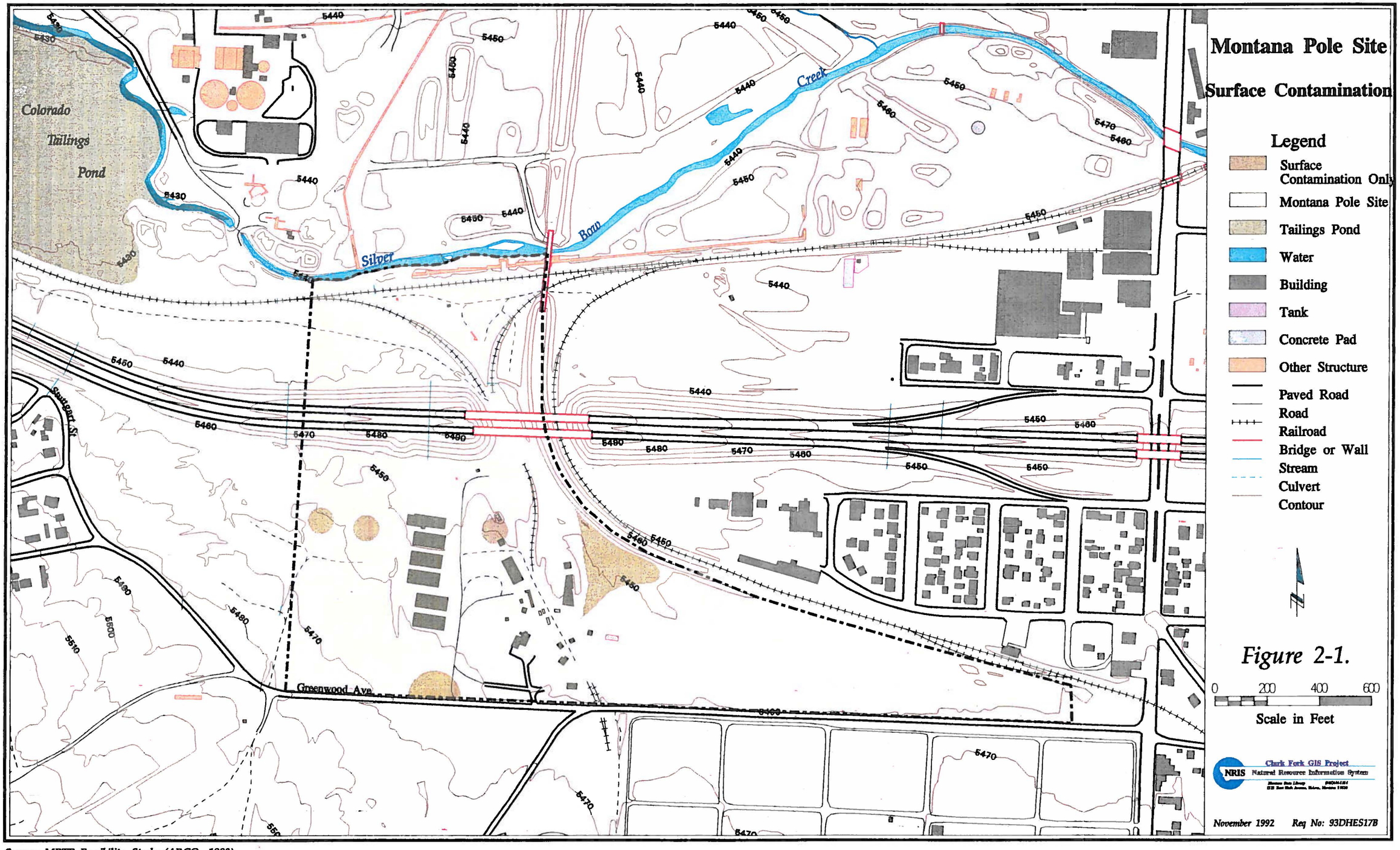
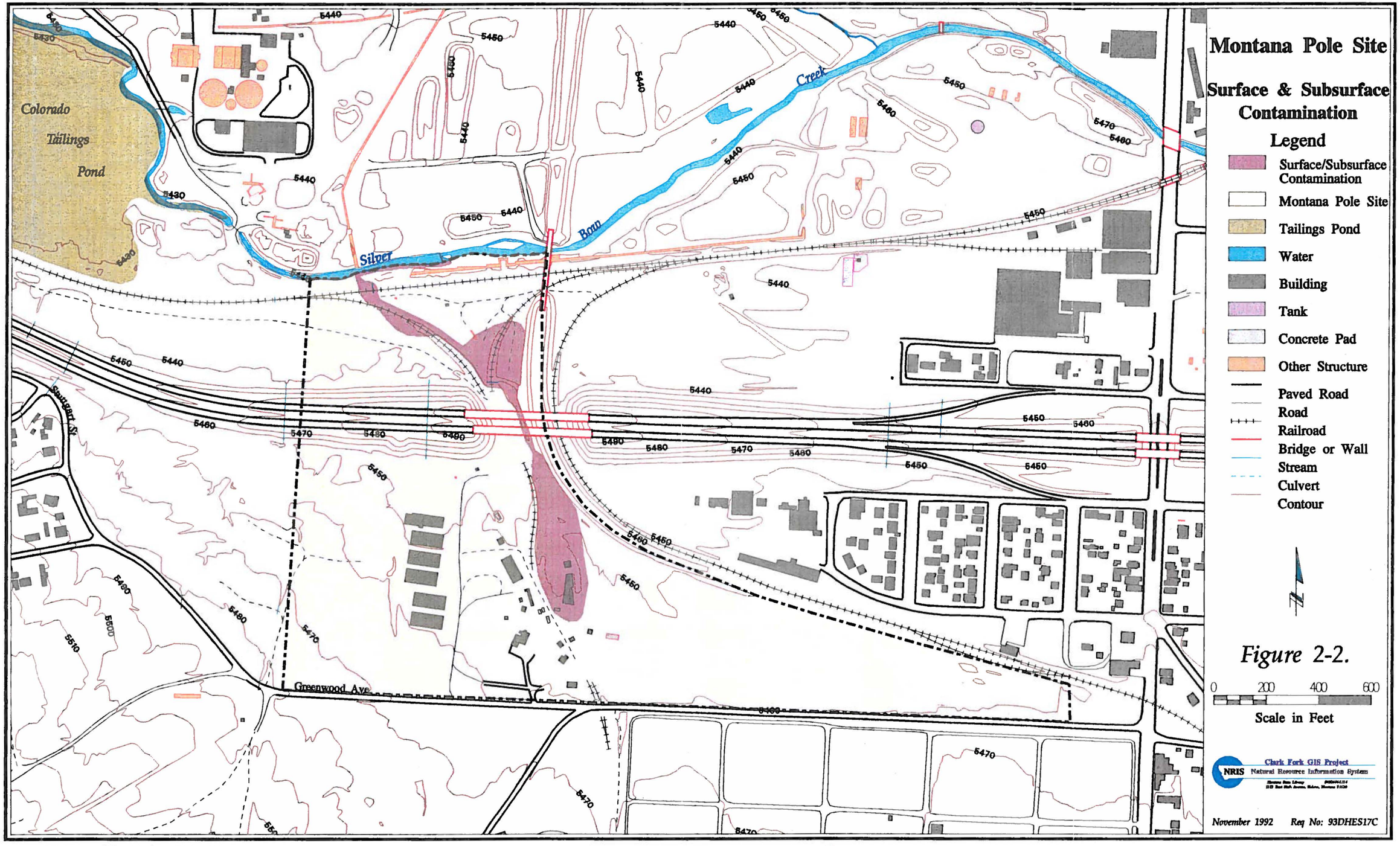


Source: MPTP Feasibility Study (ARCO, 1993)



Source: MPTP Feasibility Study (ARCO, 1993)

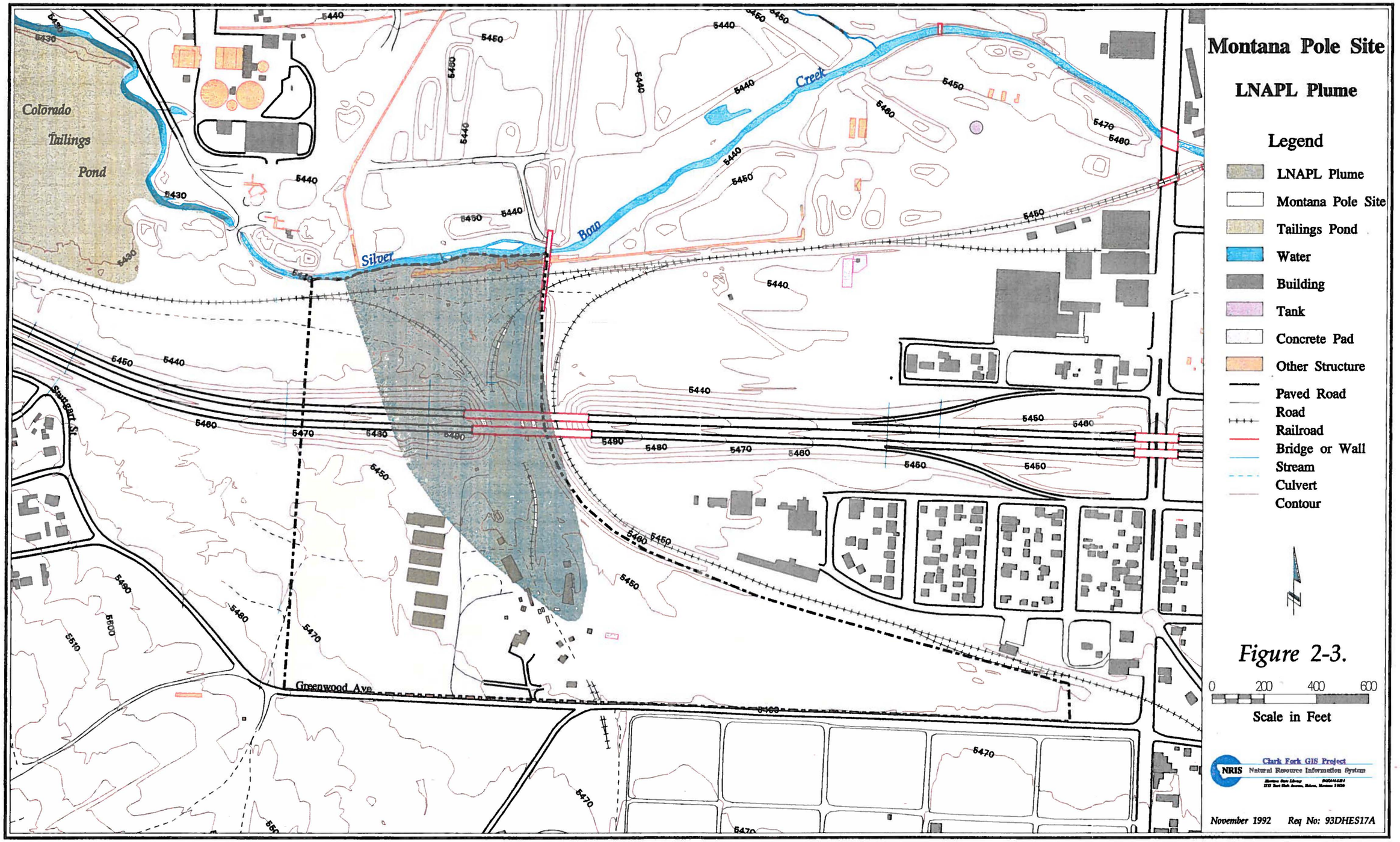
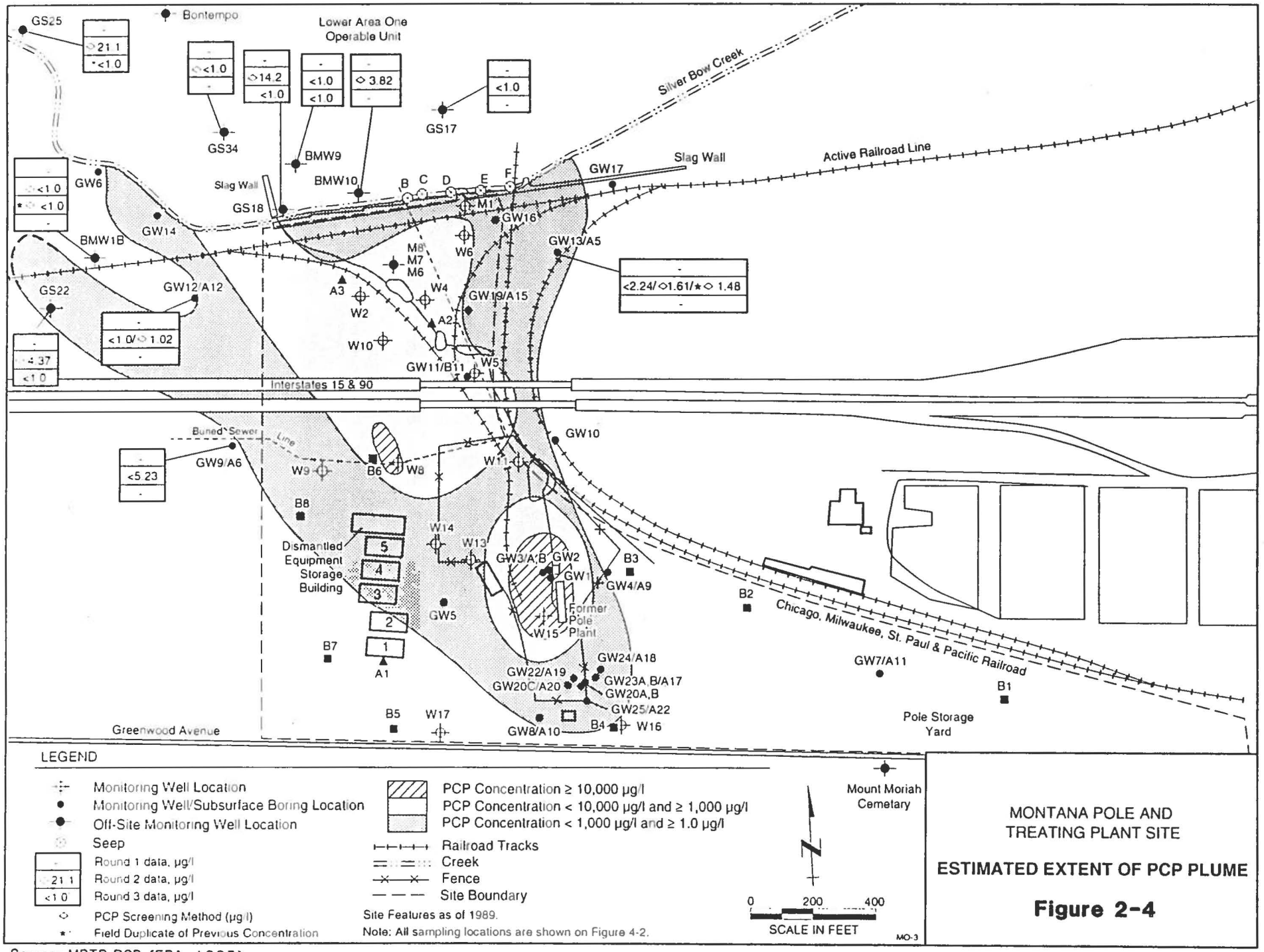


Figure 2-3.

Source: MPTP Feasibility Study (ARCO, 1993)



MONTANA POLE AND TREATING PLANT SITE

ESTIMATED EXTENT OF PCP PLUME

Figure 2-4

Source: MPTP ROD (EPA, 1993)

and treatment. The volume of soils estimated to be excavated during installation of the future groundwater extraction and treatment system is approximately 7,000 yd^3.

Table 2-1
Contaminated Soil Volume Estimates

Soils		Volume yd^3
1.	Bagged soils	10,000
2.	Contaminated near creek soils	6,000
3.	Soils excavated for groundwater extraction system	7,000
4.	Contaminated surface soils ("hot spots")	10,000
5.	Contaminated surface and subsurface soils	82,000
6.	Accessible LNAPL "smear zone" soils	93,000
7.	Soils overlying accessible LNAPL "smear zone" soils Northern portion of site Southern portion of site	 28,000 66,000
8.	Inaccessible soils	41,000

Source: Record of Decision Montana Pole and Treating Plant Site, September 1993

Volume estimates of additional contaminated in-place site soils include surface soils and subsurface soils including soils impacted along the LNAPL plume. Areas where contamination was found in surface soils but not in subsurface soils are shown in Figure 2-1 and consist of "hot spot" areas in the east and west treated wood storage yards and soils near the former process area. The volume of these soils is assumed to extend from the ground surface to 3 feet below ground surface and is estimated to be 10,000 yd^3. The actual depth of contamination in these areas will be determined during the remedial action using a sampling program to be specified in the RD.

Areas where contamination was found in both the surface and subsurface soils, down to the groundwater table are shown in Figure 2-2. The volume of soils in this area is estimated to be 82,000 yd^3. This volume assumes that contaminated subsurface soil concentrations extend to approximately 4 feet below the groundwater surface. The volume of these soils located beneath the highway is estimated at 4,000 yd^3.

Near the highway, on the north side, a "sink hole" area exists where wood-treating chemicals discharged during MPTP operations tended to collect and infiltrate to the subsurface. At this location, the depth of subsurface soil contamination is anticipated to be greater than in most other areas of the site, and this has not been considered in volume estimates to date.

In other areas of the site, subsurface soils have been impacted by the floating LNAPL layer. This area of LNAPL influence extends from the former process area to Silver Bow Creek. LNAPL volume of 370,000 gallons has been estimated based upon the inferred LNAPL plume shown in

Figure 2-3. The extent of the inferred LNAPL plume is based on the presence of LNAPLs in a number of wells and borings on the site. Within this area, a "smear zone" where LNAPL has contacted subsurface soils near the groundwater table has been estimated to extend vertically 2 feet above and 4 feet below the groundwater surface. Contaminated subsurface soils associated with the LNAPL plume in this area underlie uncontaminated soils. The volume of these uncontaminated soils has also been estimated and is presented on Table 2-1. In order to excavate contaminated soils associated with the LNAPL plume, the overlying soils will also require excavation. Separation of clean and contaminated soils during the remedial action will be important to minimize the volume of soils requiring treatment. Excavation of soils beneath the interstate highway is considered to be infeasible. Contaminated soils beneath the highway will be left in place and addressed by soil flushing and *in situ* bioremediation.

The volume of accessible contaminated subsurface soils associated with the LNAPL plume is estimated at 93,000 yd^3. This volume is in addition to the 82,000 yd^3 surface/subsurface volume estimate. The volume of contaminated subsurface soils associated with the LNAPL plume that are considered inaccessible beneath the highway is estimated at 37,000 yd^3. This volume is in addition to the 4,000 yd^3 within the drainage ditch beneath the highway. The volumes of uncontaminated soils overlying the LNAPL plume are estimated to be 28,000 yd^3 in the area north of the highway and 66,000 yd^3 in the area south of the highway.

Groundwater

The areal extent of contaminated groundwater above the Safe Drinking Water Act Maximum Contaminant Level (MCL) for PCP of 1 µg/L is estimated to be 1.8 million square feet (ARCO 1993b). Assuming an average aquifer thickness of 22 feet and a porosity of 30 percent, the total volume of alluvial groundwater contaminated above the MCL was estimated to be approximately 90 million gallons. This volume represents the volume of groundwater contaminated above the MCL in place.

Equipment and Debris

A rough estimate of the volume of equipment and debris onsite was performed for the FS. It was estimated that there is about 9,100 cubic yards of debris onsite that consists of wood, soil cuttings, concrete, steel, and brick (ARCO 1993b). This estimate does not include the slag wall on the north end of the site.

Oils and Sludges

Approximately 6,300 gallons of untreated oily wastes from the oil/water separator process; 9,000 gallons of KPEG-treated oil; 2,200 gallons of KPEG-reagent sludge; and 3,000 gallons of miscellaneous oily wastes and sludge are estimated to be stored in drums and storage tanks at the MPTP site (ARCO 1993a). ARCO (1993a) assumed that the total quantity of oily wastes and sludge requiring remediation was approximately 26,500 gallons. Additionally, it was estimated that between 3,000 and 6,000 gallons of oily wastes would be generated each year in the first few years of operation of a combined groundwater and LNAPL recovery system, which is likely to be used at this site. The quantity of LNAPL recovered from the groundwater by EPA since the 1992 ERA will be determined during the RD.

2.1.3 Cleanup Goals

Currently the MPTP site is zoned for industrial land use with residential use allowed for owners and caretakers of businesses on the premises. However, it is possible that the site will be restricted from any residential use in the future. The potentially responsible parties (PRPs) indicated in comments submitted during the Proposed Plan comment period that they are pursuing rezoning of this area, as well as creation of conservation easements and possibly other institutional controls to preclude residential land use and groundwater use at the site. Representatives of the Planning Office of Butte-Silver Bow County have expressed a willingness to accommodate the PRPs' requests and institute such land use restrictions.

Accordingly, cleanup levels and, subsequently the RD, are based upon an assumption of adequate institutional controls to prevent any residential use at the site. Soil cleanup levels have been developed to protect recreational and industrial land users at the site from excessive health risks. If, for any reason, appropriate land restrictions are not actually implemented, cleanup goals and the RD will be adjusted accordingly.

Cleanup levels for site soils are listed in Table 2-2. These levels are based on a 1 in 1,000,000 cancer risk level for recreational land use at the site for each contaminant of concern for the most susceptible exposure pathway, as described in the ROD.

Table 2-2
Soil Cleanup Levels and Corresponding Risks

Media	Contaminant	Cleanup Level (µg/kg)	Basis	Cancer Risk (recreational use for soil)	Noncancer Health Hazard Quotient
Soils	Pentachlorophenol[a]	34,000	Risk	1.0×10^{-6}	<1
	B2 PAHs (TEF)[b,c]	4,200	Risk	1.0×10^{-6}	<1
	Dioxin TCDD (TEF)[b,d]	0.20	Risk	1.0×10^{-6}	<1

[a] Levels correspond to an excess cancer risk of 1×10^{-6} and are based on data for the dermal exposure pathway as presented in the Baseline Risk Assessment Report (CDM 1993).
[b] Levels correspond to an excess cancer risk of 1×10^{-6} and are based on data for the soil ingestion exposure pathway as presented in the Baseline Risk Assessment Report (CDM 1993).
[c] Sum of individual B2 PAH (benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, benzo(g,h,i)perylene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene) concentrations multiplied by their corresponding toxicity equivalence factor (TEFs) as shown on Table 28 of the ROD.
[d] Sum of individual chlorinated dibenzo-p-dioxins and -dibenzofurans concentrations multiplied by their corresponding toxicity equivalence factor (TEF) as shown on Table 29 of the ROD.

Source: Record of Decision Montana Pole and Treating Plant Site, September 1993.

The cleanup goals for site groundwater are shown on Table 2-3 and are based on MCLs and human health risks as described in the ROD. Cleanup goals for groundwater must be met at the Point of Compliance, which will be the management unit boundary, as defined below.

Table 2-3
Groundwater Cleanup Levels and Corresponding Risks

Media	Contaminant	Cleanup Level (µg/L)	Basis	Cancer Risk (drinking use for groundwater)	Noncancer Health Hazard Quotient
Groundwater	Pentachlorophenol	1.0	MCL	1.7×10^{-6}	NA
	Benzo(a)pyrene	0.2	MCL	2.1×10^{-5}	NA
	Benzo(a)anthracene	1.0	Risk	1.0×10^{-6}	NA
	Benzo(b)fluoranthene	0.2	Risk	2.1×10^{-5}	NA
	Benzo(k)fluoranthene	1.0	Risk	1.0×10^{-6}	NA
	Chrysene	1.0	Risk	1.0×10^{-6}	NA
	Dibenzo(a,h)anthracene	0.2	Risk	2.1×10^{-5}	NA
	Indeno(1,2,3-cd)pyrene	1.0	Risk	1.0×10^{-6}	NA
	Benzo(g,h,i)perylene	1.0	Risk	1.0×10^{-6}	NA
	Total D PAHs[a]	360	Hazard Quotient	NA	0.9
	Dioxin TCDD (TEF)[b]	3.0×10^{-5}	MCL	6.2×10^{-5}	<1
	2,4,6-trichlorophenol	6.5	Risk	1.0×10^{-6}	NA
	2-chlorophenol	45	Hazard Quotient	NA	0.9
	2,4-dichlorophenol	27	Hazard Quotient	NA	0.9
	2,3,5,6-tetrachlorophenol	267	Hazard Quotient	NA	0.9

NA = Not applicable
[a] Sum of individual D PAH (acenaphthene, acenaphthylene, anthracene, fluoranthene, fluorene, naphthalene, phenanthrene, pyrene) concentrations.
[b] Sum of individual chlorinated dibenzo-p-dioxins and -dibenzofurans concentrations multiplied by their corresponding toxicity equivalence factor (TEF) as shown on Table 29 of the ROD.

Source: Record of Decision Montana Pole and Treating Plant Site, September 1993.

The cleanup levels for Silver Bow Creek are shown in Table 2-4 and are based on MCLs, human health risk, and the Montana Water Quality Act I-Classification standards, as described in the ROD. One goal of the groundwater remedial action is to contain and remediate contaminated groundwater to limit release of contaminants to Silver Bow Creek and reduce contaminant levels in the creek to within applicable standards. Using the I-Class methodology, instream contaminant concentrations at the Point of Compliance must be reduced to the larger of either EPA Gold Book levels or one-half of the mean instream concentrations immediately upstream of the site. This takes into account that there may be other sources of contaminants upstream of the site. However, as all sources of contaminants are reduced or eliminated, instream contaminant levels from Montana Pole sources will approach the Gold Book levels. Therefore, the ultimate cleanup levels that are to be achieved in the stream are Gold Book levels, risk-based criteria, and MCLs, as shown on Table 2-4.

Table 2-4
Surface Water Cleanup Levels and Corresponding Risks

Media	Contaminant	Cleanup Level (µg/L)	Basis	Cancer Risk (drinking use for surface water)	Noncancer Health Hazard Quotient
Groundwater	Pentachlorophenol	1.0	MCL	1.7×10^{-6}	<1
	Benzo(a)pyrene	0.2	MCL	2.1×10^{-5}	NA
	Benzo(a)anthracene	1.0	Risk	1.0×10^{-6}	NA
	Benzo(b)fluoranthene	0.2	Risk	2.1×10^{-5}	NA
	Benzo(k)fluoranthene	1.0	Risk	1.0×10^{-6}	NA
	Chrysene	1.0	Risk	1.0×10^{-6}	NA
	Dibenzo(a,h)anthracene	0.2	Risk	2.1×10^{-5}	NA
	Indeno(1,2,3-cd)pyrene	1.0	Risk	1.0×10^{-6}	NA
	Benzo(g,h,i)perylene	1.0	Risk	1.0×10^{-6}	NA
	Total D PAHs[a]	360	Hazard Quotient	NA	0.9
	Dioxin TCDD (TEF)[b]	1.0×10^{-5}	Aquatic Criteria	2.0×10^{-5}	<1
	2,4,6-trichlorophenol	6.5	Risk	1.0×10^{-6}	NA
	2-chlorophenol	45	Hazard Quotient	NA	0.9
	2,4-dichlorophenol	27	Hazard Quotient	NA	0.9
	2,3,5,6-tetrachlorophenol	267	Hazard Quotient	NA	0.9

NA = Not applicable
[a] Sum of individual D PAH (acenaphthene, acenaphthylene, anthracene, fluoranthene, fluorene, naphthalene, phenanthrene, pyrene) concentrations.
[b] Sum of individual chlorinated dibenzo-p-dioxins and -dibenzofurans concentrations multiplied by their corresponding toxicity equivalence factor (TEF) as shown on Table 29 of the ROD.

Source: Record of Decision Montana Pole and Treating Plant Site, September 1993.

The cleanup levels for treated water discharges to Silver Bow Creek are also based on MCLs, risk-based criteria, and the I-Classification standard. The ultimate cleanup levels that are to be achieved are shown on Table 2-5.

The clean up levels for any water to be reinjected into the aquifer are based on nondegradation criteria and must be no greater than the average concentration of groundwater contamination in the area of recharge.

2.1.4 Selected Remedies

The ROD establishes the technologies that will be used to treat contaminated media, the extent to which contaminated media will be treated, necessary institutional controls, and other necessary activities including monitoring. The major components of the selected remedy include:

Table 2-5
Discharge to Surface Water Cleanup Levels and Corresponding Risks

Media	Contaminant	Cleanup Level (µg/L)	Basis	Cancer Risk (drinking use for surface water)	Noncancer Health Hazard Quotient
Discharge to Surface Water	Pentachlorophenol	1.0	MCL	1.7×10^{-6}	<1
	Benzo(a)pyrene	0.2	MCL	2.1×10^{-5}	NA
	Benzo(a)anthracene	1.0	Risk	1.0×10^{-7}	NA
	Benzo(b)fluoranthene	0.2	Risk	2.1×10^{-5}	NA
	Benzo(k)fluoranthene	1.0	Risk	1.0×10^{-6}	NA
	Chrysene	1.0	Risk	1.0×10^{-6}	NA
	Dibenzo(a,h)anthracene	0.2	Risk	2.1×10^{-5}	NA
	Indeno(1,2,3-cd)pyrene	1.0	Risk	1.0×10^{-6}	NA
	Benzo(g,h,i)perylene	1.0	Risk	1.0×10^{-6}	NA
	Total D PAHs[a]	360	Hazard Quotient	NA	0.9
	Dioxin TCDD (TEF)[b]	1.0×10^{-5}	Aquatic Criteria	2.0×10^{-5}	<1
	2,4,6-trichlorophenol	6.5	Risk	1.0×10^{-6}	NA
	2-chlorophenol	45	Hazard Quotient	NA	0.9
	2,4-dichlorophenol	27	Hazard Quotient	NA	0.9
	2,3,5,6-tetrachlorophenol	267	Hazard Quotient	NA	0.9
	Arsenic	48	Aquatic Criteria	NA	NA
	Cadmium	1.1	Aquatic Criteria	NA	NA
	Chromium	11	Aquatic Criteria	NA	NA
	Copper	12	Aquatic Criteria	NA	NA
	Lead	3.2	Aquatic Criteria	NA	NA

NA = Not applicable

[a] Sum of individual D PAH (acenaphthene, acenaphthylene, anthracene, fluoranthene, fluorene, naphthalene, phenanthrene, pyrene) concentrations.

[b] Sum of individual chlorinated dibenzo-p-dioxins and -dibenzofurans concentrations multiplied by their corresponding toxicity equivalence factor (TEF) as shown on Table 29 of the ROD.

Source: Record of Decision Montana Pole and Treating Plant Site, September 1993.

1. Excavation of contaminated soils from accessible areas of the site, to the extent practicable. The volume of accessible soils is estimated to be approximately 208,000 cubic yards.

2. Treatment of excavated soils (208,000 cubic yards approximately) and previously removed soils (10,000 cubic yards approximately) by aboveground biological treatment.

3. In-place biological treatment of contaminated soils below the depth of excavation before backfilling.

4. Backfill of excavated and treated soils into excavated areas, if possible, surface grading, and revegetation.

5. Soil flushing of inaccessible soils areas (principally underlying Interstate 15/90) in order to recover hazardous substances.

6. Containment of contaminated groundwater and LNAPL using physical and/or hydraulic barriers (as determined during remedial design) in order to prevent the spread of contaminated groundwater and LNAPL, and to limit releases of contamination into Silver Bow Creek.

7. Treatment of extracted groundwater using the present EPA water treatment plant (which consists of oil/water separation followed by granulated activated carbon treatment). The ultimate design of the groundwater treatment system (as determined during remedial design) may include the addition of biological processes or ultraviolet oxidation (UV/oxidation) to maximize cost-effectiveness of the treatment system. Treatment will meet standards for discharge or reinjection, as appropriate.

8. Discharge of extracted, treated groundwater in Silver Bow Creek and/or reinjection of extracted, treated groundwater into the aquifer (as determined during remedial design).

9. Enhanced *in situ* biological treatment of contaminated groundwater, inaccessible contaminated soils areas and contaminated soils not recovered by excavation.

10. Treatment of contaminated site debris and equipment by decontamination followed by disposal of these materials in a licensed offsite landfill.

11. Treatment of contaminated oils and sludges in a licensed offsite incinerator.

12. Additional institutional controls preventing access to contaminated soils and groundwater.

13. Groundwater monitoring to determine movement of contaminants and compliance with remedial action requirements.

Both soils and groundwater will be remediated at the site. Soils will be excavated from four general areas: surface soil hot spot areas, surface and subsurface soils in the former plant process area, surface and subsurface soils along the historic drainage ditch running from the former plant process area to Silver Bow Creek, and subsurface soils near the groundwater table which have been contaminated by floating wood treating product. The selected treatment

technology for contaminated soils is aboveground biological treatment. Some contaminated soils and associated wood treating fluid will remain in place due to inaccessibility and limits of excavation technology. These contaminated soils will be treated in place by *in situ* biological degradation.

Contaminated groundwater and any residual wood treating fluids left after excavation will be contained from further migration using hydraulic and/or physical barriers. To create hydraulic containment of contaminated groundwater, some contaminated water will be extracted, treated, and discharged to Silver Bow Creek. Other extracted and treated water will be reinfiltrated onsite to assist in hydraulic containment, flushing of contaminated areas, and *in situ* biological degradation. Extracted groundwater will be treated aboveground in the water treatment plant constructed at the site by EPA. This facility presently consists of oil/water separation and granulated activated carbon treatment. The ultimate design of the groundwater treatment system may include the addition of biological means or UV/oxidation to maximize cost-effectiveness of the treatment system.

2.1.5 Points of Compliance

Compliance with cleanup levels described in Table 2-2 must be met for all excavated soils. Other performance standards must be achieved for contaminated soils below the depth of excavation or for soils not accessible to excavation (under the EPA water treatment plant and under Interstate I-15/90).

For groundwater, compliance with remediation levels must be achieved at the waste management area boundary. Since the contaminated materials will be excavated, treated to levels protective for soil standards, and returned to their place, some contaminated material will effectively remain in place. In such a situation, EPA has determined that "the remediation levels should generally be attained at and beyond the edge of the waste management area" (Preamble to the final NCP, 55 Fed. Reg. 8753 [March 8, 1990]). This boundary can effectively be defined as the edge of the excavated area, including any additional area where contaminated material is not excavated for any reason. This boundary is to be specifically delineated during remedial design/remedial action to ensure that groundwater contamination does not migrate into uncontaminated areas. Along Silver Bow Creek, this boundary is to be the south bank of the creek. Using this boundary as the point of compliance for attainment of the groundwater remediation levels is protective of any offsite groundwater uses and protective of the water quality goals for the stream.

This point of compliance reflects the change from the elimination of the possibility of future residential use at the site. Because impending zoning changes and other institutional controls will prevent use of groundwater on the site for drinking water purposes, it will not be necessary to attain the remediation levels throughout the contaminated plume itself. If, however, appropriate changes and controls are not implemented, the point of compliance should be viewed as throughout the plume, except the area under the interstate, since any other location on the site would be a potential area for access to groundwater for drinking water purposes.

Surface water cleanup levels must be achieved at all points within Silver Bow Creek. Upstream surface water measurements, needed for determination of the I-Class standard, must be made

upstream of all sources of contamination at the site. Additionally, any runoff from the site to Silver Bow Creek, for example, from precipitation or snow melt, must meet the same surface water standards identified for treated water discharge. Runoff not meeting those standards must be captured and treated along with extracted groundwater prior to discharge.

2.1.6 Performance Standards for Soils

For soils and sediments, the remedial goal is treatment so that the contaminant concentration levels pose no unacceptable risk to human health or the environment. Since no federal or state chemical-specific ARARs exist for these media, cleanup levels were determined for contaminants of concern through a site-specific risk assessment.

The specific performance standards that will be used to ensure attainment of the remediation levels for these contaminated media are:

- Excavation of accessible soils and associated LNAPLs with contamination levels in excess of the cleanup levels specified in Table 2-2. Depth of excavation, particularly at and below the groundwater table, will be based on field judgment and technical practicability, as determined by the lead agency in consultation with the support agency. LNAPLs at the groundwater table will be recovered to the maximum extent practicable as determined by the agencies.

- Soils below the depth of excavation with contaminant levels above cleanup levels specified in Table 2-2 will be bioremediated in place. Biotreatment may include nutrient addition via irrigation, and tilling on routine intervals. After it has been determined by the lead agency, in consultation with the support agency, that in-place bioremediation of these soils is no longer effective or practicable and contaminant levels have plateaued, or it is determined by the agencies that these areas would be effectively addressed by the *in situ* bioremediation implemented under the groundwater actions, these areas will be backfilled. Residual contamination will be further treated by *in situ* bioremediation as outlined under Performance Standards for Groundwater.

- Treatment of excavated and previously excavated soils to achieve cleanup levels specified in Table 2-2. Soils excavated from near Silver Bow Creek that contain tailings materials with elevated metals concentrations will be biologically treated and disposed in an appropriate Butte mine waste repository. All contaminated soils north of the active railroad bed are considered tailings material.

- Backfill of treated soils into excavated areas if possible, filling of remaining excavations with clean fill, replacement of all clean soils, surface grading, and revegetation or covering with suitable material compatible with existing or future land uses.

- Remediation of inaccessible contaminated soils (consisting primarily of those soils underlying Interstate I-15/90 and any soils under the EPA water treatment plant) by a two-phased approach. First, enhanced LNAPL recovery via extraction wells and recovery trenches using hydraulic gradients and soil flushing will be used to remove hazardous substances from the inaccessible soils. Adjustment of pH, use of surfactants and other methods will be considered to maximize recovery of hazardous substances. After it has

been determined by the lead agency, in consultation with the support agency, that recovery of hazardous substances from these areas by these methods is no longer effective or practical and contaminant levels have plateaued, these areas will be addressed by *in situ* bioremediation as outlined under Performance Standards for Groundwater.

- Implementation of engineering and institutional controls during the remedial action to prevent access to contamination and to limit the spread of contamination.

- Attainment of all ARARs identified in Appendix A of the ROD for the remediation of soils.

Sampling will be performed during the response action to verify that all soils contaminated above the cleanup levels are treated. The sampling program will be developed as part of the remedial design.

2.1.7 Performance Standards for Groundwater

For site groundwater, remediation goals provide maximum source reduction and protect Silver Bow Creek and uncontaminated groundwater by minimizing migration of contaminants with the groundwater. Cleanup levels for groundwater are MCLs and nonzero maximum contaminant level goals (MCLGs) established by the Safe Drinking Water Act or risk-based levels developed in the absence of MCLs or MCLGs. Attainment of these cleanup levels at groundwater points of compliance will be protective of human health and the environment and will ensure that uncontaminated aquifers and adjacent surface waters are protected for potential beneficial uses.

The specific performance standards that will be used to ensure attainment of the remediation goals for groundwater are:

- Containment of contaminated groundwater and LNAPL using hydraulic and/or physical barriers (as determined during remedial design) to effectively prevent the spread of contaminated groundwater and LNAPL and limit releases of contamination into Silver Bow Creek. Releases into Silver Bow Creek must be reduced in order to achieve cleanup levels identified in Table 2-4 for Silver Bow Creek. Migration of contaminated groundwater must be limited in order to maintain groundwater cleanup levels (Table 2-3) at groundwater points of compliance.

- Treatment of extracted groundwater to cleanup levels in Table 2-5 prior to discharge to Silver Bow Creek. Control and treatment, if necessary, of any contaminated runoff prior to discharge to Silver Bow Creek to meet the same cleanup levels.

- Treatment of the contaminated groundwater aquifer and contaminated soils not recovered by excavation by enhanced *in situ* bioremediation. The *in situ* treatment may include the reinjection of treated groundwater and the addition of oxygen and nutrients to promote the biodegradation of contaminants. The *in situ* treatment of the site groundwater will continue until contaminant levels have plateaued and it is no longer effective or practical to continue treatment, as determined by the lead agency in conjunction with the support agency.

- Attainment of all ARARs identified in Appendix A of the ROD for groundwater remediation.
- Monitoring of groundwater wells within or proximate to the contaminated groundwater plume for contaminants of concern for groundwater.
- Implementation of institutional controls to prevent access to or impacts upon contaminated groundwater at the site.

Groundwater sampling will be performed during the response action to verify that contaminated groundwater above the cleanup levels is contained and treated. It is anticipated that the treatment prescribed for sources of contamination at the site will effectively reduce the levels of contamination and shrink the contaminant plume sufficient to stabilize the site within a reasonable period of time.

2.1.8 Compliance Sampling Program

A sampling program for monitoring the remedial action and determining compliance with the performance standards will be specified by the remedial design and implemented during the remedial action. In addition, to ensure that groundwater performance standards are maintained, it is expected that groundwater will be monitored at least twice annually during the groundwater seasonal high and low for a period of at least three years following discontinuation of groundwater remediation. These monitoring programs will be developed during remedial design and shall include, at a minimum, the following: analytical parameters (focusing on the contaminants of concern, but analyzing other contaminants, if any, that are not contaminants of concern and are determined to be occurring at levels exceeding MCLs or nonzero MCLGs), sampling points, sampling frequency and duration, and statistical methods for evaluating data. Specific performance monitoring points shall be specified and approved by EPA and MDHES during remedial design, considering appropriate points of compliance.

Because the soil cleanup levels established in this Record of Decision are health-based standards for recreational use of the Site that do not provide for unlimited use with unrestricted exposure, and because residual hazardous substances may be left onsite and the cleanup is expected to take several years, the selected remedy will require five year reviews under Section 121(c) of CERCLA, Section 300.430(f)(4)(ii) of the NCP, and applicable guidance to assure the long-term effectiveness of the remedy.

As there are residents and businesses utilizing groundwater for domestic and lawn watering purposes in the immediate vicinity of the site, all wells within one-quarter mile of contaminated site groundwater will be sampled on a routine basis for contaminants. If site-related contaminants are detected in any well above regulatory or risk-based levels, appropriate measures such as individual treatment at the tap will be implemented as deemed appropriate by the regulatory agencies.

2.1.9 Engineering and Institutional Controls

These controls are required to maintain the protectiveness of the remedy. Since cleanup for all media are not likely to be met in less than 10 years, measures must be instituted to control risks

during implementation of the remedy. Fencing and posting of areas where active remediation is occurring will be required to prevent unauthorized access to contaminated media or to remedial action areas. The remedy itself includes certain actions to contain and prevent migration of the contaminant plume during implementation of the remedy. The design of this engineered containment will have to consider and accommodate removal actions to be conducted at the Lower Area One (LAO) Operable Unit (OU) of the Silver Bow Creek/Butte Area NPL Site, particularly compensating for any dewatering in connection with the removal of mine tailings at that site.

The institutional controls that must be implemented for the selected remedy include adequate zoning restrictions, conservation easements, and other controls to prevent any future residential use of the site and appropriate controls to prevent any water well drilling in the contaminated groundwater plume and adjacent areas to prevent additional receptors of contaminated groundwater or an expansion of the plume. As noted above, the PRPs for the site have indicated that they are currently pursuing implementation of these controls, in coordination with the city/county government. If controls deemed adequate by the agencies are not implemented, the assumptions used in determining the points of compliance and other aspects of the selected remedy will be invalid, and the contingency measures specified below will be implemented, and therefore must be considered in the remedial design.

2.1.10 Contingency Measures

Soil Remediation

Soil cleanup levels have been determined based on the anticipated implementation of zoning restrictions, conservation easements, and groundwater restrictions by the PRPs and Butte-Silver Bow County that will permanently prohibit residential and groundwater use at the site. If these permanent site-wide changes are not implemented, revised soil cleanup levels based on residential land use will be substituted for the recreational land use cleanup levels presented in this Record of Decision.

If the residence that currently exists onsite remains after implementation of the institutional controls, contaminated soils subject to residential use will be removed and replaced with clean soils. Soil removal levels will correspond to a 1 in 1,000,000 cancer risk level for residential land use for each contaminant of concern for the most susceptible exposure pathway.

Groundwater Remediation

Groundwater remediation points of compliance are based on the expected implementation of zoning restrictions, conservation easements, and groundwater restrictions by the PRPs and Butte-Silver Bow County. If these permanent changes are not implemented, the groundwater points of compliance will be revised to require compliance with remediation levels throughout the contaminated groundwater plume.

Oils and Sludges Remediation

The selected remedy for oils and sludges is offsite incineration. Investigation during the feasibility study determined that some licensed incinerators are reluctant to accept wastes containing dioxin. If, subsequent to the implementation of the selected remedy, no facility is

available or willing to accept the site sludges for incineration, the lead agency will require the implementation of a contingency plan. Such a contingency plan would consist of:

- A determination by the agencies that no facility is available or willing to accept these wastes for treatment and that no facility is likely to become available in the future.
- All practical methods for offsite treatment, disposal, reuse, and recycling will be investigated, and, if an appropriate option of this type is available, this option will be substituted for the selected remedy. (Note: As discussed in Section 3.5.9.1, reuse/recycling will be initially investigated for sludges and oily material prior to consideration of offsite incineration.)
- Oils and sludges will be treated using onsite incineration that will comply with all ARARs.

The decisions to invoke any or all of these contingency measures may be made by the agencies at any time during implementation of the remedial action, as appropriate.

2.1.11 Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

The final determination of ARARs by MDHES and EPA is set forth in Appendix A of the ROD. The selected remedy will comply with all ARARs. No waiver of ARARs is expected to be necessary. Some significant ARARs are listed below.

Contaminant-Specific ARARs

Contaminant-specific ARARs typically set levels or concentrations of chemicals that may be allowed in or discharged to the environment. The primary contaminant-specific ARARs for this remedy are the MCLs and nonzero MCLGs established under the safe Drinking Water Act. The selected remedy will remediate existing groundwater contamination to achieve these relevant and appropriate MCLs and MCLGs at appropriate points of compliance.

In addition, the remedy will attain the surface water quality standards for site contaminants in Silver Bow Creek, as designated under Montana law. ARM 16.20.623 specifies the standards for the "I" classification, applicable to Silver Bow Creek, and required eventual attainment of Ambient Water Quality Criteria (Gold Book levels).

Since no treatment standards have been set for the Resource Conservation and Recovery Act (RCRA) listed wastes on site (F032 and F034 wastes) as of the date of this Record of Decision, RCRA Land Disposal Restrictions (LDRs) will not apply to the remedy. Additionally, LDRs will not apply because the contaminated soils will be handled and treated within a Corrective Action Management Unit(s) (CAMU).

Location-Specific ARARs

Location-specific ARARs establish requirements or limitations based on the physical or geographic setting of the site or the existence of protected resources on the site.

Portions of the site are within a 100-year floodplain. Design of the remedy will have to ensure that no prohibited structures or other artificial obstructions are constructed in the floodplain. Although treated soils will be backfilled into excavated areas within the floodplain, the floodplain may not be used for storage or disposal of wastes.

Regulations concerning the protection of wetlands, including those relating to the Fish and Wildlife Coordination Act and Executive Orders 11,988 and 11,990, will apply to the implementation of this remedy. The protected resource, which has the potential to be adversely affected by the selected remedy, is wetland areas directly associated with Silver Bow Creek. These wetland areas are also within the LAO OU of the Butte-Silver Bow Creek NPL site and are being addressed under removal actions taking place within LAO. Consultation with the U.S. Fish and Wildlife Service during the design and implementation phase will be required to establish if any additional mitigative measures, beyond those planned for LAO, will be necessary.

Similarly, the one protected historical resource near the site is a slag wall that is actually located on the LAO OU. Any necessary mitigation measure or other protection for that slag wall are being determined in connection with activities at LAO.

Action-Specific ARARs

Action-specific ARARs generally provide guidelines for the manner in which specific activities must be implemented. Thus, compliance with many action-specific requirements must be ensured through appropriate design of the remedy.

The remedy will meet all action-specific ARARs, including the following RCRA requirements: monitoring for releases from waste management units, requirements for management of waste piles and land treatment units, and transportation requirements, as well as all requirements for reclamation of excavated areas.

In addition, the remedy, as designed, will meet other action-specific standards, including Clean Air Act regulations for particulate matter, dust control practices that achieve ambient air quality standards, Clean Water Act regulations requiring runon and runoff controls that prevent any discharge of contaminants from remedial actions that would violate surface water standards, sufficient treatment before reinjection of groundwater to ensure compliance with groundwater nondegradation standards, the requirements of the Underground Injection Control program under the Safe Drinking Water Act and RCRA regulations associated with the treatment, storage, and transportation of hazardous waste.

2.2 Existing Remedial Components

Between June 1992 and the present, EPA has instituted an emergency response action to control and recover LNAPL present at the site (REAC 1993a). The action included:

- Installation of a GUND[R] barrier wall to prevent offsite migration of LNAPLs to Silver Bow Creek.

- Excavation and temporary storage of approximately 1,200 cubic yards of contaminated near-creek soils. After installation of the GUND[R] barrier wall, oil seeps continued to be present just west of the slag wall, the source of which were LNPALs remaining on the north side of the barrier wall. EPA excavated approximately 1,200 cubic yards of near-creek soils in this area to eliminate this continued source of contamination release to Silver Bow Creek.

- Installation of seven piezometers and 10 recovery wells for monitoring and recovery of LNAPLs.

- Installation of product storage tanks.

- Completion of a groundwater treatment plant.

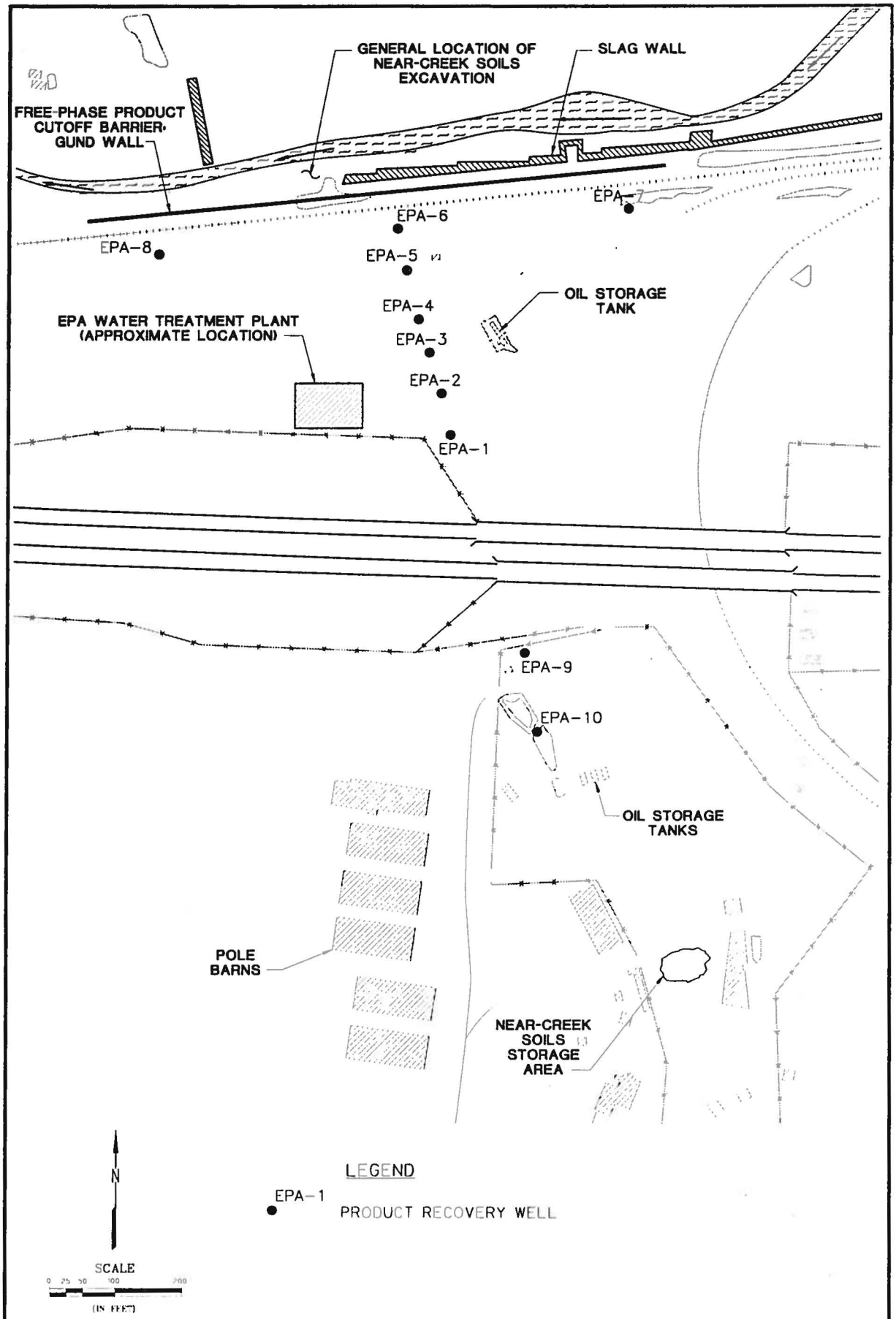
- Operation of the recovery system and treatment plant from January 22, 1993 to the present.

The GUND[R] barrier wall was installed between 9/18/92 and 9/26/92 just south of Silver Bow Creek as shown in Figure 2-5. The wall is located 12 feet below ground surface, approximately 8 feet into groundwater. The barrier wall is constructed of high density polyethylene (HDPE), manufactured by Gundwall. The wall panels interlock to form an impermeable boundary to serve as a free-phase product cutoff barrier. Groundwater can move under the barrier wall while free-phase product, floating on top of the water table, is blocked and accumulates behind the barrier.

Seven piezometers (P-4 to P-10) and 10 recovery wells (EPA-1 to EPA-10) shown in Figure 2-5 were installed between the dates of 9/21/92 to 10/13/92. Recovery wells EPA-1 through EPA-6, north of the interstate, and wells EPA-9 and EPA-10, south of the interstate, were installed in a north/south line perpendicular to Silver Bow Creek. Recovery wells EPA-7 and EPA-8 were installed at either end of the Gundwall to collect LNAPL trapped by the barrier wall. Borehole logs, obtained for wells EPA-1, 3, and 5, show a screen interval of 7 to 22 feet below ground surface and well depths to 25 feet (REAC 1993). Wells have 12-inch casings. A dual phase pumping system was installed within each of the 10 recovery wells: one to withdraw groundwater for hydraulic control and the other to pump free-phase product. Operation of the recovery system began on January 22, 1993. Pumped groundwater is piped to the groundwater treatment facility and free-phase product is pumped to two holding tanks with total capacity of 35,000 gallons.

Average total pumping rates of groundwater from the 10 recovery wells noted in the REAC report (1993) between 1/22/93 and 5/31/93, were 141 gpm and ranged from 25.5 to 162 gpm. Average product recovery for this period was 32 gal/day and ranged from 2 to 78.9 gal/day. Due to dry climatological conditions in 1994 and a declining water table (personal communication Sara Weinstock and Larry Smith, 12/15/94), winter groundwater and product pumping rates have been reduced to 93 gpm and 13 gal/day, respectively, partly due to shut down of pumps in several recovery wells.

The groundwater treatment plant consists of two skids with two 10,000-pound granular activated carbon (GAC) units per skid (REAC 1993b). Recovered groundwater is stored in one of three



MONTANA POLE & TREATING SITE
BUTTE, MONTANA

CDM
environmental engineers, scientists, planners, & management consultants

CURRENT EPA RECOVERY SYSTEM

FIGURE 2-5

11,000-gallon holding tanks and is passed through 10-micron cartridge filters prior to introduction to the granular activated carbon (GAC) units. Water is pumped from the storage units through the treatment system by a 250 gpm lift pump at 105 feet of head. A backup lift pump and cartridge filter are available at the plant. Both sets of carbon units are operated in parallel mode, each with one-half of the pumped water volume. The GAC units are backwashed approximately once per week and the carbon changed every 3 to 4 months. Microbial growth is currently interfering with the efficiency of the carbon units and the micron filters. EPA is currently attempting to evaluate and resolve this problem. The current plant capacity is 250 gpm. Sufficient space is available to expand the flow capacity to approximately 600 gpm by addition of a third skid of two 10,000-pound GAC units plus an additional 11,000-gallon holding tank. Treated water is discharged to Silver Bow Creek.

Section 3
Remedial Design Approach

3.1 Interface with Others during RD and RA

3.1.1 Overall Interface

The current RD approach is based on a critical assumption that the CDM-prepared RD construction Drawings and Technical Specifications will be transmitted to other parties for their subsequent procurement of a contractor and implementation of the RA. During the RD, CDM expects to have no direct interaction with the parties responsible for implementing the RA (RA Group); and the project approach and schedule presented in this work plan are reflective of this expectation. However, CDM understands that DHES and EPA are still considering the appropriate level of interaction with the RA Group during the RD, and CDM will make necessary adjustments to the design approach upon direction from DHES.

It should be noted that the Atlantic Richfield Company (ARCO) has been identified as a one of the PRPs at the Montana Pole Site and also is the PRP responsible for the RA at the Butte LAO site. The LAO site overlaps the MPTP site near Silver Bow Creek. The RA efforts at these sites have the potential of affecting each other. CDM understands that the RA approaches employed at LAO and the scheduling of the RA activities may dictate changes in the RD approach and RA scheduling at Montana Pole. Currently, however, CDM assumes that no significant special provisions will have to be made during RD or RA at Montana Pole relative to the actions at LAO.

As discussed below, the transfer of CDM-prepared design documents to the group responsible for RA will require specific direction to that group on necessary activities required to implement the RD beyond those presented in the Drawings and Technical Specifications.

3.1.2 Use of CDM-Developed RD Documents

To incorporate the CDM-prepared construction Drawings and Specifications into the RA construction package, to be implemented by others, it is expected that the RA Group will have to make additions and refinements to the CDM-prepared documents including:

- Contractual Language will have to be added, including Terms of Contract, General Conditions, Special General Conditions, Bonds, Insurance and Warranties, and related or equivalent "legal" requirements that are needed by the RA Group. These collectively are commonly called the "boiler plate" and/or Division 0 (please refer to the discussion in Section 4.5 on Specifications). Since the RA Group will procure and contract directly with the firm(s) performing the RA, this portion of the construction documents must be the RA Group's responsibility.

- General and Special Administrative Specification language will have to be added. This will include the RA Group's completion of Division 1 of the Specification by the addition of several sections, and refinements to a number of Specifications, as noted in the Preliminary Specifications listing in Appendix C. Primarily, these adjustments will include information to allow the RA Group to use their method of administering and compensating the

construction contractor for the RA, such as final definition of Measurement and Payment methods and specific methodology for submittal and the RA Group's review of Shop Drawings. Also, since Division 1 serves as the bridge between the contractual requirements of Division 0 and the mostly technical requirements of Divisions 2 trough 16, the RA Group's refinement of Division 1 will require their coordination with all other portions of the Specifications, and with the Drawings.

- Engineering Drawing Refinements. Although CDM does not anticipate the need for the RA Group's changes to CDM Drawings, the RA Group will be producing their own Drawings during their fulfillment of some of the performance-based requirements, presented in the CDM RD documents, which will require the RA Group's submittal of detailed design documents to the agencies for review and approval. For example, the CDM design will provide performance requirements for water treatment. If the RA Group elects to make adjustments to the current water treatment system, the adjustments will need to be represented in RA Group Drawings and Specifications, which will require review and approval by the agencies.

- Review and documentation of additions and refinements to CDM prepared documents by others. Any additions or modifications by the RA Group or others to the CDM prepared documents should be reviewed and clearly documented by the following procedures:

  — A clean copy of the affected document(s) prior to changes, should be made and filed (both "hardcopy and electronic").

  — Proposed refinements/changes to previously prepared documents (Specifications sections or Drawing sheets) should be carefully noted using either redline format on the text (indicating strikeouts and additions of text information) or use of the standard designation and callouts on the Drawings. The party performing the revisions and the date of the revision must be indicated.

  — Proposed additions of new documents: there should be a clear indication of who produced any new documents, that the new documents are additions, and the date that the documents have been added.

  — All proposed revisions and additions will be subject to review and acceptance by the agencies (with possible CDM review also) prior to finalization of the revisions and additions.

- "Stamping" revisions/additions by a Registered Professional Engineer (PE): Any revisions or additions by others should be stamped/sealed by the PE (currently registered in Montana) in charge of those changes or revisions.

3.1.3 Revisions to the RD and RA

If legal or other factors dictate that the agencies rather than an RA Group will be responsible for implementing and/or administering the RA, the above noted additions and refinements to the RD documents would still have to be performed, with some limited exceptions, by CDM as part of the RD. Under this scenario, CDM would produce either a single complete RD package or, as

an alternative, the RD might be split into several phases to allow smaller and/or local RA contracts, and to allow some RA work to begin promptly. For example, under an agency-implemented RD/RA, offsite disposal of oils/sludges and equipment/debris may be more easily accomplished in an expedited fashion. The sequencing of other RA components could also be adjusted to expedite the start date of the RA process.

3.1.4 General Responsibilities of the Group Implementing RA

As directed by DHES, the RD documents being developed by CDM for this project are focused towards an RA Group being responsible for funding, procuring, implementing and administering the RA, including long-term operations and maintenance of the remedies. To further define and document the RA requirements, certain RA Support Plans will be required to be submitted during the RA. Requirements for these plans will be included in the Technical Specifications produced by CDM, and although the RA construction contractor may actually prepare these plans, it is the RA Group's responsibility to have these plans submitted to DHES for review and acceptance. Plans required in the Draft Statement of Work for RD [at the] Montana Pole and Treatment Plant Site (DHES 1994) are:

- Construction Quality Assurance Plan
- RA Groundwater and Surface Water Monitoring Plan
- RA Soil Treatment Monitoring Plan
- Air Monitoring Plan
- RA Operations Plan
- Operations and Maintenance (O&M) Updates to the RA Operations Plan
- Institutional Control Compliance Demonstration

Other, similar plans and submittals required of the RA Group/RA construction contractor during RA, whose requirements will be defined in the Specifications, include:

- RA Health and Safety and Contingency Plan
- RA Permit Compliance Plan
- RA Monitoring, Verification, Data Acquisition/Management Plan (for information required in addition to the water and treated soil monitoring plans noted above)
- Stormwater Management/Sedimentation and Erosion Control Plan
- RA Detailed Sequence and Schedule
- Listing and Schedule of Submittals
- Schedule of Values/Breakdown of Contract Items' Pricing (in the format required of the construction contractor by the RA Group)
- Site Security Plan
- Demolition and Disposal/Transportation Plan(s)

- Excavation and Dewatering Plan
- Additional construction-phase design submittals for RA components implemented using performance-based RD approach
- Other RA submittals (including shop Drawings and specific systems and facilities O&M submittals)
- RA Progress Reports
- Project Completion Report (including "as-built" Drawings and information transfer on operating facilities)
- Submittal review period by Engineer/DHES

3.2 Interface with Lower Area One

Due to concerns about hydrogeologic connection between the MPTP site and the proposed excavation below the water table at the LAO site to be implemented by ARCO, it is important that the work of the two projects be coordinated to address potential delays or interferences to either project. The chief concern is that dewatering activities at LAO will lower the water table at the MPTP site, possibly drawing contaminated groundwater from the MPTP site onto the LAO site and/or into Silver Bow Creek. Additionally, this activity might also increase the depth of the LNAPL smear zone (and increase the volume of contaminated soils) at MPTP.

To address this issue, DHES and EPA have initiated communications between the MPTP RD team, and the LAO RD/RA Oversight team. The current status of these communications is that the LAO team is responsible for developing predictions on changes in groundwater conditions at the MPTP site based on the specific LAO dewatering plans, and the timing of the dewatering activities. These results will be communicated to CDM by DHES's MPTP project manager, and a decision will be made by both teams on whether or not engineering controls need to be applied, and by whom. If controls need to be applied, the two most likely options include (1) a change to the LAO dewatering/excavation plan, and/or (2) installation of hydraulic controls near the northern edge of the MPTP site designed to offset the hydrogeologic influences of the LAO activities. The latter of these two options will require an adjustment to the current RD at MPTP to prioritize the design and installation of such controls, or this action could be applied as part of the LAO RA.

The following presentation assumes that prioritization of this issue does not occur, or that necessary actions to address this concern in a prioritized manner will be employed under the LAO RA. However, CDM recognizes that DHES may direct CDM to address the issue under the MPTP RD, in which case, the design approach for this portion of the MPTP remedy will be adjusted from a performance-base approach to a prescriptive approach with the potential need for rapid transition to RA on this component of the MPTP remedy.

Additional discussion of this issue is provided in Section 3.5.5.

3.3 Remedial Action Sequencing

Proper sequencing of the RA activities at the MPTP site will be critical to the overall success and efficiency of the RA. For example, the timing and methods of construction and operation of an *in situ* bioremediation system will be highly dependent on the schedule of excavation and backfilling activities. Many similar interrelationships occur between other RA components which will have to be addressed in detail during the RD. This sequencing of the work will be based on, but not limited to, an evaluation of the following factors, as defined during the RD:

- Regulatory/legal issues and requirements (including possible additional times for reviews/ permits)
- Extent and timing of implementation for Institutional Controls
- Interdependence of remedy components (e.g., *in situ* bioremediation/excavation)
- Site and individual components' cleanup and verification requirements
- Use of initial RA phases at limited scale with subsequent expansion/modification over time (e.g., *in situ* bioremediation)
- Effective use of available space
- Interrelationships with LAO activities
- Availability of individual remedy component requirements (i.e., backfilling requires available materials, flushing of the groundwater requires treated water, etc.)
- Logistics (i.e., availability of storage space, contractor set up and work areas, etc.)
- Detailed design activities by RA Group on performance-based RA components
- Determination of critical path elements
- Definition of milestones
- Procurement, construction, and operational considerations
- Completion time estimates for remedy components
- Funding considerations
- Phased implementation of certain components
- Ability to concurrently construct and/or operate components of the remedy
- Weather-related constraints
- Accelerated schedule requirements (if any)

- Time-dependent availability of certain equipment and/or facilities
- Impacts to current RA components (e.g., existing extraction wells)
- Stormwater runoff control considerations
- Other miscellaneous issues

Based on the above list of considerations, RA sequencing will be discussed in detail in the Design Basis Report and subsequently represented in the Drawings and Specifications.

3.4 Prescriptive and Performance Design/Specifications/Drawings

3.4.1 General Discussion

In the engineering design and construction field there are two major approaches to the development of designs and construction documents: Performance Design and Prescriptive Design. Each of these design approaches requires the design professionals to prepare the Specifications and the Drawings to include the proper level of information for the procurement and implementation of the construction (and in many cases operations and maintenance) by the groups responsible for administering and completing the construction. Both approaches are valid and in common use, and determination of their partial or complete applicability to either individual Specification sections or for an entire project is based on consideration of several factors, as noted below. Detailed evaluation of performance vs. prescriptive design for the various components of the MPTP site remedy is presented in Section 3.5.

3.4.2 Prescriptive Design

Prescriptive design is the "traditional" engineering design method of presenting detailed construction direction in the Specifications and on the Drawings. Under a prescriptive approach, the design professionals define in detail, prior to procurement of construction services, the exact major processes, their components and requirements, plus the "means" for obtaining the required outcome. The construction contractor works within clearly defined limits, and is given no significant additional design responsibilities.

3.4.3 Performance Design

Under performance-based design, the construction contractor (or in this case the RA Group) is given the responsibility for developing the detailed design for specific component(s) based on a set of performance requirements. The performance design method focuses on presentation of performance requirements rather than defining specific "means" by which to attain the performance requirements. Necessary data, guidance, and constraints are provided to the contractor (and/or RA Group) who is required to develop and submit for approval a detailed design. Performance designs typically focus on specification of system requirements with only limited graphical representation in the Drawings.

3.4.4 Applicability of Prescriptive and Performance Approaches

Most designs consist of a combination of prescriptive and performance requirements. The determination of the appropriate approach for specific components of the proposed action requires up-front consideration of several factors including:

- RD/RA schedule considerations
- Availability of critical data, and ability to obtain critical data within the RD time frame
- Degree of control over the specific design desired by the RA authorities
- Ability to measure performance results effectively

The prescriptive approach is especially applicable where the facilities, components and their outcome are well defined and have been previously used in numerous similar situations. This method is also used for situations where the outcome is uncertain and/or the means for measuring the results are not well defined or may not be sufficient to allow a performance-based approach. For example, performance-based design of an *in situ* bioremediation system is difficult due to the uncertainties associated with achieving specific cleanup goals within certain time frames. A better approach for an *in situ* bioremediation system design is a prescriptive design for a Phase I system with an up-front recognition that adjustments will be made on system expansions based on operational and monitoring data from the Phase I system.

The performance-based design approach usually works best for components and/or systems where goals/results or limits are easily defined and measured, and the specific means of attaining those goals are more difficult to design within the required RD time frame. This method also can be used to take advantage of contractors' and vendors' specialized expertise in certain areas, and it allows a controlled use of innovative approaches.

Because of the limited amount of specific information presented in a performance-based RD package, the RD can be completed quickly and procurement of a construction contractor can typically be accomplished sooner than under a prescriptive design. This may allow RA startup at the soonest possible time by providing a mechanism where simple portions of the RA, that can be easily designed, can also be implemented quickly. However, more attention and expertise is required during the procurement and construction phase for review of contractor design submittals, than under a prescriptive design. Additionally, complex portions of the design are likely to take longer than under a prescriptive approach, due to the level of review and interaction required between the construction contractor and the agencies/oversight engineer. Care must also be taken not to provide too much leeway to the entities responsible for RA if their interests are not fully consistent with the interests of the agencies.

Selection of prescriptive vs. performance approach for various components of a project as complex as the MPTP RD is a difficult task requiring thoughtful evaluation of advantages and disadvantages. During the early stages of project planning, DHES, EPA and CDM discussed the advantages and disadvantages of the two approaches for the major components of the RA, and made decisions, which are represented in Section 3.5.

3.4.5 Supporting RD Documentation

In prescriptive portions of a design, assumptions, calculations, vendor data, and equipment data sheets are included as part of the Design Basis Report; and construction cost estimates and schedules are developed directly from these supporting documents and the Drawings and the Specifications. In performance-based aspects of a design, equipment data sheets are not developed, vendor information is limited, and the Drawings are less detailed. Construction cost estimates for performance-based portions of the design cannot be as accurate as for prescriptive portions.

3.4.6 Specifications

In prescriptive portions of a design, the Specifications focus on detailed requirements on the means for obtaining defined quality and performance requirements. In performance-based portions of the design, the Specifications focus on defining the contractor's design and submittal process, representing the performance, monitoring and reporting requirements, and defining the boundary conditions on system quality.

The methods of measuring and paying for the contractor's conduct of the work are specified for both approaches, but are typically more complex for performance-based Specifications due to the increased level of design responsibility on the part of the construction contractor.

3.4.7 Design Drawings

In prescriptive design, the Drawings are detailed, including clear representation of location, size, configuration, details, ancillary equipment, utilities, and processes associated with the RA components. In performance-based design, the Drawings provide limited detail and focus more on representing site features, locations, general layouts, and system schematics. The number of Drawings in a prescriptive design will typically exceed the number of Drawings in a performance-based design, although the construction contractor will eventually produce detailed Drawings in response to the design submittal requirements of a performance-based Specification.

3.4.8 Submittals during Construction

Submittals required of the construction contractor during RA are identified in the RD Specifications. Under prescriptive design, the submittals consist mostly of shop Drawings required to provide details on the equipment and materials selected by the contractor. Operation and Maintenance submittals are normally of the traditional instruction and training type. Under performance-based design, submittals by the contractor include detailed design and Specification documents, in addition to the submittals normally required in a prescriptive RD.

3.4.9 Procurement

The prescriptive design approach is applicable to several types of contractor procurement methods, but is especially suited to the standard construction bidding method. The bid schedule is relatively easy to formulate due to the very detailed presentation of project requirements in the Drawings and Specifications. Contractor procurement under the performance-based design approach typically requires an exhaustive prequalification process to ensure that the selected contractor has adequate design capabilities. Additionally, since many of the project components

are not defined in detail in the Drawings and Specifications, the assumptions used to develop the bid schedule are subject to revision during RA which is more likely to result in Change Orders than under the prescriptive approach.

For the MPTP project, parties not directly involved in the RD (RA Group) are expected to implement the RA. This provides another basis for consideration of the procurement approach since the RA Group will be responsible for procuring the construction contractor. In one sense, it reduces the responsibilities of the agencies, but at the same time creates another component of the project for which the agencies will have to formulate an adequate mechanism of control. Measurement of the progress of construction, for payment purposes, will ultimately be defined by the party responsible for administering the construction. Typically, measurement and payment methods are specified at the end of each individual Specification, and consist of either unit price or lump sum. The measurement and payment approaches for the individual Specifications define the makeup of the bid schedule. CDM will provide measurement and payment sections in the individual Specifications, where appropriate, and will not address this issue for individual Specifications where the decision should be left to the RA Group.

3.5 Remedial Design Components

Each of the 13 major remedial components discussed in the ROD, and summarized in Section 2.1.4, will be developed during the RD phase to produce construction documents for implementation during the RA. The components will be evaluated in detail during the early phase of RD, as documented in the Design Basis Report (DBR). The initial evaluation process is used to identify and evaluate RD approach options, key issues and additional data requirements. Based on this information, project requirements and experience at similar remediation sites, the overall design approach will be refined in the Preliminary RD, including limited presentation of Drawings and Specifications. From this basis, further detailed design (including calculations, communications, scheduling, and cost estimating) will be carried out to delineate construction and operational requirements. The RD process is discussed in detail in Section 4.

The following discussion presents the major issues and considerations for: the 13 individual remedy components, with some components combined where appropriate; and other additional components of the remedy not specifically represented in the ROD, but which are necessary components of a complete RA. The following evaluation and determinations were made during the project kickoff meetings held in October, and through subsequent consideration and discussion by DHES, EPA, and CDM. Serving as a starting point, these items will be further developed in the DBR and Preliminary RD, and completely developed during the remainder of the RD process. The presentation in this section (and later in the DBR) will include the following items of discussion for each remedial component:

- Description
- Options
- Evaluation Criteria/Key Issues
- Additional Data Needs
- Design and Specification Approach
- Drawings Approach

3.5.1 Excavation of Contaminated Soils

3.5.1.1 Description

This component of the remedy, as presented in the ROD consists of:

> Excavation of accessible soils and associated LNAPLs with contamination levels in excess of the cleanup levels specified in [Table 2-2]. Depth of excavation, particularly at and below the groundwater table, will be based on field judgment and technical practicability, as determined by the lead agency in consultation with the support agency. LNAPLs at the groundwater table will be recovered to the maximum extent practicable as determined by the agencies.

3.5.1.2 Options

Options for the actual methods of excavation to be used will be evaluated by the construction contractor. CDM's focus will be in developing and representing the performance criteria and performance measuring techniques for this activity.

3.5.1.3 Evaluation Criteria/Key Issues

The major evaluation criteria for the RD are preliminarily identified in the following list. These criteria will be developed in the DBR, and represented in detail in the Drawings and Specifications.

- Criteria for vertical and areal limits of excavation
- Cut line representation relative to proximity of highway, creek, railroad berms, etc.
- Shoring/stabilization considerations
- Surface soil hot spot removal criteria
- Special consideration of the "sink hole" area on the north side of the highway (see Section 2.1.2)
- Removal of "clean" overburden to access contaminated "smear zone" soils
- Temporary soil storage/management
- Open excavation LNAPL recovery
- Removal of the onsite slag wall along Silver Bow Creek and related historic resource issues
- Excavation staging and sequencing criteria
- Interrelationship with soil flushing, and *in situ* and *ex situ* bioremediation
- Interrelationship with existing and future groundwater extraction/containment systems and the water treatment system

- Consideration of near-creek soils contaminated with site-related contaminants and nonsite-related metals (tailings)
- Dewatering considerations
- Backfilling/compaction methods and sequencing
- Removal/replacement of railroad
- Utilities/buried items
- Stormwater management
- Surface Restoration (as related to final land use goal[s])
- Security/safety issues
- Flood plane considerations (possible Federal Emergency Management Agency [FEMA] analysis)
- LAO issues
- Dust control
- Air quality monitoring
- Sampling/monitoring/verification requirements and methods required to carry them out

3.5.1.4 Additional Data Requirements

In addition to the information requirements implied by the list of evaluation criteria and key issues presented above, adequate representation of the requirements for excavation of contaminated soils in the Drawings and Specifications will require an excavation study to answer several key questions. This study is in addition to important data which might be generated by the LAO project team related to the effects of dewatering during the LAO RA (also see Section 3.2). Key objectives associated with the excavation study include:

- Determining to what depth excavation can reasonably be conducted below the water table using conventional excavation equipment without dewatering
- Determining the effects of mixing of the soils below the water table, during excavation, and if LNAPL recovery can be enhanced by this activity
- Determining if visual observations and immunoassay (in-field) analytical tests can be used for determining extent of excavation, and for differentiating between clean overburden and contaminated underlying soils

- As the excavation moves toward the edges of the LNAPL plume, determining if the decision to stop further excavation be made based on visual observation of the smear zone thickness

- Determining how LNAPL moves into the excavation from surrounding areas, and how the LNAPL in the open excavation be readily recovered

In addition to the above key issues to be addressed by an excavation study, other data will be collected during this study in support of *in situ* and *ex situ* bioremediation aspects of the RD, as discussed in Sections 3.5.2 and 3.5.7.

3.5.1.5 Design and Specification Approach

The goal of CDM's design of this aspect of the remedy is to provide enough performance control to ensure that excavation of contaminated soils occurs to the maximum extent practicable, as stated in the ROD; while at the same time, allowing the RA Group and its contractor appropriate leeway in applying the best and most cost-effective excavation techniques they can develop for the site. Thus, the Excavation Specification will be based mostly on performance requirements, with prescriptive representation of acceptable verification activities for determining the final limits of the excavation during the RA. The Excavation Specification will clarify that the agencies have the responsibility of making the final determinations on vertical and lateral limits of excavation, based on field observations and results of verification activities.

3.5.1.6 Drawings Approach

Construction Drawings for this component of the remedy will represent cut lines and excavation limits (on plan and sections) for two levels of removal certainty: "A" Lines = high confidence; "B" Lines = probable/field determined. The cut lines will be based on currently available site data, with the recognition that final limits of excavation will be determined by the agencies based on the extent of the contamination discovered during the actual RA excavation activities. The Drawings will also indicate sequencing of the excavation work.

3.5.2 Treatment of Excavated Soils

3.5.2.1 Description

This component of the remedy consists of *ex situ* biological treatment of soils to be excavated during the RA (approximately 200,000 cubic yards), and those excavated during the 1985 removal action at the site (approximately 10,000 cubic yards). Site soils that were excavated in 1985 were combined with sludges from both the process building and two underground septic vaults and bagged into individual three cubic yard bags which are currently stored in onsite pole barns. The bagged soils are more highly contaminated than the majority of soils yet to be excavated and therefore may need to be mixed with soils to be excavated to optimize their biological treatment. Some of the bagged soils may contain enough oils and sludges that they may need to be incinerated offsite.

Directly adjacent to Silver Bow Creek, some site soils contaminated with PCP and other site related organic constituents also contain elevated concentrations of arsenic and metals from historic mining waste discharges to Silver Bow Creek. The estimated volume of these soils is

6,000 cubic yards. Some of these soils have recently been excavated by EPA and relocated to a plastic liner in the former process area on the south side of the site. CDM expects that these soils can be treated and backfilled onsite along with other site soils, but CDM will conduct a sampling program during the RD to further evaluate this question. If the metals concentrations result in a determination that offsite disposal of these soils is necessary, or that inhibition of bioremediation processes could occur, CDM will make the appropriate RD adjustments, per the intent of the ROD.

3.5.2.2 Options

Both Land Treatment Units (LTU) and Biopiles will be evaluated for *ex situ* biotreatment of soils. In addition, either type of design can be located in an enclosure such as the current pole barns to provide a controlled environment, or outside, over a larger site area. These options will be evaluated during the RD to determine and design the option that maximizes treatment efficiency (minimizes treatment time), while remaining cost-effective.

3.5.2.3 Evaluation Criteria/Key Issues

The following criteria will be utilized to evaluate the above options and for designing the treatment facility. General items for comparison of treatment type include:

- Volume of soils that can be treated in a season
- *Ex situ* treatment interface with soil excavation schedule
- Design and regulatory requirements for each option
- Cost considerations
- O&M requirements

Land Treatment Units

The above general criteria will be evaluated using the following detailed list of evaluation criteria for LTUs.

Criteria that affect the volume of soils that can be processed in a season using LTUs, and other important RD criteria, are:

- The onsite land area available for use in the LTU (based on preliminary estimates this area is approximately 11 acres)
- Land area requirements for soil preparation/materials handling prior to application to the LTU
- Maximum height of lift that can be treated at one time
- Length of season during which the LTU biotreatment system can operate (i.e., physically be operated, filled <u>and</u> biologically active)
- Existing treatability study results (see Section 1.3.2)
- Anticipated time required to attain ROD cleanup goals for contaminants of concern in LTU soils

Information needed to evaluate these items, such as maximum height of lift, length of season, and time required to attain cleanup levels will be obtained through consideration of climatological records, reports from other wood treating sites in Montana where LTUs have been implemented and/or studied such as the Libby site and the BN Somers site, site-specific information such as biotreatability studies conducted during the Montana Pole RI/FS, reports from and discussion with government agencies such as EPA Kerr labs and the U.S. Army Cold Regions Research and Engineering Lab, and available vendor information.

Design, operations, and regulatory considerations for implementation of the LTU that will be evaluated as part of the remedial design are:

- RCRA regulatory requirements under Subpart M Sections 264.270 through 264.273 and Section 164.278 which specify requirements for the treatment program, treatment demonstration, design, and operating requirements under RCRA including LTU operations to optimize biological activity, stormwater runon and runoff control and treatment, and vadose zone monitoring requirements (CDM intends to acquire and use demonstration data from other sites in Montana, in addition to the MPTP RI/FS treatability study results, to support a written demonstration rather than a field demonstration)

- Evaluation of the need for a No Migration Petition (current information indicates not required)

- Timing and sequencing of excavation activities

- Liner and leachate collection systems, and use of leachate waters and/or collected stormwater runoff to maintain moisture content of the LTU

- Drainage of the LTU (very little leachate generation is expected during the summer months due to dry climate and evapotranspiration processes)

- Excess leachate transfer to the water treatment system

- Processing or mixing of soils prior to application to the LTU to homogenize soils and control contaminant loading rates

- Need for dewatering of soils excavated from below the water table (i.e., is mixing soils from the vadose and saturated zones sufficient to attain an acceptable moisture content for biodegradation?)

- Amendments required to maintain nutrient, moisture, and pH levels that are optimal for biological activity as well as requirements for other amendments such as microorganisms, bulking agents, or soil conditioners

- Soil physical characteristics that may affect performance of the system (e.g., cohesiveness resulting from clay materials)

- Soil chemical characteristics that may affect performance (contaminant concentrations, pH, TOC, inorganics, etc.)

- Existing biological conditions in the soil (microbial numbers, PAH degraders, etc.)
- Air emissions, monitoring, and dust control
- Operation and maintenance items including labor, equipment, time, and cost requirements

Information from existing documents, as noted above, will be utilized to assess how design and regulatory issues were handled at other similar sites in Montana to increase the efficiency of this design process.

Biopiles
Due to climatic conditions in Butte, operation of an LTU is not expected to be effective for a significant portion of the year (during cold weather periods). For this reason, chiefly, the use of biopiles might provide a more efficient means of *ex situ* biological treatment of excavated soils. A comparative analysis between biopiles and an LTU will be conducted in the preliminary stages of the RD to support a decision on this matter which can then be developed by subsequent design of the selected system type.

The primary evaluation consideration will be anticipated treatment efficiency that can be attained using biopiles versus an LTU, and the difference in anticipated capital and operating costs. Criteria of interest include:

- Biopile dimensions, (length, width, and height)
- Angle of repose of piles (estimated from grain size analysis) to evaluate area requirements for a given height of pile
- Number of biopiles to be implemented and area designated for biopile treatment
- Effects of mixing/aeration requirements on pile configuration and dimensions
- Ability to control temperature (i.e., indoor/outdoor, soil heating/cooling)
- Effects of bulking agents (if needed) on total volume of contaminated soils
- Cohesiveness and gas permeability of soils
- Seasonal effects on operational efficiency
- Anticipated treatment time required to attain cleanup goals for Contaminants of Concern (COCs) at the site

Information needed to evaluate these items, particularly treatment times, optimal biopile height, and length of treatment season will be evaluated using climatological data and data from other sites containing similar contaminants of concern where biopiles have been implemented or evaluated.

Design, operations, and regulatory considerations for implementation of biopiles that will be evaluated as part of the remedial design are:

- RCRA regulatory requirements under Subpart L Sections 264.250 through 264.259 for outside operation of waste piles where runoff or leachate may potentially be generated from precipitation. If operated within an enclosure, Subpart L regulations may not pertain to biopile design. Regulatory requirements will be evaluated in detail during the preliminary stages of RD.
- Timing and sequencing of excavation activities.
- Processing or mixing of soils prior to application to the biopile to homogenize soils, increase permeability, affect soil cohesiveness, and control contaminant loading rates
- Dewatering of soils excavated from below the water table if necessary
- Amendments to maintain nutrient, moisture, and pH levels that are optimal for biological activity and any other amendments such as specific microorganisms or bulking agents
- Soil physical characteristics that may affect performance of the system (e.g., cohesiveness resulting from clay materials)
- Soil chemical characteristics that may affect performance (pH, TOC, other COCs [such as organics], etc.)
- Air emissions, monitoring, and dust control
- Process requirements such as air piping, irrigation piping, and potentially, heating (and possibly cooling) of the influent air, or enclosed atmosphere if an enclosure is used
- Requirements for leachate collection and recirculation or treatment
- Operation and maintenance items including labor, equipment, time, and cost requirements

As stated above for LTU design, previous work at other sites will be used where applicable to define and/or evaluate the above design items.

3.5.2.4 Additional Data Needs

In addition to the information requirements implied by the list of evaluation criteria and key issues presented above, additional sampling will be conducted during the soil excavation study for analysis of biological parameters and concentrations of COCs in excavated/mixed soils as presented in Section 4.2 of this work plan.

As noted above, during the early stages of the RD, results reported in the literature will be utilized to perform several of the comparative evaluations and could potentially be sufficient to fulfill the regulatory requirements for a land treatment demonstration. References include reports from other sites in Montana including the BN Somers, Libby, and Idaho Pole sites, Cold

Region bioremediation reports, and EPA bioremediation resources at the Kerr Labs. Additionally, experts within CDM, and at Kerr Labs will be consulted directly.

Demonstration studies at the site for both biopiles and an LTU would provide very useful comparative information in support of the decision to choose one approach over the other. However, CDM currently believes that available information, and information to be collected in the additional studies will be sufficient for CDM and the agencies to make a decision and proceed through the RD with an acceptable level of confidence. If, during the RD, CDM or the agencies determine that the limitations of the available information significantly impact the reliability of the RD process for this component of the remedy, reconsideration of the approach may occur.

One possibility that has been discussed, but is currently considered an alternate approach to full-scale design without demonstration studies, is phased application of the *ex situ* system with expansion to full-scale when operation of the first phase has been shown to be effective, or specific improvements to system have been identified. This approach has specifically been discussed relative to the potential use of the existing onsite pole barns for housing the *ex situ* treatment system(s), but potentially could also be applicable to outdoor systems.

3.5.2.5 Design and Specification Approach

Since the soil treatment cleanup requirements are specific numerical standards, the use of a performance-based design appears to be an appealing approach for this component of the remedy. This would specifically require that the RA Group meet the intent of the ROD, while also allowing the RA Group significant flexibility in their specific approach to problem. However, several important considerations must be evaluated in support of the selection of the appropriate RD approach, as described below.

This component of the remedy consists of two aspects: construction of the *ex situ* treatment unit; and subsequent operation of the unit. This is an important distinction because of the very different potential consequences of using a performance-based design or a prescriptive design for these two aspects. For operation of the system, performance-based design is considered more applicable than prescriptive design since flexibility in the operational approach will be necessary to optimize the operational techniques. Further, there will be an inherent incentive for the RA Group to operate the system as effectively as possible to minimize the time frame of the operation. Still, some controls will have to be provided in the Specification for operation of the system to ensure that the RA Group is maintaining a commitment to operational optimization.

For the construction of the facility, a prescriptive approach is considered the best approach because:

- If CDM designs the facility, the RA Group can focus on construction, rather than design, as soon as they are provided with the CDM RD documents. Thus, the system can be placed on-line faster than under a performance-based approach.

- The CDM design will have the agencies' interest as a priority. This will result in a treatment unit design which maximizes the use of available space and is intended to

provide the facilities necessary to achieve completion of the *ex situ* soil treatment portion of the remedy within the quickest practical time frame.

3.5.2.6 Drawings Approach

The requirements for operation of the system will be entirely represented in the Specifications using the performance-based approach, with no supporting Drawings. The Drawings for the facility construction will be detailed and comprehensive including clear representation of location, size, configuration, details, ancillary equipment, piping, appurtenances, utilities and processes associated with the facility.

3.5.3 Backfill of Excavated and Treated Soils

3.5.3.1 Description

This component of the remedy, as presented in the ROD, consists of: "Backfill of treated soils into excavated areas if possible, filling of remaining excavations with clean fill, replacement of all clean soils, surface grading, and revegetation or covering with suitable material compatible with existing or future land uses." Important considerations include compliance with ARARs including the RCRA Corrective Action Management Unit (CAMU) rules, sequencing with installation of *in situ* bioremediation systems, delineation of additional treated soils storage areas (for volume increases resulting from treatment), surface grading, and surface restoration.

3.5.3.2 Options

Initially identified options for evaluation include:

- Backfill of treated soils
- Backfill of other clean soils with alternate onsite disposition of treated soils

3.5.3.3 Evaluation Criteria/Key Issues

The following are critical issues to be considered during the RD:

- Cross section, materials, grading of backfill and final cover (gravel, cover, treated soils, other onsite or offsite fill source)
- Length of time the excavation should remain open
- Timing relative to LNAPL recovery in the open excavation
- Soils volume balance relative to bulking or reduction
- Interface with excavation, soil flushing, extraction system, containment barrier, *ex situ* bioremediation, and *in situ* bioremediation (especially initial backfill, delivery system installation, etc.)
- Stormwater management
- Surface restoration details, Land Use coordination, consideration of residual dioxin levels, O&M

- Recontamination potential (wicking of LNAPL, or advective transport, back into treated soils from surrounding contaminated areas)
- Storage/handling of backfill material
- Compaction considerations (*in situ* bioremediation, final land use)
- Consideration of water in the excavation
- Consideration of backfilling in the water, including additional dewatering, grain size control, dewatering sequence, etc.

3.5.3.4 Additional Data Requirements

Data needed for the design of this component of the remedy are currently considered to be available without the need for any additional sampling activities, although the ability to backfill the treated soils will require support in the form of final contaminant concentrations in the treated soils.

3.5.3.5 Design and Specification Approach

The requirements for this component of the RA will be represented in the RD through a combination prescriptive and performance-based Specification. The prescriptive requirements will relate to:

- Necessary considerations for the *in situ* bioremediation and soil flushing systems
- Surface restoration requirements
- Disposition of excess treated soils onsite

The performance-based requirements will relate to:

- Concentrations of contaminants in backfill soils
- Compaction requirements
- Addressing LNAPL and water in the excavation
- Temporary storage of backfill material
- Stormwater management
- Coordination with groundwater extraction and containment facilities

3.5.3.6 Drawings Approach

The Drawings presentation will include:

- Backfill locations (coordinated with excavation)
- Subgrade details (*in situ* bioremediation aspects)
- Grading/revegetation/site restoration plans, sections, and details

3.5.4 Soil Flushing of Inaccessible Areas

3.5.4.1 Remedy Description

This component of the remedy, as presented in the ROD, consists of:

Remediation of inaccessible contaminated soils (consisting primarily of those soils underlying Interstate I-15/90 and any soils under the EPA water treatment plant) by a two-phased approach. First, enhanced LNAPL recovery via extraction wells and recovery trenches using hydraulic gradients and soil flushing to remove hazardous substances from these inaccessible soils. Adjustment of pH, use of surfactants and other methods should be considered to maximize recovery of hazardous substances. After it has been determined by the lead agency, in consultation with the support agency, that recovery of hazardous substances from these areas by these methods is no longer effective or practical and contaminant levels have plateaued, these areas will be addressed by *in situ* bioremediation as outlined under Performance Standards for Groundwater (see Section 2.1.7).

CDM anticipates that enhancement of *in situ* bioremediation in both the unsaturated and saturated zones of the inaccessible areas, concurrently with soil flushing in the LNAPL "smear zone" may be useful.

3.5.4.2 Options

Several options have been identified for this component of the remedy which will be evaluated during the early stages of RD followed by selection and design of the system(s). The current options include one or more of the following; hydraulic control, LNAPL mobilization, and *in situ* bioremediation. Each of these options have suboptions which will also be addressed during RD.

Hydraulic control includes downgradient control of the water table and collection of LNAPL, combined with upgradient control and LNAPL collection to prevent continued movement of LNAPL into the inaccessible areas, and to provide a means of hydraulic gradient manipulation within the inaccessible areas.

LNAPL mobilization includes methods of enhancing movement of LNAPLs from the inaccessible areas to collection points using a variety of potential techniques. The target zone for LNAPL mobilization is the LNAPL "smear zone" which is slightly above and below the water table. Thus, the interaction of the hydraulic control component and the LNAPL mobilization component of the soil flushing system will be critical to achieving success.

Options to be considered for the hydraulic control/LNAPL mobilization system include:

- System design options including horizontal wells, trenches, and vertical wells
- Use of surfactants, pH adjustment, hot water, high vacuum, etc., for enhancing LNAPL mobilization for subsequent recovery
- Pulsed or continuous operation

Since excavation will not occur in the inaccessible areas, there may be no reason to delay implementation of an *in situ* bioremediation system within these areas, unless the soil flushing activities (selected chemicals, pH adjustments, etc.) are expected to interfere with biological growth. Although some zones within the inaccessible areas may contain contaminant levels too high for biological growth, until the soil flushing has been successfully applied, the

contamination within the inaccessible areas would be expected to be reduced by *in situ* bioremediation concurrent with soil flushing activities. Options to be considered for *in situ* bioremediation include:

- Oxygenated water addition
- Bioventing in the unsaturated zone
- Biosparging in the saturated zone
- Nutrient addition
- System design options include use of horizontal wells, vertical wells, trenches, and numerous configuration options

3.5.4.3 Evaluation Criteria/Key Issues

Criteria CDM will use to select and design the system options include:

- Detailed delineation of the inaccessible areas
- Lithology of subsurface soils under the highway, in particular where the clay and sand layers interface (i.e., at well GW-11, north of the highway, there is a high proportion of sand and sandy materials noted in the log while at GW-3, south of the highway, the lithologies noted are predominantly clays and clayey material)
- Thickness and lateral extent of LNAPL in the inaccessible areas
- Soil grain size effect on LNAPL extent (smaller grain size may result in greater capillary action and greater extension in the vadose zone)
- Residual saturation properties of LNAPL-containing zones
- Existing treatability study result (EPA soil washing study)
- Hydraulic conductivity of soils in the inaccessible areas
- Pore volume exchange rate (flushing rate) for both the saturated and unsaturated portions of the target zone
- Potential for occurrence of LNAPL under confined conditions
- Control of additional LNAPL smearing
- O&M considerations (e.g., plugging)
- Long- and short-term O&M requirements
- Predicted mass removal rates

- Technical feasibility of potential options
- Predicted radius of influence (ROI) of the extraction/injection/bioventing/biosparging components
- Drainage characteristics of the unsaturated zone and resultant mounding of the groundwater table under various hydraulic control scenarios
- Predicted travel time for groundwater movement through inaccessible areas under hydraulic manipulation scenarios
- Department of Transportation requirements for bridge and approaches (embankments) protection
- LNAPL physical characteristics
- Predicted LNAPL and water extraction rates and comparison with current water treatment plant capacity and LNAPL storage capacity
- Separation of LNAPL from extracted water
- Water/LNAPL conveyance to treatment/storage
- RA sequencing - adjacent soils excavation, hydraulic controls installation/operation, *in situ* bioremediation systems
- Monitoring approach/systems for evaluation of system performance and determination of when system shutdown is warranted

3.5.4.4 Additional Data Needs

Since design of the soil flushing system(s) is expected to be one of the most complex aspects of the RD, and currently available site data provide only limited supporting information for this activity, CDM anticipates that additional data will need to be gathered and evaluated. Data collection activities are expected to include literature reviews, field sampling, bench-scale testing, and computer modeling. These data collection activities will be defined in detail in an Additional Study Work Plan (see Section 4.2), and implemented during the Spring of 1995. Specific data needs include:

- Thickness and lateral extent of LNAPL in the inaccessible areas
- Hydraulic conductivity of soils in the inaccessible areas
- Computer modeling including groundwater flow modeling, LNAPL modeling, unsaturated zone modeling, and soil vapor modeling
- LNAPL physical characteristics (density, viscosity)
- Detailed stratigraphy information within the target zone

- Pore volume exchange rate (flushing rate)
- Effectiveness of LNAPL mobilization techniques (pH adjustment, surfactants, hydraulic pulsing, etc)
- ROI of extraction, injection, bioventing, biosparging components
- Current biological activity in target zones
- Biological effects of LNAPL mobilization techniques
- Potential impacts to highway, the bridge, and its approaches' integrity
- Oil/water separation efficiencies after extraction

3.5.4.5 Design and Specifications Approach

Since the performance criteria for the soil flushing portion of the RA are not numerically defined in the ROD, but rather will be defined by actual success in the field, a prescriptive design of the soil flushing system will be conducted by CDM. The CDM design will have the agencies' interest as a priority, whereas if the RA Group is given design responsibilities (under a performance-based approach) it may be difficult for the agencies to ensure that the design is formulated with a similar focus on success. The CDM design will be intended to provide the facilities necessary to achieve completion of the soil flushing portion of the remedy within the quickest practical time frame.

The prescriptive design will cover the construction, operation, monitoring and maintenance of the system, so that the RA Group receives very clear direction on this RA component. Still, CDM anticipates that after construction and startup of the system, adjustments will need to be made based on operational and monitoring data. Therefore, a phased construction/operation approach may be appropriate to gather useful operational data for subsequent use in system expansion. Although the RA Group may develop recommendations on system enhancements over time, CDM assumes the agencies will maintain responsibility for evaluating the operational and monitoring data collected by the RA Group, and will subsequently direct the RA Group on appropriate system adjustments.

The system Specification will be written with the following intentions:

- Prescriptive design of system(s) possibly using a phased construction/operation approach
- Specifications will provide detailed system, operational, monitoring and maintenance requirements with an expectation and allowance for system(s) adjustments based on operational data
- Time of operation (shut-off of system) will be per agency evaluation of the contaminant reduction and recovery from the system over time

3.5.4.6 Drawings Approach

The Drawings for the system construction will be detailed and comprehensive including clear representation of location, size, configuration, details, ancillary equipment, piping, appurtenances, utilities and processes associated with the operation and monitoring of the system.

3.5.5 Containment of Contaminated Groundwater and LNAPLs

3.5.5.1 Description

This component of the remedy, as presented in the ROD, consists of:

> Containment of contaminated groundwater and LNAPL using physical and/or hydraulic barriers (as determined during remedial design) to effectively prevent the spread of contaminated groundwater and LNAPL and limit releases of contamination into Silver Bow Creek. Releases into Silver Bow Creek must be reduced in order to achieve cleanup levels identified in [Table 2-4] for Silver Bow Creek. Migration of contaminated groundwater must be limited in order to maintain groundwater cleanup levels [Table 2-3] at groundwater points of compliance.
>
> For groundwater, compliance with remediation levels must be achieved at the waste management boundary. This boundary can effectively be defined as the edge of the excavated area, including any additional area where contaminated material is not excavated for any reason. This boundary is to be specifically delineated during the remedial design/remedial action to ensure that groundwater contamination does not migrate into uncontaminated areas. Along Silver Bow Creek, this boundary is to be the south bank of the creek. Using this boundary as the point of compliance for attainment of the groundwater remediation levels is protective of any offsite groundwater uses and protective of the water quality goals for the stream.
>
> This point of compliance reflects the change from the Proposed Plan that results from elimination of the possibility of future residential use at the site. Because impending zoning changes and other institutional controls will prevent use of groundwater on the site for drinking water purposes, it will not be necessary to attain the remediation levels throughout the contaminated plume itself, as anticipated in the Proposed Plan. If, however appropriate changes and controls are not implemented, the point of compliance should be viewed as throughout the plume, except the area under the interstate, since any other location on the site would be a potential area for access to groundwater for drinking water purposes.
>
> Surface water cleanup levels must be achieved at all points within Silver Bow Creek. Upstream surface water measurements, needed for determination of the I-Class standard, must be made upstream of all sources of contamination at the site. Additionally, any runoff from the site to Silver Bow Creek, for example, from precipitation or snow melt, must meet the same surface water standards identified for treated water discharge. Runoff not meeting those standards must be captured and treated along with extracted groundwater prior to discharge.

As discussed in Section 2.2, EPA installed a groundwater/LNAPL containment, recovery and treatment system in 1992, and is currently operating that system. The current system effectiveness has not been measured against the performance requirements that will be specified for the RA, and it is anticipated that adjustments to the system will be made during future RA activities at the site.

Due to concerns about hydrogeologic connection between the MPTP site and the proposed excavation below the water table at the LAO site to be implemented by ARCO, it is important that the work of the two projects be coordinated to address potential delays or interferences to either project (see Section 3.2). The chief concern is that dewatering activities at LAO will lower the water table at the MPTP site, possibly drawing contaminated groundwater from the MPTP site onto the LAO site and/or into Silver Bow Creek, and possibly increasing the depth of the LNAPL smear zone at MPTP. Thus, the planned actions at LAO have a potential major impact on how the MPTP site groundwater containment system is designed and implemented. This potential impact could result in the groundwater containment portion of the MPTP RD and RA becoming a time-critical component of the remedy. Currently, CDM is waiting on specific direction from DHES on how this issue will be handled during the RD.

The following presentation assumes that prioritization of this issue does not occur, or that necessary actions to address this concern in a prioritized manner will be employed under the LAO RA. However, CDM recognizes that DHES may direct CDM to address the issue under the MPTP RD, in which case, the design approach for this portion of the MPTP remedy (outlined below) will be adjusted from a performance-base approach to a prescriptive approach with the potential need for rapid transition to RA on this component of the MPTP remedy.

This section discusses the RD for contaminated groundwater containment. Treatment of contaminated groundwater using the aboveground water treatment system is discussed in Section 3.5.6.

3.5.5.2 Options

The potential alternative approaches to addressing this remedy component during the RD are explained in general in the above paragraphs. Additional considerations include:

- Prescriptive RD for initial adjustments to existing system and monitoring requirements, and performance-based long-term O&M
- Prescriptive RD related to monitoring requirements, and performance-based RD related to initial and long-term system adjustments/expansions.

3.5.5.3 Evaluation Criteria/Key Issues

Criteria CDM will consider during the RD of this remedy component include:

- Detailed construction and operation information on the existing containment system
- Interface and sequencing considerations relative to excavation of contaminated soils
- Interface and sequencing relative to soil flushing and *in situ* bioremediation

- Interface and sequencing with LAO RA activities
- Consideration of the capacity of the existing treatment system
- Effectiveness of current containment system and its suitability for upgrading
- Specific definition of points of compliance for groundwater (required by ROD)
- Performance requirements in ROD
- Other specific ARARs considerations
- Site water balance
- Interface with surface water runoff control
- Hydraulic/physical controls options
- Sampling/monitoring/verification requirements
- Short-term and long-term O&M

3.5.5.4 Additional Data Requirements

The amount and type of additional data needed in support of RD will depend greatly on the RD approach used. If CDM is tasked to design specific containment systems in response to the planned activities at LAO, a data collection program will likely be required to support detailed design activities. These activities would include pumping tests in the vicinity of planned containment systems, and groundwater modeling beyond what may currently be underway by ARCO to predict the general effects of LAO activities on the MPTP site. Additionally, CDM anticipates that sampling of existing wells, and potentially some new wells, will be required to delineate the points of compliance for the containment portion of the remedy over the long-term. These sampling points should be located to verify the eastern and western edges of the contaminant plume near Silver Bow Creek, since RI data are becoming dated.

If design of specific containment measures by CDM is not required in response to LAO needs, additional data collection activities are expected to be limited to the delineation of compliance points as described in the above paragraph, since CDM will apply a performance-based design approach to this component of the remedy.

Additional studies are discussed further in Section 4.2.

3.5.5.5 Design and Specification Approach

If CDM is tasked to design the containment system in response to planned LAO activities, CDM will apply a prescriptive approach for required adjustments to existing system and monitoring requirements, and performance-based long-term O&M.

If CDM is not tasked to specifically address the LAO concerns as part of the MPTP RD, CDM will apply a prescriptive approach related to monitoring requirements, and a performance-based RD related to initial and long-term system adjustments.

In summary, unless time-critical containment system enhancements are required in response to LAO related issues, CDM considers a performance-based approach to be most applicable to the actual system adjustments. This is because the points of compliance, and numerical standards will be specifically identified and used by the agencies as the determining factor relative to system effectiveness. Thus, the agencies will have a reliable means of directing the RA Group that system adjustments are necessary without having to actually specify what those adjustments should be. It will be up to the RA Group to use its own technical resources to apply containment measures that meet definitive performance requirements that can be reliably measured.

Assuming no time-critical need for containment system enhancements, the Specification for this component of the remedy will:

- Define points of compliance
- Specify performance requirements (numerical standards)
- Define monitoring and reporting requirements in detail
- Define the mechanism of agency control relative to system performance
- Define the method of RA Group design/agency review of system enhancements

3.5.5.6 Drawings Approach

Assuming no time-critical need for containment system enhancements, the Drawings produced by CDM will represent:

- The current containment system to as high a level of detail as possible based on availability of EPA as-built Drawings and survey data

- Points of compliance

- Specific monitoring points

If CDM is tasked to design system upgrades in response to LAO issues, or for other reasons, the Drawings will also include detailed and comprehensive representation of system upgrades including location, size, configuration, details, ancillary equipment, piping, appurtenances, utilities and processes associated with the system upgrade.

3.5.6 Treatment and Discharge of Extracted Groundwater

3.5.6.1 Description

This component of the remedy, as presented in the ROD, consists of:

> Treatment of extracted groundwater using the present EPA water treatment plant (which consists of oil/water separation followed by granulated activated carbon treatment). The ultimate design of the groundwater treatment system (as determined

during remedial design) may include the addition of biological means or ultraviolet oxidation (UV/oxidation) to maximize cost effectiveness of the treatment system. Treatment will meet standards for discharge or reinjection, as appropriate.

Discharge of extracted, treated groundwater into Silver Bow Creek and/or reinjection of extracted treated groundwater into the aquifer (as determined during remedial design).

Treatment of extracted groundwater to cleanup levels in Table 2-5 prior to discharge to Silver Bow Creek. Control and treatment, if necessary, of any contaminated runoff prior to discharge to Silver Bow Creek to meet the same cleanup levels.

The cleanup levels for any water to be reinjected into the aquifer are based on non-degradation criteria and must be no greater than the average concentration of groundwater contamination in the area of recharge. As discussed in Section 2.2, EPA installed a groundwater/LNAPL containment, recovery and treatment system in 1992, and is currently operating that system. It is anticipated that adjustments to the system will be made during future RA activities at the site. These adjustments might include addition of new processes, as noted above, and changes to the discharge locations. Currently, all treated water is discharged to Silver Bow Creek. Upon implementation of the *ex situ* and *in situ* bioremediation systems, and the soil flushing system, some discharge water will be applied to those processes.

Since adjustments to the containment system in response to LAO issues, as described in Section 3.2 and Section 3.5.5, might result in changes in the operating criteria for the water treatment system, CDM may be tasked to make design adjustments to the system as part of the MPTP RD project. Currently, however, CDM is assuming that prescriptive design adjustments to the system will only be related to influent sources (e.g., leachate from *ex situ* bioremediation system, stormwater), discharge locations, and other discharge needs (such as oxygenation and nutrient addition) related to the bioremediation systems. All other aspects of this component of the remedy are anticipated to be addressed using a performance-based approach as described below.

3.5.6.2 Options

The potential alternative approaches to addressing this remedy component during the RD are explained in general in the above paragraphs. Additional considerations include:

- Possible additional and/or expanded treatment processes, which become apparent during CDM evaluation of current system operating performance
- Discharge methods (surface, reinjection, etc.) and types (wells, trenches, galleries, etc.)
- Application of a lower degree of treatment for water to be reinjected than for water to be discharged to Silver Bow Creek

3.5.6.3 Evaluation Criteria/Key Issues

Important criteria to consider during the CDM RD include:

- Performance standards/cleanup goals.

- Information on water rights issues and permit requirements for discharge location. (Note: DHES and EPA have indicated they will provide this.)
- Determination of the needs for, and possible types of, additional treatment processes and/or expanded capacity (stormwater runoff, dewatering).
- Sequencing considerations (dewatering, implementation rate of *in situ* bioremediation systems, containment system adjustments, etc.).
- Construction and operations information for the existing treatment facilities including costs.
- Determination of optimum method(s) and location(s) for discharge of treated water.
- Discharge quantity and quality required by other remedy components (flushing, bioremediation, etc.).
- Discharge systems/structures.
- Sampling/monitoring/verification requirements.
- Consideration of carbon regeneration process and associated ARARs .
- Site water balance issues.
- Existing system capacity and available expansion space.
- Long-term capacity considerations (i.e., after completion of excavation, full implementation of *in situ* bioremediation, and steady state operation of containment system).
- Residuals handling and disposal.
- Final land use considerations (architectural/aesthetics issues).
- Entity "owning" the facility and/or the discharge during RA.
- Seismic considerations.
- Failure Analysis.
- Short-term and long-term O&M including instrumentation/control issues .

3.5.6.4 Additional Data Requirements

Although the information requirements presented above are comprehensive, CDM does not currently anticipate the need for any additional sampling activities associated with this component of the remedy under the current CDM RD approach. Data necessary to design infiltration systems (*in situ* bioremediation, soil flushing), discharge oxygenation/nutrient addition systems (*in situ* bioremediation), and additional influent components (*ex situ*

bioremediation leachate) will be gathered as part of the additional studies associated with those RD components.

Additional studies are discussed further in Section 4.2.

3.5.6.5 Design and Specification Approach

The RD approach CDM intends to apply to this component of the remedy is as follows:

- Prescriptive design of system modifications necessary to support the *ex situ* and *in situ* bioremediation systems, and the soil flushing system
- Performance-based Specification of the requirements for treating stormwater, dewatering water, and other contaminated water produced during RA activities
- Performance-based Specification of interaction with the groundwater containment system
- Prescriptive Specifications for monitoring/verification, and any quality discharge

3.5.6.6 Drawings Approach

Available as-built Drawings of the existing water treatment system will be referenced in the CDM Drawings. Detailed drawings, outside of the treatment facility, of influent and effluent systems modifications necessary for connection to the *ex situ* and *in situ* bioremediation systems and the soil flushing system will also be provided. The Drawings will include detailed and comprehensive representation of system upgrades including location, size, configuration, component details, ancillary equipment, piping, appurtenances, utilities and processes associated with the system additions.

3.5.7 Enhanced In Situ Bio Treatment of Soils and Groundwater

3.5.7.1 Description

This component of the remedy, as presented in the ROD, consists of:

> Treatment of the contaminated groundwater aquifer and contaminated soils not recovered by excavation by enhanced *in situ* bioremediation. *In situ* treatment may include the reinjection of treated groundwater and the addition of oxygen and nutrients to promote the biodegradation of contaminants. *In situ* treatment of the site groundwater will continue until contaminant levels have plateaued and it is no longer effective or practical to continue treatment, as determined by the lead agency in conjunction with the support agency.

In situ bioremediation of inaccessible areas is discussed along with soil flushing in Section 3.5.4. Although the design of all aspects of the *in situ* bioremediation system will be interactive throughout the RD process, this section concentrates on the application of *in situ* bioremediation of soils and groundwater during and following excavation of accessible contaminated soils.

3.5.7.2 Options

Options for *in situ* bioremediation of contaminated soils and groundwater include:

- Injection of oxygenated and nutrient-amended water into the contaminated zone
- Bioventing
- Combined bioventing with injection of oxygenated/nutrient-amended water
- Full-scale design for application to the entire contaminant plume
- Phased design for limited initial application with subsequent expansion
- Implementation of short-term *in situ* bioremediation of exposed groundwater while excavation area is open, in addition to long-term *in situ* bioremediation in remaining contaminated zones
- Design options for the oxygen/nutrient delivery systems include trenches, vertical wells, and horizontal wells

3.5.7.3 Evaluation Criteria/Key Issues

The following are critical issues to be considered during the RD:

- Data and information available from similar sites
- Presence and degree of intrinsic bioremediation occurring at the site for use in determining the extent of enhanced *in situ* bioremediation required
- Chemical parameters that are indicators of intrinsic biodegradation
- Microbial populations capable of degrading the contaminants of concern
- Environmental parameters that affect biological processes such as pH, available nutrients, oxidation/reduction potential, dissolved oxygen, iron and manganese levels (clogging potential), and temperature in groundwater
- Consideration of whether sufficient amounts of low molecular weight PAHs (naphthalene or phenanthrene) are present to enhance biodegradation of the higher molecular weight PAHs (such as benzo(a)pyrene)
- Short-term bioremediation (in open excavation) system components and O&M considerations (oxygen delivery, nutrient delivery)
- Air flow rates and blower requirements for short-term bioremediation system
- Short-term bioremediation monitoring program (oxygen/nutrient delivery, oxygen/nutrient uptake, reduction in COCs, and determination of the time of shut-off)
- Consideration of the maximum depth of excavation below the water table and if this includes the full extent of the LNAPL smear zone (i.e., will LNAPLs be left in-place below the excavation that will require long-term *in situ* bioremediation)

- Consideration of the depth of dissolved phase contamination to be targeted by the *in situ* bioremediation system for evaluating depth of injection system
- Hydraulic conductivity within the specific area of concern
- Soils/geologic factors (e.g., clay zones in the target area that may affect movement of water/air through the contaminated soils)
- Injection/extraction system components and spacings
- Rates for delivery of oxygenated, nutrient-amended water to the subsurface and type of delivery (i.e., pulsed or continuous injection) such that the extraction system controls movement of injected water (i.e., does not contribute to spreading of the dissolved phase contaminant plume)
- Type of nutrients and oxygen source to be injected (i.e., hydrogen peroxide, pure oxygen or air, ammonium phosphate, or other)
- Potential for biofouling in the injection/extraction systems
- Predicted biotreatment rates
- Monitoring points and methods
- Climatic considerations
- O&M considerations
- Criteria and protocol for system shut-down

3.5.7.4 Additional Data Needs

Many of the evaluation criteria and key issues identified above are available from existing sources, however, a sampling program will be necessary under the RD to address several of the key concerns.

Data that will need to be collected as part of the *in situ* bioremediation system design include:

- Microbial populations capable of degrading the contaminants of concern
- Environmental parameters that affect biological processes including pH, available nutrients, oxidation/reduction potential, dissolved oxygen, iron and manganese levels (clogging potential), and temperature in groundwater
- Hydraulic conductivity within the specific areas anticipated to require enhanced *in situ* bioremediation
- Soils/geologic factors (e.g., clay zones in the target area that may affect movement of water/air through the contaminated soils)

3.5.7.5 Design and Specification Approach

Although the conceptual approach to *in situ* bioremediation at the site will evolve during the RD process, the following sequence of RD and RA implementation is currently anticipated:

1. Consideration of all of the above evaluation criteria will be made by CDM, followed by prescriptive remedial design of the first phase of the *in situ* bioremediation system.

2. Excavation of contaminated soils will begin at the upgradient end of the LNAPL plume, to slightly below the water table. The volume of soils removed during the first excavation sequence will equal the volume of soils required for the first application to the *ex situ* bioremediation system (with consideration for mixing with the appropriate quantity of bagged soils and soil amendments).

3. While the excavation remains open, LNAPL will be recovered from the exposed groundwater surface, to the extent practicable, and a temporary aeration system will be installed to aerate groundwater in the excavated area for stimulation of bioremediation of dissolved phase contaminants. Nutrient addition may also be employed.

4. As *ex situ* biological treatment of excavated soils proceeds, treated soils will be backfilled into the excavation starting at the upgradient end and proceeding in the downgradient direction. Excavation from the downgradient end will continue at a rate consistent with the treatment rate of the *ex situ* bioremediation system, with continued LNAPL recovery and *in situ* bioremediation enhancement of the exposed groundwater as the excavation proceeds.

5. As treated soils are backfilled into the excavation, as described in (3) above, the *in situ* bioremediation system will be installed to address soils and groundwater below the limits of the excavation. A Phase I system will be installed over a limited area within the backfilled zone, based on CDM's prescriptive design.

6. As backfilling proceeds, the *in situ* bioremediation system will also be expanded, with appropriate adjustments based on operational data from the Phase I system.

7. At the completion of excavation and *ex situ* bioremediation activities, the areal coverage of the *in situ* bioremediation is expected to include the area of excavation/backfill, the contaminated soils areas inaccessible to excavation (see Section 3.5.4), and areas along the boundary of the excavated/backfilled area which contain contaminated groundwater above cleanup goals, where oxygen and/or nutrient addition is necessary.

Since the performance criteria for the *in situ* bioremediation portion of the RA are not numerically defined in the ROD, but rather will be defined by actual success in the field (concentration plateau), a prescriptive design of the *in situ* bioremediation system will be conducted by CDM. The CDM design will have the agencies' interest as a priority, whereas if the RA Group is given design responsibilities (under a performance-based approach) it may be difficult for the agencies to ensure that the design is formulated with a similar focus on success. The CDM design will be intended to provide the facilities necessary to achieve completion of the *in situ* bioremediation portion of the remedy within the quickest practical time frame.

The prescriptive design will cover the construction, operation, monitoring and maintenance of the system, so that the RA Group receives very clear direction on this RA component. Still, CDM anticipates that after construction and startup of the system, adjustments will need to be made based on operational and monitoring data. Therefore, a phased construction/operation approach is anticipated to allow consideration of operation data from the first phase of the application for subsequent use in system expansion. Although the RA Group may develop recommendations on system enhancements over time, CDM assumes the agencies will maintain responsibility for evaluating the operational and monitoring data collected by the RA Group, and will subsequently direct the RA Group on appropriate system adjustments.

The system Specification will be written with the following intentions:

- Prescriptive design of system(s) using a phased construction/operation approach.
- Specifications will provide detailed system, operational, monitoring and maintenance requirements with an expectation and allowance for system(s) adjustments based on operational data.
- Time of operation (shut-off of system) will be per agency evaluation of the contaminant reduction over time.

3.5.7.6 Drawings Approach

The Drawings for the system construction will be detailed and comprehensive including clear representation of location, size, configuration, details, ancillary equipment, piping, appurtenances, utilities and processes associated with the operation and monitoring of the system.

3.5.8 Treatment and Disposal of Contaminated Site Debris and Equipment

3.5.8.1 Description

This component of the remedy, as presented in the ROD, consists of: "Treatment of contaminated site debris and equipment by decontamination followed by disposal of these materials in a licensed off-site landfill."

A rough estimate of the volume of equipment and debris on site was performed by ARCO for the FS. It was estimated that approximately 9,100 cubic yards of debris is on the site, which consists of wood, soil cuttings, concrete, steel, and brick.

The ROD also states that a sampling program should be undertaken as part of remedial design to determine more accurately the volume of debris and extent of contamination prior to disposal.

This remedy component will include demolition of the majority of remaining Montana Pole facilities, including process buildings. The need for decontamination prior to offsite disposal will depend on the type of material (e.g., treated timbers are regulated differently than contaminated brick, etc.). New Land Ban regulations expected to be promulgated in 1995 may further restrict disposal options.

3.5.8.2 Options

The potential options of interest include:

- Detailed inventory, or require bidders to bid as lump sum after their own inspection
- Decontamination methods
- Disposal type and locations
- Reuse/salvage
- Transport options
- Expedited RA

3.5.8.3 Evaluation Criteria/Key Issues

The following are key criteria and issues to be considered during RD of this component:

- Performance standards/decontamination requirements for individual material types
- Inventory of types and quantities of materials
- Disposal requirements for different material types
- Transportation requirements
- Disposal locations
- Decontamination and verification requirements/feasibility
- Occupational Safety and Health Administration (OSHA) requirements
- Possible asbestos
- Possible lead based paint
- Potential value of expedited RA
- Phasing/sequencing
- Additional regulatory requirements
- During the RD, CDM will review RCRA 264.250 subpart L concerning wastepits and the following related requirements

  +264.270 subpart M (unlisted treatment)
  +264.272 (treatment demonstration)
  +261.4 (exclusions [oils])
  +261.6 (requirements for recyclable materials)

- Scrap metal is not subject to regulations except under 261.7 (residues of hazardous waste in empty containers [if container is empty, it is not subject to regulations])

- Treated wood is excluded and can be sent to a Class III landfill
- Historical considerations related to removal of the slag well
- If material is brick or similar material, it is an F032 waste and after January 1, 1995, Land Ban treatment standards will apply - DHES will check into methods that can used to deal with this issue.

3.5.8.4 Additional Data Requirements

Early in the RD an inventory will be made to classify and quantify site items requiring demolition and/or offsite disposal. The information to be gathered includes:

- Types of materials (wood, brick, scrap iron, insulation, etc.)
- Estimated volumes of each material type
- Identification of items requiring demolition

Additional Studies are discussed further in Section 4.2.

3.5.8.5 Design and Specification Approach

Removal of contaminated equipment and debris from the site should be conducted very early in the RA process, and therefore the information provided by the CDM design should be detailed enough to allow rapid implementation. However, methods of applying certain aspects of the RA component will be best defined by the RA Group. For example, CDM will define the regulatory requirements for transport and disposal of the various material types, but the PRP will be best suited for selecting the actual transporter and disposal locations. The same is true for decontamination. CDM will define the required results of decontamination of certain materials, based on regulatory considerations, and the RA Group will be given leeway in selecting the decontamination procedures.

In summary, the Specification will be performance focused, with enough prescriptive direction to ensure that delays in implementation do not occur once the CDM RD documents are provided to the RA Group.

3.5.8.6 Drawings Approach

Construction Drawings will show, in detail, the known location and makeup of items to be disposed of including demolition, plan, and section views. Photographic imaging will be used to provide direct representation of the materials on the Drawings.

3.5.9 Offsite Treatment of Contaminated Oils, Sludges, and Other Residuals

3.5.9.1 Description

This component of the remedy, as presented in the ROD, consists of:

> Treatment of contaminated oils and sludges in a licensed offsite incineration, [or by recycling in conformance with ARARs]. Investigation during the feasibility study determined that some licensed incinerators are reluctant to accept wastes containing dioxin. If, subsequent to the implementation of the selected remedy, no facility is

available or willing to accept the site oils and sludges for incineration, the lead agency will require the implementation of a contingency plan. Such a contingency plan would consist of:

- A determination by the agencies that no facility is available or willing to accept these wastes for treatment and that no facility is likely to become available in the future.
- All practical methods for offsite treatment, disposal, reuse and recycling will be investigated, and, if an appropriate option of this type is available, this option will be substituted for the selected remedy.
- Oils and sludges will be treated using onsite incineration which will comply with all ARARs.

Recently, EPA has found that, under some circumstances, oils and sludges from former wood treating sites do not necessarily have to be incinerated, but rather can be recycled. A recycling option for the MPTP site would be a preferred alternative to incineration, if regulatory requirements can be met. Therefore, CDM will evaluate the recycling alternative as a priority method of addressing the oils and sludges present at the site.

The oils and sludges to be addressed under this component of the remedy include currently stored oils and sludges (including recovered LNAPL), and LNAPL to be recovered during future RA implementation. The estimated volume of oils and sludges currently stored onsite is discussed in Section 2.1.2.

Although some of the oils and sludges may be candidates for recycling, others may only be addressable by incineration. Therefore, this component of the remedy is likely to include a combination of recycling and incineration.

Other residuals requiring consideration under this remedy component include sludges from the water treatment system, sludges recovered during decontamination of equipment and debris, and soils stored in the onsite pole barns (some sludges were apparently mixed with some of the bagged soils).

3.5.9.2 Options

The primary options available for consideration are as described above - recycling versus incineration. DHES and EPA are currently evaluating the applicability of recycling. Depending on the regulatory constraints associated with the recycling option, all or some of the oils and sludges may be addressed in this manner.

3.5.9.3 Evaluation Criteria/Key Issues

Important criteria to consider during the CDM RD include:

- Onsite management requirements
- Transportation requirements
- Disposal requirements for different material types

3.5.10.5 Design and Specification Approach

If required, CDM will present the required scope and implementation schedule of the institutional controls in the Specifications, as directed by DHES. Additionally, a prescriptive Specification will be provided to describe the requirements of site fencing and signs.

3.5.10.6 Drawings Approach

The construction Drawings will identify the location of the site fencing, gates, and appropriate signs. No other Drawings related to institutional controls are currently anticipated.

3.5.11 Groundwater and Surface Water Monitoring

3.5.11.1 Description

This component of the remedy, as presented in the ROD, consists of:

> Groundwater monitoring to determine movement of contaminants and compliance with remedial action requirements. A sampling program for monitoring the remedial action and determining compliance with the performance standards shall be implemented during the remedial design. In addition, to ensure that groundwater performance standards are maintained, it is expected that groundwater will be monitored at least twice annually during the groundwater seasonal high and low for a period of at least three years following discontinuation of groundwater remediation. These monitoring programs will be developed during remedial design and shall include, at a minimum, the following: analytical parameters (focusing on the contaminants of concern, but analyzing other contaminants, if any, that are not contaminants of concern and are determined to be occurring at levels exceeding MCLs or nonzero MCLGs), sampling points sampling frequency and duration, and statistical methods for evaluating data. Specific performance monitoring points shall be specified and approved by EPA and DHES during remedial design, considering appropriate points of compliance.
>
> Because the soils cleanup levels established in [the] Record of Decision are health based standards for recreational use of the Site that do not provide for unlimited use with unrestricted exposure, and because residual hazardous substances may be left onsite and the cleanup is expected to take several years, the selected remedy will require five year reviews under Section 121(c) of [Comprehensive Environmental Response, Compensation, and Liability Act] CERCLA, Section 300,430(f)(4)(ii) of the [National Contingency Plan] NCP, and applicable guidance to assure the long-term effectiveness of the remedy.
>
> As there are residents and businesses utilizing groundwater for domestic and lawn watering purposes in the immediate vicinity of the site, all wells within one-quarter mile of contaminated site groundwater will be sampled on a routine basis for contaminants. If site related contaminants are detected in any well above regulatory or risk based levels, appropriate measures such as individual treatment at the tap shall be implemented as deemed appropriate by the regulatory agencies.

In addition to the discussion in this Section, monitoring of soils treatment is discussed in Section 3.5.2, monitoring of performance of soil flushing is discussed in Section 3.5.4, monitoring of performance of groundwater containment systems is discussed in Section 3.5.5, monitoring of performance of the water treatment plant is discussed in Section 3.5.6, and monitoring of performance of *in situ* bioremediation is discussed in Section 3.5.7.

3.5.11.2 Options

Other than consideration of alternative monitoring points, frequency, and alternative analyses for various aspects of the remedy (e.g., *in situ* bioremediation, groundwater containment) no options are identified for this RD component. The above requirements of this portion of the remedy are clear and will require specific presentation in the Drawings and Specifications.

3.5.11.3 Evaluation Criteria/Key Issues

Important criteria to consider during the RD include:

- Association with soil flushing, water treatment plant discharge/reinjection, *in situ* bioremediation, surface water quality, and groundwater containment
- Identification of compliance points and monitoring points, sampling and analysis requirements, and frequency
- RD monitoring activities
- Need for, locations, and types of additional monitoring wells
- Format for long-term monitoring plan and possible users of the plan and its output
- Interaction with LAO activities
- Reporting requirements and frequency

3.5.11.4 Additional Data Requirements

As stated in Section 3.5.5, Containment of Contaminated Groundwater, CDM anticipates that sampling of existing wells, and potentially some new wells, will be required during the RD to delineate the points of compliance for the containment portion of the remedy over the long-term. These sampling points should be located to verify the eastern and western edges of the contaminant plume near Silver Bow Creek. Additionally, prior to implementation of the RA, general baseline conditions of the contaminant plume should be delineated. Contaminant reduction trend analyses during the RA will be based on the baseline results, and subsequent monitoring results. Although the points of compliance will be determined during RD, the general baseline conditions of the contaminant plume for contaminant reduction trend analyses can be delineated as an early RA activity.

3.5.11.5 Design and Specification Approach

The monitoring requirements during and after the RA will be detailed by CDM in a prescriptive Specification. The Specification will:

- Define points of compliance
- Specify performance requirements (numerical standards)
- Define monitoring and reporting requirements in detail
- Define the mechanism of agency response/control relative to monitoring results and adjustments to the monitoring program
- Define the requirements of the RA Group's monitoring plan

3.5.11.6 Drawings Approach

The Drawings produced by CDM will represent:

- Points of Compliance
- Specific monitoring points (new and existing)
- Monitoring well details

3.5.12 Additional Design Considerations

In addition to the design issues discussed in the above sections, the following have been identified as having influence on the project, and will be further defined and evaluated during the RD:

- Historic Preservation Concerns - There is a potential that historic preservation issues will affect the approach to the RD and RA. The slag wall located onsite near Silver Bow Creek should be removed during the RA. Currently, CDM anticipates that this can be accomplished, but we assume DHES will provide specific direction based on the "Programmatic Agreement" between ARCO and the City of Butte that addresses these types of issues.

- In the early portion of the RD, existing physical site data will continue to be evaluated and additional site data will be required to support the design activities. The physical site data will include "as-builts" of existing facilities along with existing operating data and costs, survey data (such as a property and/or easement boundaries, topographic information, survey control data/benchmarks and grid data); geotechnical data, boring and well locations; the size location and ownership of utilities; flood plane and climatic data. This information will be compiled by CDM for presentation in the Design Basis Report and in the Drawings and Specifications as appropriate.

- Further Review of ARARs will be undertaken to ensure that the RD fully addresses, and complies with them. Of special note will be permits/permit equivalents required for the RA.

- Stormwater Management - Although discussed above sections as a key evaluation criteria for several individual remedy components, overall stormwater management will be specifically considered during the RD. Flood plane considerations and management requirements will be addressed as a major RD/RA issue. This will include the specified

requirements for a Stormwater/Erosion/Sedimentation management plan to be produced during the RA defining the construction contractor's methods for handling these items site wide.

- Interfacing with Existing Facilities - All RD evaluation and output will carefully consider logistics, sequencing, and operations to integrate the new facilities with the existing facilities to manage the interaction and minimize conflict.

- Special Requirements - Identification of special processes or equipment requirements and their potential impact on implementation of the RA will be addressed during the RD. These might include excessively long delivery times, large utility or space requirements, ill-defined successful demonstration history, undesirable residuals, proprietary considerations, etc.

- Land Use - Identification of the long-term land use plan for the site will have a significant effect on the RD and implementation of the RA, particularly related to the type of surface restoration specified. The locations of excess treated soils disposal locations and surface features, surface water drainage pathways and components, facilities siting, and other aesthetics considerations will be determined based on land use plans for the site.

- Remedial Action Support Plans and Remedial Action Plans, Reports and Requirements - The Draft Statement of Work for Remedial Design/Remedial Action at the Montana Pole and Treating Plant Site, Butte, Montana (DHES 1994) notes a number of Plans, Reports and other requirements that are required in support of RA. These are:

  — Construction Quality Assurance Plan
  — Groundwater and Surface Water Monitoring Plan
  — Soil Treatment Monitoring Plan
  — Air Monitoring Plan
  — Remedial Action Operation Plan
  — O&M Updates to the Remedial Action Operation Plan
  — Performance Standards Report - Institutional Control Compliance Demonstration
  — Remedial Action Work Plan
  — Certification of Completion of the Remedial Action
  — Certification of Completion of the Groundwater Portion of the Remedial Action
  — Certification of Completion of the Soils Portion of the Remedial Action
  — Regular Reporting
  — O&M Reporting
  — Post Compliance Monitoring Reports
  — Periodic Review
  — Certification of Completion of the Work

The requirements and contents of these Plans, Reports and other requirements will be detailed in the RD Specifications.

Section 4
Remedial Design Activities and Documents

4.1 Remedial Design Planning Documents

In addition to this RD Work Plan, other planning documents are required to direct the activities associated with the RD. The Additional Studies Work Plan will describe planning, sampling, analysis, and reporting activities associated with additional studies required for RD. Additional Studies Project-Specific Documents will be written in association with the Additional Studies Work Plan. These include a Sampling and Analysis Plan (SAP), Quality Assurance Project Plan (QAPP), and Data Management/Data Validation Plan(DM/DVP), which will consist of addenda to the existing Clark Fork Superfund Site Investigations (CFSSI) documents. Only tasks, procedures, and approaches that are not described in the existing CFSSI documents will be detailed in the Additional Studies Project-Specific Documents. A site-specific Health and Safety Plan (HSP) is also required to address the RD activities to be conducted on the site.

Concurrent with the delivery of this RD Work Plan, the HSP and a technical memorandum (TM) that details the approach and level of anticipated effort associated with the development of the Additional Studies Project-Specific Documents, are being delivered. Until the Additional Studies Work Plan is written, the associated Project-Specific Documents cannot be completed. These documents will be developed under the next project Task Order which will also include the Preliminary Design Report. As detailed in the Preliminary RD Schedule, presented in Section 6, the Additional Studies Work Plan (including the Project-Specific Documents) will be developed in early 1995.

4.2 Additional Studies

Additional studies required to support the RD have been preliminarily identified in Section 3.5 for each major component of the site remedy. Based on the currently anticipated design approach described throughout Section 3, these studies include:

- Excavation Study (see Section 3.5.1.4)
- Biological Parameters Sampling and Analyses (for *in situ* and *ex situ* bioremediation system designs - see Sections 3.5.2.4 and 3.5.7.4)
- Soil Flushing System Design Sampling and Analysis (see Section 3.5.4.4)
- Containment System Study (aquifer testing and modeling if detailed design is required - see Section 3.5.4)
- Inventory of equipment and debris (see Section 3.5.8.4)
- Points of compliance determination sampling (See Sections 3.5.5.4 and 3.5.11.4)

These studies will be defined in detail in the Additional Studies Work Plan and associated SAP, QAPP, and DM/DVP. The preliminary schedule for development of these Plans and

implementation of the additional studies is presented in Section 6. Since the additional studies will be implemented concurrently with development of the Draft DBR and the Preliminary Design Report (PDR), due to overall RD schedule constraints, these design documents will be lacking specific information necessary to address several critical RD evaluation criteria. However, numerous RD components do not rely on the availability of the additional data, and therefore, can be designed in significant detail for presentation in the Draft DBR and the PDR. Additionally, significant RD progress can be made on those RD components requiring additional studies without the additional studies data since many of the evaluation criteria for these components do not require additional studies.

4.3 Additional Studies Reports

As stated above, results of RD field sampling and other data gathering programs will not be fully available until after submittal of the PDR. These results will be used during the major RD refinements that will occur between the PDR and the Pre-Final Design Report (PFDR). Since the results of the additional studies have the potential of significantly affecting the RD approach for the various RD components, CDM will indicate any significant changes through direct communication with DHES, and as part of the Additional Studies Reports.

The reports will include a comprehensive description of the objectives and methods of the investigations, all field and laboratory data generated up to that point, an evaluation of the data, and a detailed presentation of any effects the results have on the RD.

4.4 Preliminary Design Report

4.4.1 General

CDM will submit a PDR which will reflect the design effort at approximately 30 percent completion. The PDR is anticipated to be completed within the time frame presented in Section 6, and will include:

- Information on additional studies undertaken, including results of RD field sampling activities, as available at the time of PDR submittal
- DBR
- Preliminary Construction Drawings at approximately 30 percent completion
- Technical Specifications at approximately 30 percent completion
- Preliminary RA Construction Cost Estimate
- Preliminary RA Construction Schedule Estimate

The primary objective of the PDR is to present the conceptual/preliminary design and supporting information/documentation for agency evaluation of the design's ability to achieve the remedial action goals in accordance with the ROD and approved work plans.

CDM assumes that 10 copies of all documents will be provided to DHES for review and comment.

4.4.2 Design Basis Report

The DBR will describe the design criteria, assumptions, constraints, and concepts for the RD. Notwithstanding limitations due to the incomplete status of the additional studies, the DBR will document, to the degree possible, that the design meets the technical requirements of the ROD including compliance with ARARs, acceptance of environmental protection measures and technologies, and feasibility of the selected remedies. The DBR will present design documentation including design calculations, data evaluations, options evaluation, pertinent vendor-supplied information, design criteria, and (as appropriate) process selection and sizing. The DBR will be revised and updated as the RD progresses to Final RD. A preliminary outline of the DBR is provided in Appendix A.

The calculations and other design documents will reflect the same level of completeness as the respective design they support. Calculations will be prepared on standard engineering calculation paper, with each page numbered and identified by the project name, subject of the calculation, initials of preparer, initials of checker, and respective dates. Calculations (or reference or other information) that cannot be readily placed on calculation paper (e.g., maps, graphs, or computer printouts) will contain the same identifying information discussed above. The calculations will present the following information, as applicable:

- Calculation cover sheet summarizing information and showing calculation progression
- Statement of objectives/problem statement
- Summary of the methodology used to solve the problem
- Design/analysis/evaluation criteria employed, including the source
- Design/analysis assumptions with justification
- References to literature and/or data sources
- Design/analysis equations and calculations with equation terms and input data clearly defined
- Answer and conclusion to problem statement

Computer programs used to complete calculations will be described to provide adequate information to document proper usage of the software. At a minimum, a computer cover sheet will be prepared that: (1) documents the program used; (2) discusses the theory on which the program is based; (3) lists input data to the program; and (4) summarizes the results of the program runs. All output generated from the program will be attached to the cover sheet.

4.4.3 Preliminary Construction Drawings

A preliminary listing of construction Drawings is provided as Appendix B, however, this list will be refined between now and the time of submittal of the PDR. The Preliminary Drawings submitted as part of the PDR will represent an approximate 30 percent level of completion.

Major remedial components will be conceptually developed during the Preliminary Design and will be submitted in the form of Process Flow Diagrams (PFDs). PFDs will depict direction of material flow and major pieces of equipment and processing steps. Where relevant, material balances may be depicted on the PFD to present an overall picture of amounts of materials requiring treatment, as well as quantities of treatment residuals.

The Drawings submitted during Preliminary Design will include site layout Drawings, and preliminary arrangement Drawings depicting the approximate outline and locations of facilities and/or equipment, preliminary excavation limits, and the potential extent of site improvements. Preliminary Drawings are used as a working tool for identifying overall placement of facilities and equipment. They form the basis for development of more detailed Drawings, such as those depicting concrete, structural, electrical, piping, and mechanical construction sections and/or details. This further effort will not be necessary for remedy components that will be designed using the performance-based approach.

Construction Drawings for all submittals will be produced by Computer Aided Design and Drafting (CADD) methods using *AutoCAD*, Release 12 or 13. In order to provide consistency, the engineering Drawings standards will include, unless otherwise required by DHES:

- Drawings size of 22 inches by 34 inches.
- A CDM standard title block will be used.
- Drawing numbers will start with the first letter of the discipline that the Drawings represent.
- Standard CDM layering systems and Drawing presentation will be used.

4.4.4 Preliminary Technical Specifications

A preliminary listing of Specifications is provided as Appendix C, however, this list will be refined between now and the time of submittal of the PDR. The Preliminary Specifications submitted as part of the PDR will represent an approximate 30 percent level of completion. Due to the variable nature of the complexity and project-specificity of the individual Specifications, some of the Specifications will be effectively complete at this stage of the RD, while others will only be provided in outline form.

Specifications sections will be numbered, titled, and grouped within a 16-division format in accordance with the latest edition of the Construction Specifications Institute (CSI) Manual of Practice, reflecting standards in the RD/RA field.

4.4.5 Preliminary RA Construction Cost Estimate

The Preliminary RA Cost Estimate will be a revision of the ROD Cost Estimate to reflect any significant changes based on 30 percent design information. This might include information such as revision to the anticipated method of oils and sludges disposal, etc. The level of effort CDM anticipates for this task at this stage in the RD is relatively low since the degree of accuracy will not be significantly enhanced over the ROD estimate due to the limited degree of design at this point in the project.

4.4.6 Preliminary RA Schedule

A preliminary RA schedule will be submitted, in a bar graph format to show the estimated time frame and general sequencing for completion of RA components. Elapsed times, milestones, critical path items, and basic inter-relationships between major remedy components, as presented in the PDR, will be indicated.

4.5 Pre-Final Design Submittal

4.5.1 General

CDM will submit a PFDR that will reflect the design effort at approximately 90 percent completion. The PFDR is anticipated to be completed within the time frame presented in Section 6, and will fully address the agencies' comments on the PDR, Additional Studies Reports, and any other agency comments. CDM anticipates that several progress meetings will be held between the submittal of the PDR and the PFDR so that the agencies maintain an appropriate level of awareness of progress and project direction.

The PFDR will represent the final design minus some cross references and details required for completion of the Final Design Report. The purpose of the PFDR is to provide a basically complete document for final review and comment by the agencies so that the Final Design Report can be produced for use with an administrative order or consent decree, without additional need for agency revision. As discussed in Section 3.1, the Engineering Drawings and especially the Technical Specifications produced under this RD will be provided to the RA Group for their use in implementing the RA. Due to the nature of this arrangement, the RA Group will have to add contractual/management control requirements to the RD package (especially a new Division 0 and additional Division 1 sections and modifications in the Specifications) to make the documents a fully functional construction package.

The PFDR will completely develop and address the project's technical requirements, and will have undergone CDM's internal QA/QC procedures in full. The PFDR will include:

- Any revised additional studies reports
- Revised Design Basis Report
- Pre-Final Engineering Drawings at approximately 90 percent completion
- Pre-Final Technical Specifications at approximately 90 percent completion
- Pre-Final RA Construction Cost Estimate
- Revised RA Construction Schedule Estimate
- Draft Performance Standards Report

CDM assumes that 10 copies of all documents will be provided to DHES for review and comment.

4.5.2 Revised Additional Studies Reports

Any necessary revisions to the Additional Studies Reports will be submitted as part of the PFDR. These will follow the format as required and described in Section 4.3 above.

4.5.3 Revised Design Basis Report (DBR)

Using the DBR submitted with the PDR as a base, agency review comments and any additional data and evaluations will be incorporated to provide a pre-final DBR. Additional supporting data, documentation, calculations and supporting information beyond those provided in the PDR, will be provided in the revised DBR, as part of the PFDR, to further define the functional aspects of the program.

4.5.4 Pre-Final Construction Drawings

Drawings included with the PFDR will expand on and solidify the information presented in the PDR Drawings using the format noted previously. The PFDR will include all Drawings required to graphically present the components of the remedy, so that in association with the Technical Specifications, and RA Group contractual language added later, the project may be properly implemented. All of the Drawings will be presented at a level of completion of approximately 90 percent, including plan and section views, the majority of construction details, schematics, and all supporting, notes, and legends.

4.5.5 Pre-Final Technical Specifications

Pre-final Specifications will be prepared in accordance with the CSI Manual of Practice. Each Specification section will generally be formatted in four parts: Part 1 - General; Part 2 - Products; Part 3 - Execution; and Part 4 - Measurement and Payment. A Specification cover sheet and index will be used during production to serve as the control mechanism and documentation for the development progress of each Specification.

Each Specification will contain at a minimum (please see the discussion in Section 3.4 relating to performance and prescriptive Specifications):

- Description of the work to be performed
- List of reference codes, regulations, and standards
- Measurable performance requirements for the work to be performed, and additional goals for performance design sections
- Inspection, testing, and acceptance criteria for the work performed
- Required submittals in the form of shop Drawings and data such as: for prescriptive Specifications - fabrication, installation, testing information and O&M instructions; and for performance-based Specifications - construction design submittal requirements

- Material and component requirements *
- Fabrication requirements *
- Assembled equipment requirements *
- Implementation/installation requirements *
- RA performance plans
- Methods of Measurement and Payment

  * Items thus marked will be less defined in performance specifications

Methods of measurement and payment will be clearly represented for some components, but for others, the RA Group will need to provide input since the RA Group will be administering the construction contract. The RA Group will be expected to, as part of their addition of their own contractual language to the documents, define the pricing breakdown for the project, and develop a proposal/bid sheet to meet their procurement and RA administration requirements.

Each Specification will be thoroughly reviewed and checked against calculations, equipment data sheets, vendor information, construction Drawings, and other Specifications, in accordance with CDM QA/QC standards.

4.5.6 Pre-Final RA Construction Costs

The pre-final construction cost estimate will be prepared using the PDR cost estimate as a basis, however, it will reflect the additional detail and information incorporated in the PFDR, and will indicate a potential breakdown of "bid items" for remedy components to reflect the RD composition. For prescriptive design-based components, definitive quantity takeoffs from Drawings and Specifications, and pricing from vendors will be incorporated. For performance-based design components, assumptions on potential detailed construction contractor RA designs/approaches will be made. In all cases, estimates and pricing sources will be fully documented.

4.5.7 Pre-Final RA Construction Schedule

Using the PDR RA schedule as a basis, along with additional details and data provided in the PFDR, a basic CPM-type RA schedule will be produced. As for the PDR RA schedule the PFDR RA schedule will include: component and overall RA start and completion times; milestones; sequencing and basic interrelationship of components; and highlighted critical tasks.

4.5.8 Draft Performance Standards Report

All ARARs, as well as other standards and requirements, identified in the ROD will be incorporated into the RD and documented by CDM in a Performance Standards Report. The report will include a detailed description of how the DBR, Drawings, and Specifications meet the contaminant-, location-, and action-specific ARARs and all other specified cleanup criteria.

4.6 Final Design Submittal

CDM will submit the Final Design Report (FDR) that will reflect the design effort at 100 percent completion of the technical portion of this project. The FDR is anticipated to be completed within the time frame presented in Section 6, and will fully address the agencies' comments on the PFDR. As previously noted (especially in Section 3.1) the RA Group will need to take the FDR and add their own language and refinements for contractual procurement, and other administrative matters to reflect the RA Group's RA management requirements. The FDR will include:

- Final Design Basis Report
- Final Construction Drawings (to be "stamped" by the P.E. in responsible charge of the project)
- Final Technical Specifications
- Final Performance Standards Report
- Final RA Construction Cost Estimate
- Final RA Schedule Estimate

FDR submittals will be made as follows, unless otherwise directed by DHES:

- Ten bound copies of all documents (with 1 additional unbound copy of each text document)
- One electronic copy of Specifications and Drawings on 3½-inch high density (HD) disks
- One reproducible (mylar) original of Drawings

Section 5
Project Team and Subcontractors

Figure 5-1 presents the MPTP RD project team. Key CDM staff are listed in addition to team subcontractors. CDM was selected by DHES to conduct the MPTP RD based on previous work on the site, and a proposal to DHES from CDM dated July 1994. CDM is the lead contractor on the MPTP RD project team, and therefore will conduct the majority of the work and manage team subcontractors throughout the project. All project communications between the project team and DHES will occur through CDM, specifically Mr. Hunter Nolen, who is CDM's project manager. Resumes of listed CDM employees are provided in the July 1994 proposal. Additional copies of resumes of the CDM staff can be provided upon request.

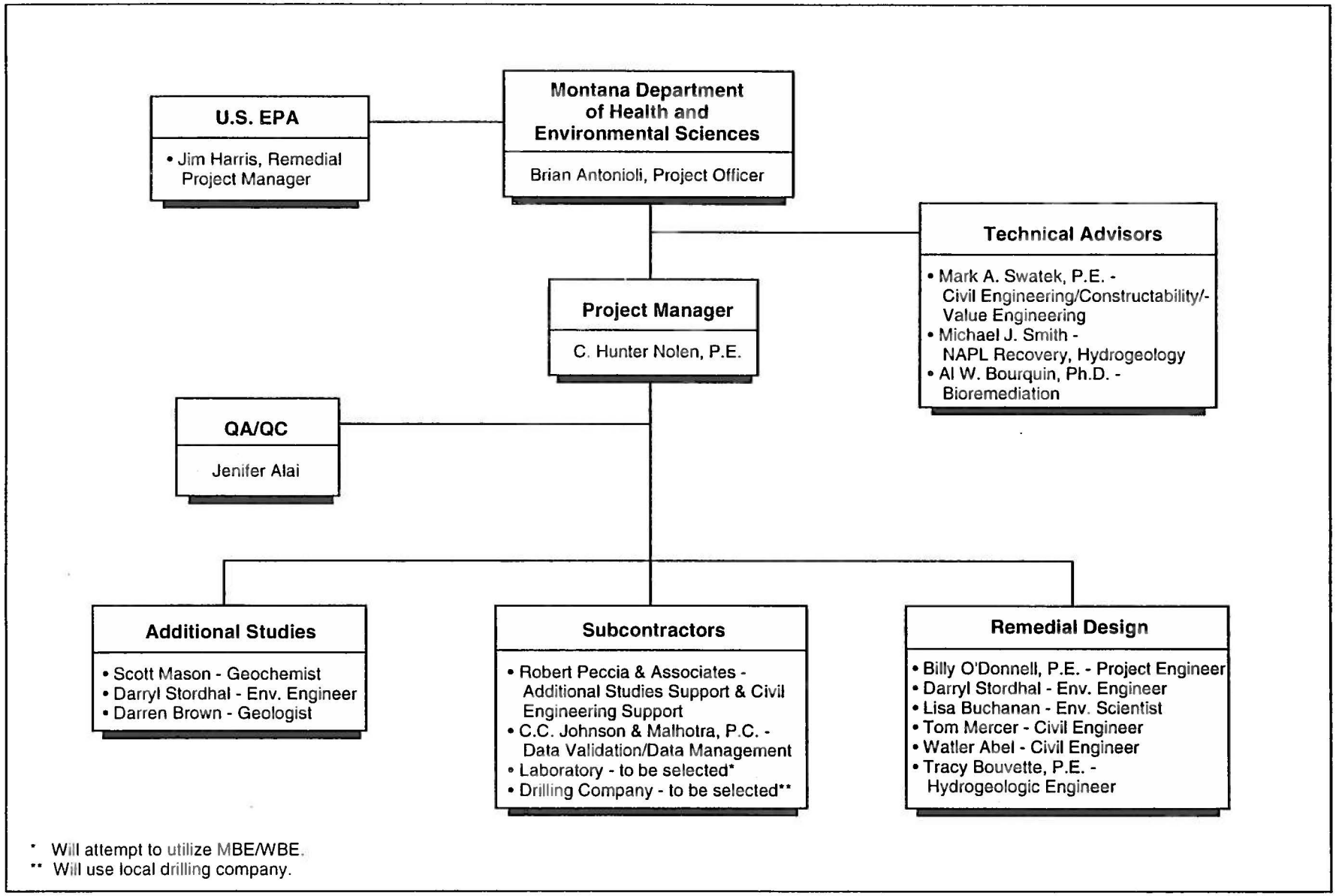
Robert Peccia & Associates (RPA) is a Helena-based civil engineering firm. RPA will provide assistance during the planned excavation study, and related to certain civil engineering portions of the RD. RPA is expected to be involved in:

- Field support during additional studies
- Disposal of equipment and debris
- *Ex situ* bioremediation facility
- Excavation of contaminated soils
- Stormwater management/erosion control
- Site surface restoration

C.C. Johnson & Malhotra, P.C. (CCJM) is a minority business enterprise (MBE), environmental engineering firm which has been providing data management and data validation services to CDM on the MPTP site since 1989. CCJM will assist in the development of project plans related to data collection and management, and will assist in any necessary data validation.

Mueller Consulting Land Surveyors is a disadvantaged business enterprise (DBE) which will provide site surveying services to CDM during additional studies, and during the RD process, as necessary.

Other subcontractors CDM will utilize during the RD project include laboratory services, which CDM intends to award to a WBE or DBE, and drilling services for the additional studies (including provision of a backhoe for the excavation study), which CDM intends to award to a firm located in Butte or vicinity of Butte.



CDM Camp Dresser & McKee

Figure 5-1
Project Team

Section 6
Remedial Design Schedule

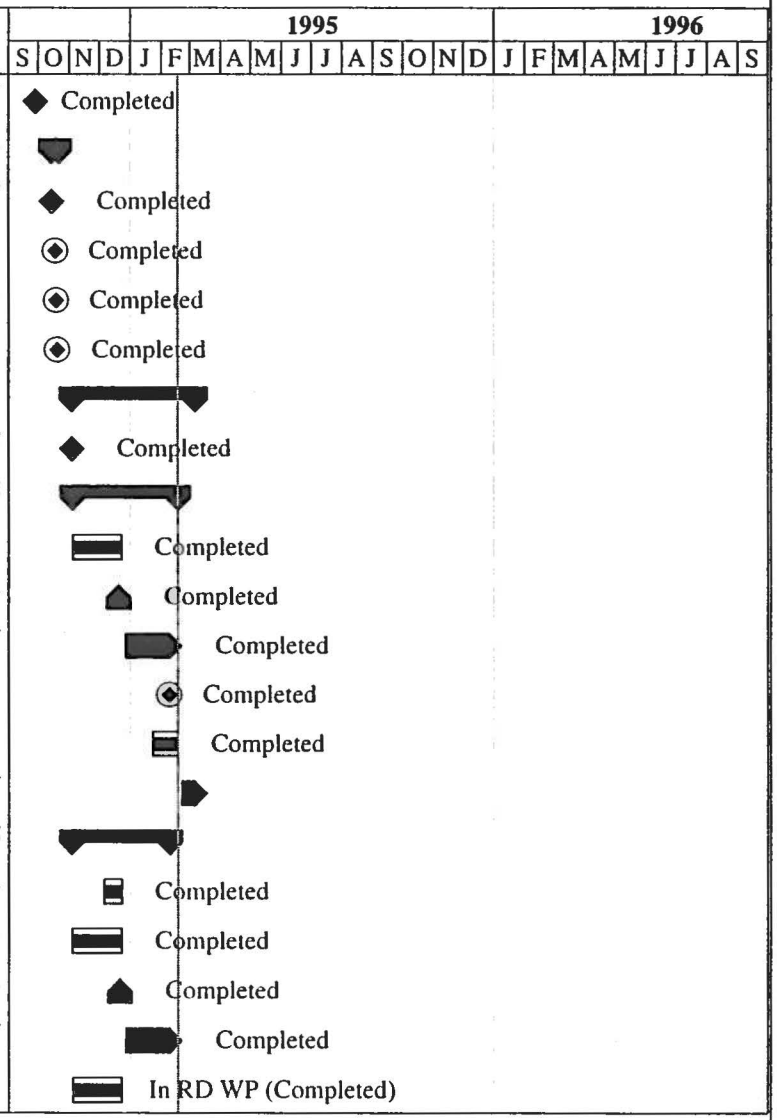
Figure 6-1 presents the preliminary project schedule for the MPTP RD project. The days(d) shown under the "Work" column are working days, not calendar days.

On a project of this magnitude and complexity, there are many potential schedule impacts that may arise during the work.

CDM will proceed with the work with full commitment to meeting the schedule, and will notify DHES immediately if issues arise that will impact the schedule.

FIGURE 6-1
RD SCHEDULE-MONTANA POLE AND TREATING PLANT SITE

ID	TASKS/SUBTASKS (CDM Task [#])	Work	Start	End
1	*RD CONTRACT W/DHES SIGNED*	*1d*	*9/28/94*	*9/28/94*
2	**TASK 1 PRE-PROJECT PLANNING**	**6d**	**10/14/94**	**10/21/94**
3	*TASK ORDER 1 SIGNED*	*1d*	*10/14/94*	*10/14/94*
4	KICKOFF MEETING	1d	10/18/94	10/18/94
5	PQM	1d	10/19/94	10/19/94
6	FOCUSED INITIAL RD MEETING	2d	10/20/94	10/21/94
7	**TASK 2- WORKPLANS & INITIAL RD**	**83d**	**11/3/94**	**3/6/95**
8	*TASK ORDER 2 SIGNED*	*1d*	*11/3/94*	*11/3/94*
9	**[2.1] RD WORKPLAN(RDWP)**	**72d**	**11/4/94**	**2/17/95**
10	[2.1.1]DRAFT RDWP	34d	11/4/94	12/23/94
11	[2.1.2]TRC-DRAFT RD WP	1d	12/20/94	12/20/94
12	*AGENCIES' REVIEW*	*32d*	*12/27/94*	*2/9/95*
13	[2.1.3]REVIEW MTG W/AGENCIES	1d	2/9/95	2/9/95
14	[2.1.4] FINAL RD WP	20d	1/23/95	2/17/95
15	*AGENCIES APPROV FINAL RD WP.*	*10d*	*2/21/95*	*3/6/95*
16	**[2.2]OTHER RD PROJECT PLANS**	**67d**	**11/3/94**	**2/9/95**
17	[2.2.1]SCOPING REPORT-PROJ PLAN. DOC (a)	15d	12/5/94	12/23/94
18	[2.2.2]RD HEALTH & SAFETY PLAN (HSP)	35d	11/3/94	12/23/94
19	[2.2.3]TRC/DRAFT SCOP RPT & HSP	1d	12/21/94	12/21/94
20	*AGENCIES' REVIW.-DRAFT OTHER RD PLANS*	*32d*	*12/27/94*	*2/9/95*
21	[2.3]INITIAL DESIGN BASIS DEVELOPMENT	34d	11/4/94	12/23/94

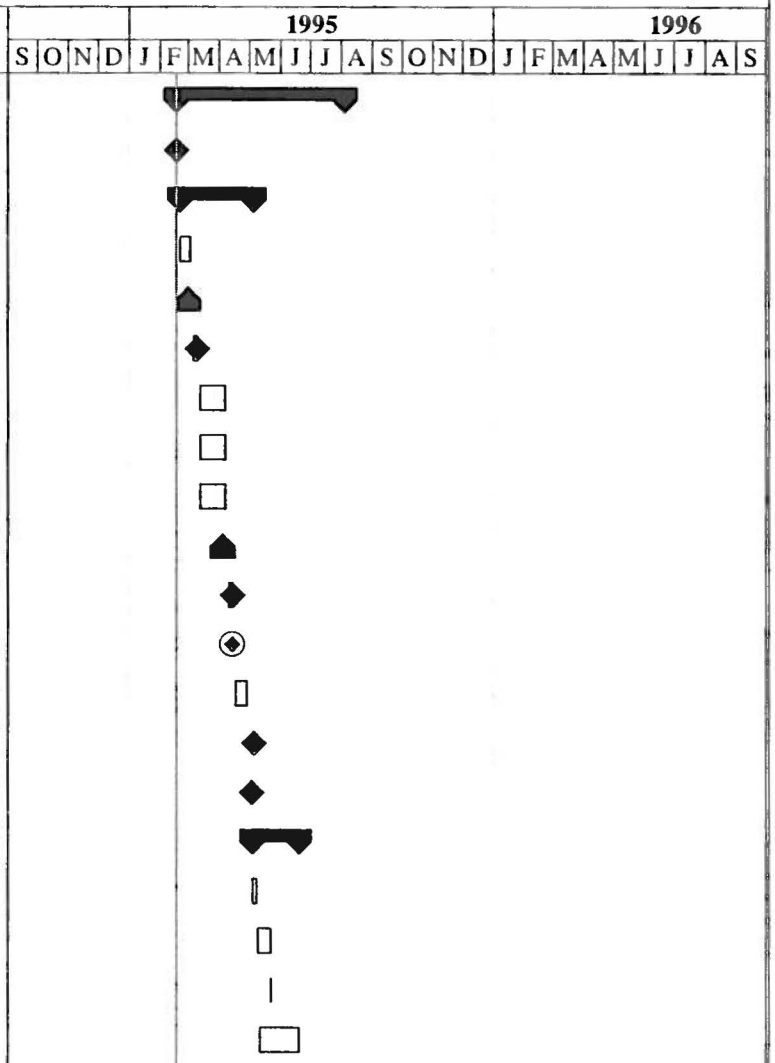


Project: MPTP RD
Date: 2/16/95
(Notes on Last Page)

Critical		**Milestone**	◆	**Agency Interaction**	◆
Noncritical		**Summary**		**Meetings**	◈
Progress		**Rolled Up**	◇	**TRC**	▲

FIGURE 6-1
RD SCHEDULE-MONTANA POLE AND TREATING PLANT SITE

ID	TASKS/SUBTASKS (CDM Task [#])	Work	Start	End
22	**TASK 3-ADDITIONAL STUDIES/DATA NEEDS**	**118d**	**2/17/95**	**8/4/95**
23	*TASK ORDER 3 SIGNED(b)*	*1d*	*2/17/95*	*2/17/95*
24	**[3.1] ADDITIONAL STUDIES WORK PLAN**	**54d**	**2/21/95**	**5/5/95**
25	[3.1.1]ADD. STUDIES SCOPING MEMO	9d	2/21/95	3/3/95
26	[3.1 2] TRC-ADD.STUDIES SCOPING MEMO	1d	3/1/95	3/1/95
27	*AGENCIES' REV'W.-ADD. STUD. SCOP MEMO*	*5d*	*3/6/95*	*3/10/95*
28	[3.1.3]DRAFT ADD'L. STUDIES WP	20d	3/13/95	4/7/95
29	[3.1.4] DRAFT-SAP(c)	20d	3/13/95	4/7/95
30	[3.1.5] DRAFT QAPP & DM/DVP ADDENDA(c)	20d	3/13/95	4/7/95
31	[3.1.6] TRC- DRAFT DOC. [3.1.3>3.1.5]	1d	4/4/95	4/4/95
32	*AGENCIES' REV'W. DOC. [3.1.3>3.1.5]*	*5d*	*4/10/95*	*4/14/95*
33	[3.1 7] REVIEW MEET. W/ AGENCIES	1d	4/14/95	4/14/95
34	[3 1.8]FINAL ADD'L. STUDIES WP + SAP, etc.	10d	4/17/95	4/28/95
35	*AGENCIES APPRV.ADD'L. STUD.WP + SAP, etc.*	*5d*	*5/1/95*	*5/5/95*
36	*TASK ORDER 4 SIGNED(d)*	*1d*	*5/3/95*	*5/3/95*
37	**[3.2]FIELD SAMPLING PROGRAM**	**32d**	**5/4/95**	**6/19/95**
38	[3.2.1]PLANNING & MOBILIZE TO FIELD	3d	5/4/95	5/8/95
39	[3.2.2]FIELD SAMPLING	10d	5/9/95	5/22/95
40	[3.2.3]FIELD DEMOBILIZE	1d	5/22/95	5/22/95
41	[3.2 4] LAB ANALYSIS	27d	5/11/95	6/19/95
42				

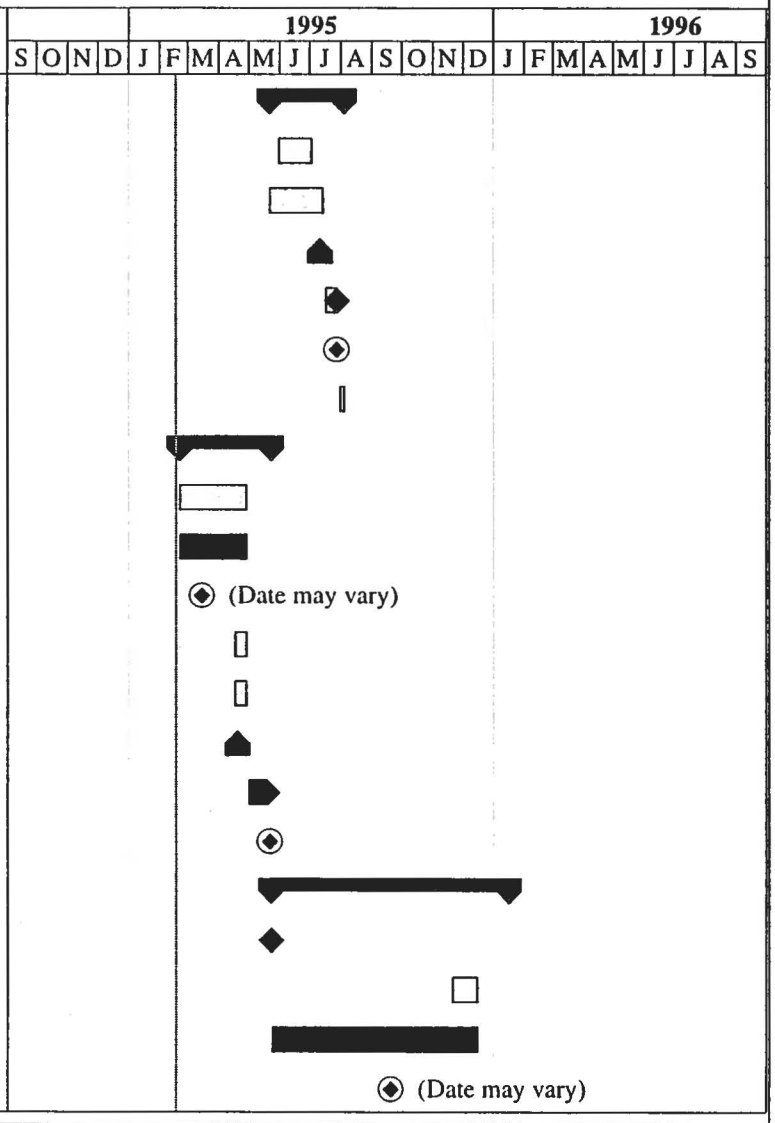


Project: MPTP RD
Date: 2/16/95
(Notes on Last Page)

Critical		**Milestone**	◆	**Agency Interaction**	◆
Noncritical		**Summary**		**Meetings**	◈
Progress		**Rolled Up**	◇	**TRC**	▲

FIGURE 6-1
RD SCHEDULE-MONTANA POLE AND TREATING PLANT SITE

ID	TASKS/SUBTASKS (CDM Task [#])	Work	Start	End
43	**[3.3]ADD'L STUDIES REPORTING**	**53d**	**5/22/95**	**8/4/95**
44	[3.3.1] DATA MANAGEMENT/ EVAL.	24d	5/31/95	7/3/95
45	[3.3.2]DRAFT ADD'L. STUDIES REPORT	38d	5/22/95	7/14/95
46	[3.3.3] TRC-DRFT ADD STUD. RPT.	1d	7/11/95	7/11/95
47	*AGENCIES' REVIEW-ADD'L. STUDY REPORT*	*10d*	*7/17/95*	*7/28/95*
48	[3.3.4]REVIEW MTG W/AGENCIES	1d	7/28/95	7/28/95
49	[3.3.5]FINAL ADD'L. STUDIES REPORT	5d	7/31/95	8/4/95
50	**TASK 4 -PRELIMINARY DESIGN REPORT (30%)**	**66d**	**2/21/95**	**5/23/95**
51	[4.1]DESIGN BASIS REPORT	49d	2/21/95	4/28/95
52	[4.2]PRELIM. DWGS & MIN.TECH. SPECS.	49d	2/21/95	4/28/95
53	[4.3] PROG. MEET. W/ AGENCIES	1d	3/15/95	3/15/95
54	[4.4]PRELIM. EST. PROBABLE RA COSTS	10d	4/17/95	4/28/95
55	[4.5]PRELIM. RA SCHEDULE	10d	4/17/95	4/28/95
56	[4.6]TRC PRELIM DESIGN	1d	4/19/95	4/19/95
57	*AGENCIES' REVIEW-PDR*	*15d*	*5/1/95*	*5/19/95*
58	[4.7] RVW MTG W/AGENCIES	2d	5/22/95	5/23/95
59	**TASK 5 - PRE-FINAL DESIGN REPORT(90%)**	**164d**	**5/23/95**	**1/16/96**
60	*TASK ORDER 5 SIGNED(f)*	*1d*	*5/23/95*	*5/23/95*
61	[5.1] DESIGN BASIS RPT-REVISION	18d	11/20/95	12/15/95
62	[5.2]PRE-FINAL DSN DWGS & TECH. SPECS.	143d	5/24/95	12/15/95
63	[5.3] PROG. MEET. W/ AGENCIES	1d	9/20/95	9/20/95

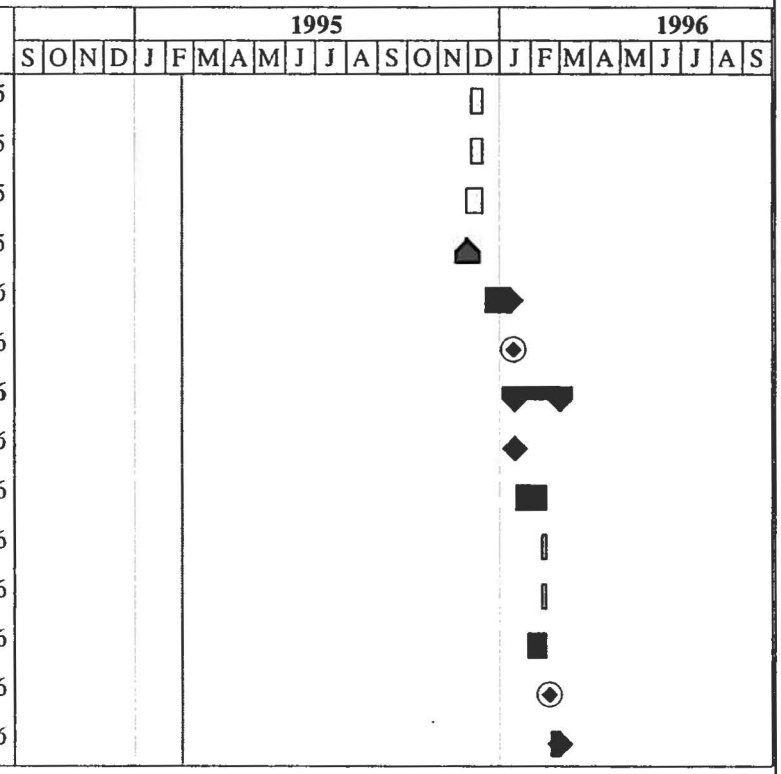


Project: MPTP RD
Date: 2/16/95
(Notes on Last Page)

Critical		Milestone	◆	Agency Interaction	◆
Noncritical		Summary		Meetings	◈
Progress		Rolled Up	◇	TRC	▲

FIGURE 6-1
RD SCHEDULE-MONTANA POLE AND TREATING PLANT SITE

ID	TASKS/SUBTASKS (CDM Task [#])	Work	Start	End
64	[5.4]PRE-FINAL EST. PROBABLE RA COSTS	10d	12/4/95	12/15/95
65	[5.5]PRE-FINAL RA SCHEDULE	10d	12/4/95	12/15/95
66	[5.6]DRAFT PERF. STNDS PLAN	13d	11/29/95	12/15/95
67	[5.7] TRC/BCO (PRE-FINAL SUBMITTAL)	3d	11/28/95	11/30/95
68	*AGENCIES' REVIEW-PRE FINAL RD*	*18d*	*12/18/95*	*1/12/96*
69	[5.8]REVIEW MEETING W/AGENCIES	2d	1/15/96	1/16/96
70	**TASK 6- FINAL DESIGN REPORT(100% TECH)**	**33d**	**1/16/96**	**3/1/96**
71	*TASK ORDER 6 SIGNED(g)*	*1d*	*1/16/96*	*1/16/96*
72	[6.1]FINAL DRAWINGS & SPECS	23d	1/17/96	2/16/96
73	[6.2]FINAL OPINION PROBABLE RA COST	5d	2/12/96	2/16/96
74	[6.3]FINAL RA SCHEDULE	5d	2/12/96	2/16/96
75	[6.4] FINAL PERF. STANDARDS PLAN	15d	1/29/96	2/16/96
76	[6.5] REVIEW MEETING W/ AGENCIES	1d	2/20/96	2/20/96
77	*AGENCIES' RVW-& APRV.FINAL RD*	*8d*	*2/21/96*	*3/1/96*



Project: MPTP RD
Date: 2/16/95
(Notes on Last Page)

Critical	Milestone	Agency Interaction	
Noncritical	Summary	Meetings	
Progress	Rolled Up	TRC	

RD SCHEDULE NOTES:

(a) Based on discussions with DHES, the Scoping Report for Project Planning Documents (SAP and addenda for QAPP & DM/DVP) is an analysis for determination of approach to these documents.

(b) Task Order 3 covers completion of the additional Studies Work Plan and the Preliminary Design Report

(c) The SAP and addenda (to the Clark Fork Plans) for the QAPP and DM/DVP will be appendices attached to the Additional Studies Work Plan.

(d) Task Order 4 is anticipated to cover the Additional Studies Field Sampling, Analysis and Reporting.

(e) Due to the schedule, the PDR will not include consideration of all of the Additional Studies results.

(f) Task Order 5 will include the Pre-Final Design Report.

(g) Task Order 6 will cover the Final Design Report

MAJOR ABBREVIATIONS

BCO	Biddability, Constructability, and Operability Review
DBR	Design Basis Report
DM/DVP	Data Validation/ Data Management Plan
FDR	Final Design Report
PDR	Preliminary Design Report
PFDR	Pre-Final Design Report
PQM	Project Quality Management Plan
QAPP	Quality Assurance Project Plan
SAP	Sampling and Analysis Plan
TRC	Technical Review Committee

Section 7
References

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Appendix A
Preliminary Outline
Design Basis Report

Appendix A
Preliminary Outline
Design Basis Report

1.0 OVERVIEW

1.1 Purpose, Scope and Organization of this Report
1.2 Remedial Design Goals, Objectives and Scope of Work
1.3 Key Design Components and Factors
1.4 Existing Reports and Data Sources
1.5 Basic Procedures

1.5.1 Design
1.5.2 Procurement
1.5.3 Construction
1.5.4 Operations and Maintenance

1.6 Additional Data Gathering/Studies - Summary
1.7 Major Interface Requirements

1.7.1 EPA and Other Agencies
1.7.2 Potentially Responsible Parties
1.7.3 Community Involvement
1.7.4 Lower Area One Construction/Silver Bow Creek
1.7.5 Existing Remediation System(s)
1.7.6 Interstate Highway
1.7.7 Rail Road(s)
1.7.8 Sewer
1.7.9 Litigation
1.7.10 Site Limits/Land Ownership/Access

1.8 Permits and ARARS
1.9 Weather Considerations

2.0 EXCAVATION OF CONTAMINATED SOILS

(**Note: Subheadings for 2.1 through 2.9 are presented as typical, and will generally be applicable for Sections 3.0 through 10.0, with modifications as appropriate)

2.1 Summary of [Excavation] ROD Requirements and ARARS
2.2 Description and General Discussion
2.3 Key [Excavation] Design Criteria/Issues

2.3.1 Interface with other Remedy Components/Sequencing
2.3.2 Alternative Design Approaches
2.3.3 Evaluation Criteria
2.3.4 Other Key Issues

2.3.5 Selected Design Approach
2.3.6 Component Sizing Capacity
2.3.7 Construction Requirements
2.3.8 O & M Requirements
2.3.9 Monitoring and Verification Requirements

2.4 Design/Specifications/Drawings Approach

2.4.1 Design Approach (details level, output, methods, assumptions, schematic representation, etc.)
2.4.2 Specifications (detail level, phasing, measurement of completion, submittals, standards of quality, etc.)
2.4.3 Drawings (level of presentation, content, etc.)

2.5 Failure Analysis

3.0 *EX SITU* BIOLOGICAL TREATMENT OF SOILS

4.0 *IN SITU* BIOLOGICAL TREATMENT OF GROUNDWATER AND SOILS

5.0 BACKFILLING

6.0 SOIL FLUSHING

7.0 CONTAINMENT AND EXTRACTION OF NAPLS AND GROUNDWATER

8.0 TREATMENT AND DISCHARGE OF LIQUID STREAMS

9.0 TREATMENT AND DISPOSAL OF SITE DEBRIS AND EQUIPMENT

10.0 DISPOSAL OF OILS AND SLUDGES AND RESIDUALS

11.0 ADDITIONAL REMEDIAL DESIGN AND REMEDIAL ACTION COMPONENTS/ CONSIDERATIONS

11.1 Institutional Controls
11.2 Fencing/Security
11.3 Environmental Controls

11.3.1 Storm Water Management/Run-on, Run-off, Erosion and Sedimentation Controls
11.3.2 Dust Controls
11.3.3 Other Environmental Controls

11.4 Historic Preservation
11.5 Surface Restoration
11.6 Long-Term O & M

11.7 Utilities
11.8 Other RD/RA Items

12.0 OTHER DESIGN DISCIPLINES

(headings noted for 12.1.1, 12.1.2, 12.1.3, and 12.1.4 also will be used for Subsections 12.2 through 12.7)

12.1 Civil

12.1.1 Description
12.1.2 Criteria
12.1.3 Drawings
12.1.4 Specifications

12.2 Instrumentation and Control
12.3 Process Mechanical
12.4 Architectural
12.5 Structural
12.6 Building Mechanical
12.7 Electrical/Communications
12.8 Operations and Maintenance

12.8.1 Short-Term
12.8.2 Long-Term
12.8.3 Specifications

12.9 Construction Sequencing/Phasing

12.9.1 Assumptions
12.9.2 Constraints/Interfaces
12.9.3 Milestones
12.9.4 Drawings
12.9.5 Specifications

12.10 Estimates of Probable Costs (Capital and Operating)

12.10.1 Estimates' Summary
12.10.2 Basis/Qualifying Factors
12.10.3 Sensitivity

12.11 Health and Safety

12.11.1 RD Phase
12.11.2 RA Phase
12.11.3 Air Monitoring and Control
12.11.4 Decontamination
12.11.5 Specifications

12.12 Monitoring and Verification Overall

12.12.1 Monitoring/Verification Programs Summary
12.12.2 RD Chemical Data Management
12.12.3 RA Chemical Data Management
12.12.4 RA Monitoring and Verification
12.12.5 Post RA Monitoring and Verification
12.12.6 Specifications

13.0 CONSTRUCTION ITEMS

13.1 Designers' Interface with RA
13.2 RD Documents' Refinements & Addition for Implementation
13.3 RA Support Plans
13.4 RA Submittals

14.0 APPENDICES

14.1 Design Calculations/Vendor Information
14.2 QA/QC Documentation
14.3 Permits and Applications
14.4 Key RD Communications
14.5 Opinion of Probable Costs -Details (in a separate volume)

Appendix B
Preliminary List of Drawings

Appendix B
Preliminary List of Drawings

This is a preliminary listing of the anticipated construction Drawings for this project assuming that: all of RA is done under 1 contract, and the use of performance-based RD (i.e., minimal drawings) will be as indicated in the RD WP. This list will be refined during the preliminary phases of the RD, particularly as a result of the development of the Design Basis Report.

Overall Project Drawings

—	(Cover/Title Sheet)

General Drawings

G-1	General Notes and Abbreviations
G-2	Overall Project Sequencing, Layout & General Legend
G-3	Existing Overall Site-Plan
G-4	Existing Storage Buildings-Plan & Sections
G-5	Work This Contract-Overall Site Plan
G-6	Work This Contract-Site North Plan
G-7	Work This Contract-Site South Plan
G-8	New Monitoring Wells-Sections & Details
G-9	Miscellaneous Details

Schematics/ Instrumentation Drawings

I-1	Instrumentation/Schematics — Notes, Legend, and Details
I-2	Overall Project Schematic — Soils/Debris
I-3	Overall Project Schematic — Liquids/NAPLs

Architectural/ Structural Drawings

A/S-1	Permanent Buildings Architectural-General Elevations
A/S-2	Permanent Buildings Architectural-General Elevations & Details

Process Mechanical Drawings

M-1	Mechanical- Notes, Legend & Details
M-2	Pipe Schedules & Equipment Lists

Electrical Drawings

E-1	Electrical-Notes, Legend, Details & Design Criteria
E-2	Electrical-Overall Site Layout & One-Line Diagram

Remedy Specific Component Drawings

Demolition/ Removal Drawings

D/R-1	Demolition Notes, Plan, & Sections
D/R-2	Demolition Sections & Details
D/R-3	Equipment Removals Notes, Plan, & Decontamination
D/R-4	Equipment Removals-Details

Civil Drawings

C-1	Civil Legend & Notes Civil Site Work Plan
C-2	Storm Water Management & Erosion/Sediment Control Sections & Details
C-3	Civil-Sections & Details
C-4	Civil-Details
C-5	Materials Handling & Storage Schematic, Plan, & Details
C-6	Sewer Relocation Plan & Profile I
C-7	Sewer Relocation Plan & Profile II
C-8	Sewer Relocation Sections & Details
C-9	Site North - Final Restoration - Plan & Details
C-10	Site South - Final Restoration - Plan & Details
C-11	Site-Cross Sections I
C-12	Site-Cross Sections II
C-13	Site-Cross Sections III

Ex Situ Soils Bioremediation Drawings

ES-1	*Ex Situ* Soil Treatment Schematic, Notes & Plan
ES-2	*Ex Situ* Soil Treatment Phase I-P & ID, Mechanical & Details
ES-3	*Ex Situ* Soil Treatment — Sections & Details

In Situ Bioremediation System Treatment Drawings

IP-1	In-Place Treatment-Schematic, Notes & Plan
IP-2	In-Place Treatment Phase I — P&ID, Mechanical & Details
IP-3	In-Place Treatment Phase I — Sections & Details
IP-4	In-Place Treatment Phase II

Soil Flushing & Recovery Drawings

SF-1	Flushing/Removal Schematic, Notes & Plan(S)
SF-2	Flushing/Recovery Phase I — P&ID, Mechanical & Details
SF-3	Flushing/Recovery Phase I — Sections & Details
SF-4	Flushing/Recovery Phase II

Groundwater/ NAPLs Management Drawings

GN-1	GW/NAPLs Management-Schematic, Notes & Plan
GN-2	GW/NAPLs Management-Containment: Sections & Details
GN-3	GW/NAPLs Management-Extraction: P&ID, Sections & Details
GN-4	GW/NAPLs Management-Treatment: Schematic, Notes, & Plan
GN-5	GW/NAPLs Management-Discharge/Reinjection Plan, Sections & Details

Residuals Management Drawings

RM-1	Residuals Management Schematic, Notes, & Plan
RM-2	Residuals Management Sections & Details

Appendix C
Preliminary List of Specifications

Appendix C
Preliminary List of Specifications

This is a preliminary listing of Specification sections. The actual sections, their numbers, and contents will be refined during the course of the RD.

NOTES: (RA Group Supplied/Refined) indicates that it is currently planned that the RA Group will supply and/or refine these sections during their implementation of the RA.

DIVISION 0	**CONTRACTUAL REQUIREMENTS (SUPPLIED BY RA GROUP)**
DIVISION 1	**GENERAL REQUIREMENTS** (All of this Division will require refinement by the RA Group, except those noted to be supplied by the RA Group).
01010 *	Summary of Work
01011 *	Protection of Existing Facilities
01012 *	Connection to Existing Facilities
01015 *	Preconstruction Property Condition Survey
01025	Measurement and Payment
01030 *	Sequence of Construction
01040	Coordination and Site Conditions
01046	Control of Work
01070	Safety, Health, and Emergency Response
01105 *	Environmental Data Management and Reporting
01110 *	Environmental Protection
01170	Special Provisions
01210	Management during Construction
01300	Submittals
01310 *	RA Progress Schedule
01430 *	Chemical Data Acquisition
01440 *	Contractor Quality Control
01445 *	Chemical Testing Laboratory Services
01505	Mobilization/Demobilization
01510	Temporary Utilities and Temporary Facilities (Supplied by RA Group)
01610	Material and Equipment - General

01640 *	Systems Startup
01700	Contract Closeout (Supplied by RA Group)
01715 *	Operation and Maintenance Instructions
01730 *	Operation and Maintenance Data and Manuals
01750 *	Security
01808 *	Systems Operation and Maintenance
01810 *	Information Transfer (at completion of this contract)
01900 *	Monitoring and Verification
01901 *	Sampling and Analysis

* Minimal refinement expected from the RA Group

DIVISION 2 SITE WORK

02050	Demolition and Debris Management
02051	Existing Stockpiles Management
02060	Well Abandonment
02090	Offsite Transportation and Disposal
02110	Clearing, Grubbing, and Stripping
02115	Contaminated Soil Removal
02119	Interim Storage of Contaminated Materials
02140	Excavation Dewatering
02200	Earthwork - General
02205	Access Roads and Parking Areas
02210	Site Grading
02221	Sampling and Analysis
02222	Earthwork for Utilities Systems
02223	Backfilling and Compaction
02272	Geotextiles
02674	Piezometers and Wells (Extraction, Injection, and Monitoring)
02712	Flood Protection
02713	Stormwater Management
02725	Collection/Distribution Piping System

02740	Extraction Trench Construction
02742	Injection Trench Construction
02744	Cutoff Wall
02777	Geomembranes
02830	Permanent Fences and Gates
02935	Site/Surface Restoration
DIVISION 3	**CONCRETE**
03100	Structural Concrete Formwork
03200	Concrete Reinforcement
03250	Expansion Joints, Construction Joints, and Waterstops
03300	Concrete for Building Construction
DIVISION 4	**MASONRY (Not Used)**
DIVISION 5	**METALS (Not Used)**
DIVISION 6	**WOOD AND PLASTIC (Not Used)**
DIVISION 7	**THERMAL AND MOISTURE PROTECTION (Not Used)**
DIVISION 8	**DOORS AND WINDOWS (Not Used)**
DIVISION 9	**FINISHES**
09901	Surface Preparation and Shop Prime Painting
09902	Field Painting
DIVISION 10	**SPECIALTIES (Not Used)**
DIVISION 11	**EQUIPMENT**
11299	Package Groundwater Well Pump System
11303	Packaged Pump Stations
11310	Package Aboveground NAPL Storage Tank
DIVISION 12	**FURNISHING (Not Used)**
DIVISION 13	**SPECIAL CONSTRUCTION**
13121	Pre-Engineered Metal Building
13412	Contaminated Material Handling and Storage
13416	Offsite Incineration/Recycling of Oils and Sludges
13431	Air Quality Monitoring and Control

13908	Process Liquid Treatment System
13909	*In Situ* Bioremediation of Soils and Groundwater
13910	*Ex Situ* Bioremediation of Soils
13920	Soil Flushing and Recovery System(s)
DIVISION 14	**CONVEYING DEVICES (Not Used)**
DIVISION 15	**MECHANICAL**
15061	Steel Pipe and Fittings
15064	Plastic Pipe and Fittings
15065	HDPE Pipe and Fittings
15066	Stainless Steel Pipe and Fittings
15075	Double Containment Piping Systems
15100	Valves and Appurtenances
15140	Pipe Hangers, Anchorage, and Supports
15400	Plumbing - General Provisions
15500	HVAC - General Provisions
DIVISION 16	**ELECTRICAL**
16000	Electrical - General Provisions
16110	Raceways, Boxes, and Fittings
16120	Wire and Cables (600 Volt Maximum)
16191	Miscellaneous Electrical Equipment
16470	Panelboards
16480	Motor Control Center
16912	Process Instrumentation and Controls