ADMINISTRATIVE RECORD

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S.O.U. Idaho Pole
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RECORD OF DECISION

IDAHO POLE NATIONAL PRIORITIES LIST SITE

BOZEMAN, MONTANA

Montana Department of Health & Environmental Sciences
Solid & Hazardous Waste Bureau
Cogswell Building
Helena, Montana 59620

in cooperation with the
United States
Environmental Protection Agency
Region VIII - Montana Office
Federal Bldg., 301 S. Park, Drawer 10096
Helena, MT 59626-0096

September 1992

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414052

RECORD OF DECISION

IDAHO POLE COMPANY NATIONAL PRIORITIES LIST SITE

INTRODUCTION

Based on the Remedial Investigation/Feasibility Study, the Proposed Plan, the public comments received, including those from the Potentially Responsible Parties, Environmental Protection Agency comments, and other new information, the Montana Department of Health & Environmental Sciences presents the Record of Decision for the Idaho Pole Company site (the Site). The Record of Decision presents a brief outline of the Remedial Investigation/Feasibility Study, actual and potential risks to human health and the environment, and the selected remedy. The state followed EPA guidance[1] in preparation of the Record of Decision. The Record of Decision has the following three purposes:

1. Certify that the remedy selection process was carried out in accordance with the requirements of the Comprehensive Environmental, Response, Compensation and Liability Act (CERCLA), 42 U.S.C. 9601 *et seq.*, as amended by the Superfund Amendments and Reauthorization Act (SARA), and, to the extent practicable, the National Contingency Plan (NCP);

2. Outline the engineering components and remediation goals of the selected remedy; and

3. Provide the public with a consolidated source of information about the history, characteristics, and risks posed by the conditions at the Site, as well as a summary of the cleanup alternatives considered, their evaluation, and the rationale behind the selected remedy.

The Record of Decision is organized into three distinct sections:

- The **Declaration** functions as an abstract for the key information contained in the Record of Decision and is the section of the Record of Decision signed by the Director of the Montana Department of Health and Environmental Sciences and the EPA Regional Administrator;

- The **Decision Summary** provides an overview of the site characteristics, the alternatives evaluated, and the analysis of those options. The Decision Summary also identifies the selected remedy and explains how the remedy fulfills statutory requirements; and

[1]Guidance on Preparing Superfund Decision Documents: The Proposed Plan, the Record of Decision, Explanation of Differences, the Record of Decision Amendment, Interim Final, EPA/540/G, July 1989.

- The **Responsiveness Summary** addresses public comments received on the Proposed Plan, the Remedial Investigation/Feasibility Study and other information in the administrative record.

DECLARATION

SITE NAME AND LOCATION

Idaho Pole Company Site
Bozeman, Montana

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedy for the Idaho Pole Company site (the Site), in Bozeman, MT. The Montana Department of Health & Environmental Sciences, in consultation with the United States Environmental Protection Agency (EPA), selected the remedy in accordance with CERCLA, as amended by SARA, and, to the extent practicable, the NCP. The Environmental Protection Agency concurs in the selected remedy. The attached index identifies the items that comprise the administrative record upon which the selection of the remedial action is based.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

This is the final action for the only operable unit for the Site. The operable unit includes all known sources and contaminated media at the Site. This action addresses the principal threats remaining and provides for treatment of contaminated soils and ground water. Some treatment residuals and soils contaminated at lower levels will remain onsite, such that the Site will require longterm management.

The contaminants of concern at the Site are pentachlorophenol (PCP), polynuclear aromatic hydrocarbons (PAHs), polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans. This Record of Decision establishes cleanup levels for those contaminants of concern at the Site. The major components of the selected remedy include:

- Excavation and surface land biological treatment of approximately 19,000 cubic yards of contaminated soils from the pasture area and the area between Cedar Street and U.S. Interstate Highway 90 (I-90) including ditch sediments or bottoms, and the former roundhouse area;

- Hot water and steam flushing of soils underlying the pole plant facility and I-90 in order to recover hazardous substances;

- Separation and disposal of oily wood treating fluid extracted from soils;

- Closure of onsite treatment units in compliance with RCRA Subtitle C requirements;

- Ground water cleanup using extraction and biological treatment and return of water to the ground water aquifer to enhance *in situ* biological degradation and to control potential migration of contaminants;

- Treatment of contaminated residential wells exceeding maximum contaminant levels (MCLs) or risk based concentrations of the contaminants of concern at the distribution point in addition to institutional controls preventing new access to contaminated ground water; and

- Continued residential and ground water monitoring to determine movement of contaminants and compliance with remedial action requirements.

Both soils and ground water will be remediated as one operable unit at the Site. Soils will be excavated from three general areas: the area between Cedar Street and I-90 (includes Cedar Street ditch) and the pasture (includes the substation ditch) and the former roundhouse area. Biological treatment will take place in land treatment units. The former roundhouse area soils are predominantly PAH contaminated while the other soils are predominantly PCP contaminated.

Ground water treatment will focus in the area underneath the oily wood treating fluid plume. Extraction wells will be centrally located within the contaminated ground water and injection wells will be placed along the perimeter of the oily wood treating fluid plume. Extracted ground water will be biologically treated. Treated ground water will be injected in order to deliver oxygen and nutrients back to the aquifer. Ideally this will create a hydraulic barrier to reduce or eliminate continued transfer of hazardous substances from the oily wood treating fluid plume to ground water. Additionally, nutrients will diffuse downgradient, providing for biodegradation of the downgradient contaminated ground water plume. If it is not possible to reinject all of the treated ground water, discharge to the publicly owned treatment works or treatment and discharge to surface water under a Montana Pollutant Discharge Elimination System (MPDES) permit may be required.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost-effective. This remedy uses permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable and satisfies the preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. Because this remedy may result in hazardous substances remaining onsite above health based levels, the five year review will be conducted within five years

after commencement of remedial action to ensure that the remedy continues to provide adequate protection to human health and the environment.

Dennis Iverson, Director
Montana Department of Health & Environmental Sciences

9/28/92
Date

Jack W. McGraw, Acting Regional Administrator
Environmental Protection Agency, Region VIII

9/28/92
Date

DECISION SUMMARY

Decision Summary

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I. SITE NAME LOCATION, AND DESCRIPTION

Idaho Pole Company
Bozeman, MT

The Idaho Pole Company site (the Site) is located near the northern limits of Bozeman, Montana (approximately 22,660 inhabitants) and occupies approximately 50 acres in the east half of Section 6 and the west half of Section 5, Township 2S, Range 6E of Gallatin County. The Site, illustrated in Figure 1, is located in a light industrial use area. The Site is bounded by the Montana Rail Link railroad tracks to the south. Commercial property is west of the Site. Rocky and Mill Creeks are to the north and east. North of the pole plant is a semirural neighborhood of twelve residences with a population of about 30 individuals. Most residences have a few acres of land used for pasture, hay or grass production and vegetable gardens. Nine of the residences continue to use ground water for domestic purposes.

Rocky Creek flows along the northern edge of the Site. It combines with Bozeman Creek about 1/2 mile from the Site to form the East Gallatin River. Wetlands exist within the Site, generally near Rocky Creek; the 100 year floodplain is close in towards Rocky and Mill Creeks and is within Site boundaries. Figure 1 shows the Site relative to the town and surrounding area.

Significant features of the Site include the Idaho Pole Company (IPC) pole plant and surrounding land as shown in the Site Plan, Figure 2. The IPC facility is currently in operation to treat white wood poles. The Site also includes Burlington Northern Railroad (BN) property, Montana Rail Link property, land owned by the Montana Power Company (MPC), including the East Gallatin substation, privately owned land west and east of Rocky Creek, and a portion of U.S. Interstate 90 (I-90).

II. SITE HISTORY

The IPC wood treating facility began operation in 1945 using creosote to preserve wood. In 1952, the company switched to pentachlorophenol in carrier oil (similar to fuel oil) for the wood treating solution. IPC wood treating equipment has included butt and pole length treating vats. In 1975, a pressurized heated retort was added for treating full length poles. The pole length vats were removed in the early 1980's. There is also a drying area where treated poles are stored prior to shipment. IPC continues wood treating with a pressurized heated retort and butt dipping vat.

In 1978, the Montana Department of Fish, Wildlife and Parks notified Montana Department of Health & Environmental Sciences (MDHES) of a suspected release of oily wood treating fluid from the plant. MDHES found evidence of a release in ditches near the facility and near Rocky Creek. Consequently, MDHES issued a compliance order on September 29, 1978, notifying IPC of statutory violations and directing the company to stop uncontrolled releases and to clean up spilled treating fluid.

In an attempt to slow or eliminate movement of the oily wood treating fluid through ground and surface water and into private wells, IPC installed and operated an interceptor drain with a sump and an interceptor trench adjacent to I-90. Absorbent pads were also used in the culverts and ditches to intercept and collect oily wood treating fluid. Culverts under I-90 have been dammed to prevent runoff of contaminated surface water to Rocky Creek. However, during high runoff periods, discharge through the culverts has occurred.

In 1984, IPC conducted a remedial investigation without MDHES or EPA oversight to identify the sources and extent of contamination at the Site. IPC drilled monitoring wells to collect ground water samples and also collected soil and surface water samples. MDHES and EPA concluded that IPC's remedial investigation report was not sufficient to identify contaminant sources and to characterize the nature and extent of contamination.

EPA proposed the facility for the National Priorities List of Superfund sites in 1984. The listing was final in 1986, making the site eligible for federal funds for enforcement, investigation and remediation.

In 1989, MDHES assumed the lead agency role through a cooperative agreement with EPA and began the remedial investigation and feasibility study (RI/FS) following the EPA approved Work Plan and EPA guidance. The RI defined the nature and extent of contamination and provided data to complete the baseline health and Ecological Risk Assessments. The FS included the development, screening and evaluation of potential site remedies.

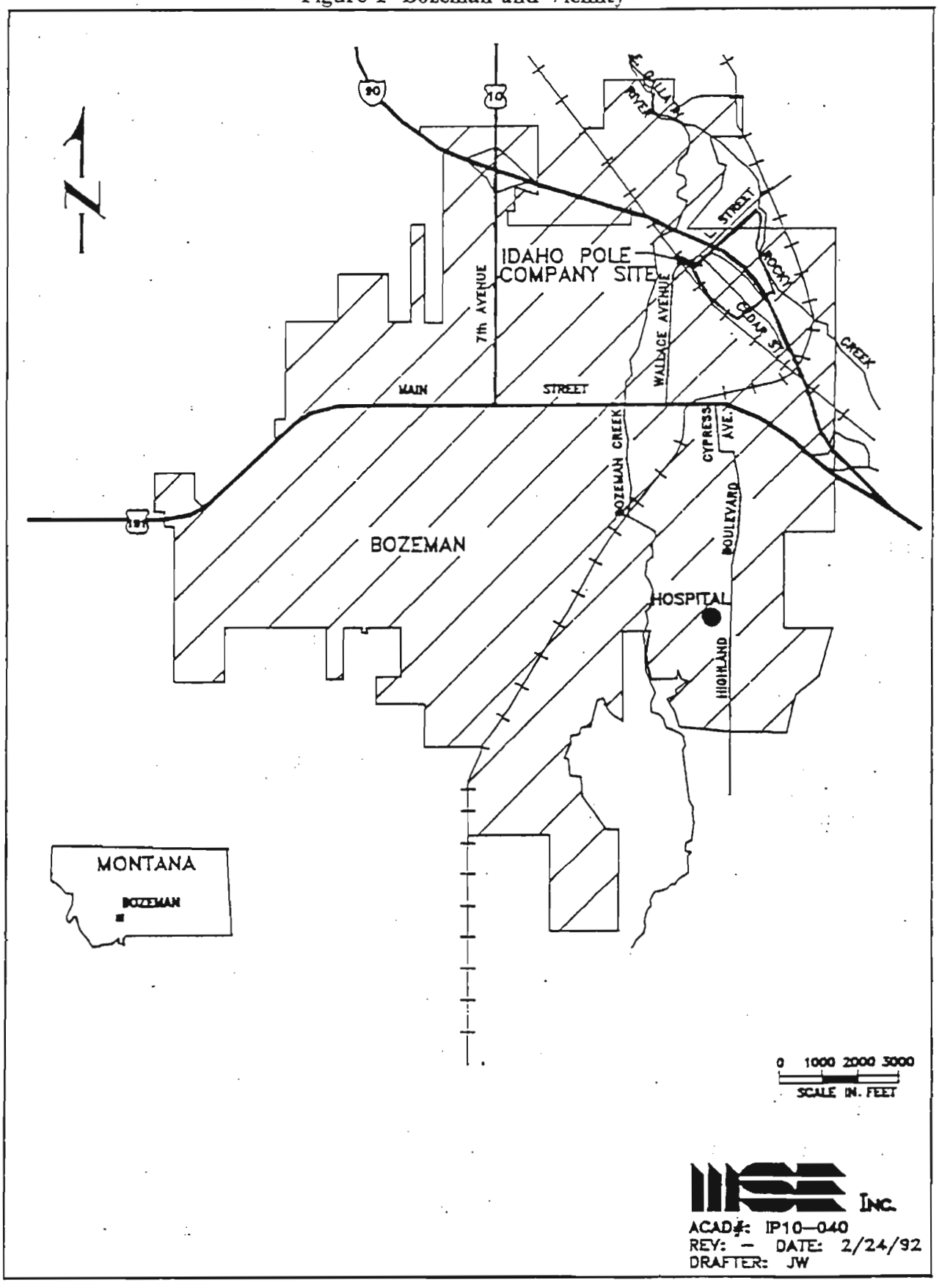
Enforcement Actions

EPA issued general notice letters and information requests to the potentially responsible parties (PRPs), IPC and BN, in February 1988. The PRPs responded with general information about their activities at the Site: IPC described treatment plant operations and BN outlined historic railroad and roundhouse activities.

In June 1988, EPA issued special notice letters to IPC and BN to initiate RI/FS negotiations between the PRPs, EPA and MDHES. Issuance of the special notice letters triggered a 60 day moratorium during which EPA would take no action to proceed with the RI/FS. Both PRPs responded with good faith offers to conduct the RI/FS and the moratorium was extended an additional 30 days. IPC prepared a draft RI/FS Work Plan and offered comments on EPA's draft Administrative Order on Consent. BN assumed a secondary role in the negotiations.

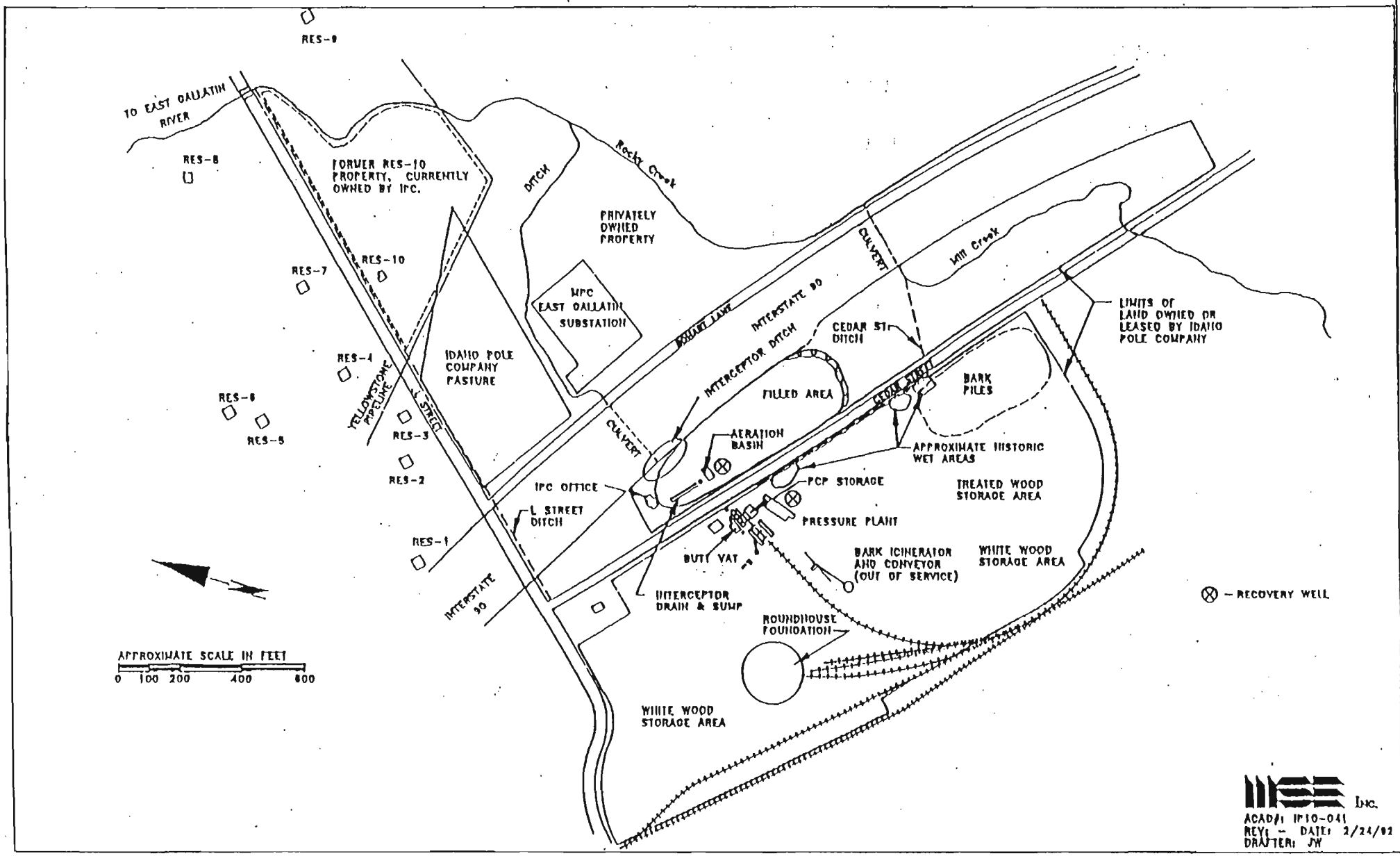
Negotiations ended unsuccessfully in January 1989. In March 1989, MDHES requested and received the lead agency role for a Fund financed RI/FS for the Site.

Figure 1 Bozeman and Vicinity



VICINITY MAP
IDAHO POLE COMPANY NPL SITE BOZEMAN, MONTANA

Figure 2 Idaho Pole Site



STUDY AREA PLAN
IDAHO POLE COMPANY NPL SITE BOZEMAN, MONTANA

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

Public participation is required by CERCLA sections 113 and 117. These sections require that before adoption of any plan for remedial action to be undertaken by the President (EPA) or by a State (MDHES) or by anyone (PRPs), the lead agency shall:

1. Publish a notice and brief analysis of the Proposed Plan and make such plan available to the public; and

2. Provide a reasonable opportunity for submission of written and oral comments and an opportunity for a public meeting at or near the Site regarding the Proposed Plan and any proposed findings relating to cleanup standards. The lead agency shall keep a transcript of the meeting and make such transcript available to the public. The notice and analysis published under item #1 shall include sufficient information to provide a reasonable explanation of the Proposed Plan and alternative proposals considered.

Additionally, notice of the final remedial action plan (Record of Decision) adopted shall be published and the plan shall be made available to the public before commencing any remedial action. Such a final plan shall be accompanied by a discussion of any significant changes to the preferred remedy presented in the Proposed Plan along with the reasons for the changes and a response (Responsiveness Summary) to each of the significant comments, criticisms, and new data submitted in written or oral presentations during the public comment period.

MDHES has conducted required community participation activities through presentation of the Proposed Plan, a 60 day public comment period, a public hearing and presentation of the selected remedy in the Record of Decision. Specifically included in the Record of Decision is a Responsiveness Summary that summarizes public comments and MDHES and EPA responses. The Record of Decision documents changes, if any, to the preferred remedy as a result of public comments.

The Proposed Plan for the Site was released for public comment on April 16, 1992. The Proposed Plan was made available to the public in both the administrative record located at the Bozeman Public Library and at MDHES offices in Helena, MT, and information repositories maintained at MDHES offices in Helena, the Bozeman Public Library, the Gallatin County Environmental Health office and the State Library in Helena. The Proposed Plan was distributed to the MDHES IPC Site mailing list. The notice of availability of the Proposed Plan was published in the Bozeman Chronicle on April 16, 1992. A public comment period was initially designated from April 16, 1992 through May 16, 1992, but requests from the PRPs resulted in a 30 day extension to June 16, 1992.

A public hearing was held in Bozeman, MT on April 30, 1992. At this hearing, representatives from EPA and the MDHES answered questions about problems at the Site and the remedial alternatives under consideration as well as the preferred remedy. A portion of the hearing was dedicated to accepting oral comments from the public. A court reporter

transcribed the entire hearing and MDHES made the transcript available to the public on May 22, 1992. A response to the comments received during the public comment period is included in the Responsiveness Summary, which is part of this Record of Decision. Also, community acceptance of the selected remedy is discussed in section VII, Summary of Comparative Analysis of Alternatives, of the Decision Summary.

IV. SCOPE AND ROLE OF RESPONSE ACTION

To address potential threats posed by hazardous substances at the Site, MDHES organized the Site into one operable unit and through the RI identified three specific types of contaminated media. These are:

- Contamination in the ditch & creek sediments;
- Contamination of the ground water aquifer; and
- Contamination in soils.

The contaminants of concern in these media include pentachlorophenol and other chlorinated phenols, polynuclear aromatic hydrocarbons, polychlorinated dibenzo-p-dioxins and polychlorinated dibenzofurans.

In order to develop an effective remedy two categories of alternatives have been defined: soils (including sediments) and ground water. The selected remedy will include both soil and ground water alternatives and will address all contaminated media exceeding cleanup levels.

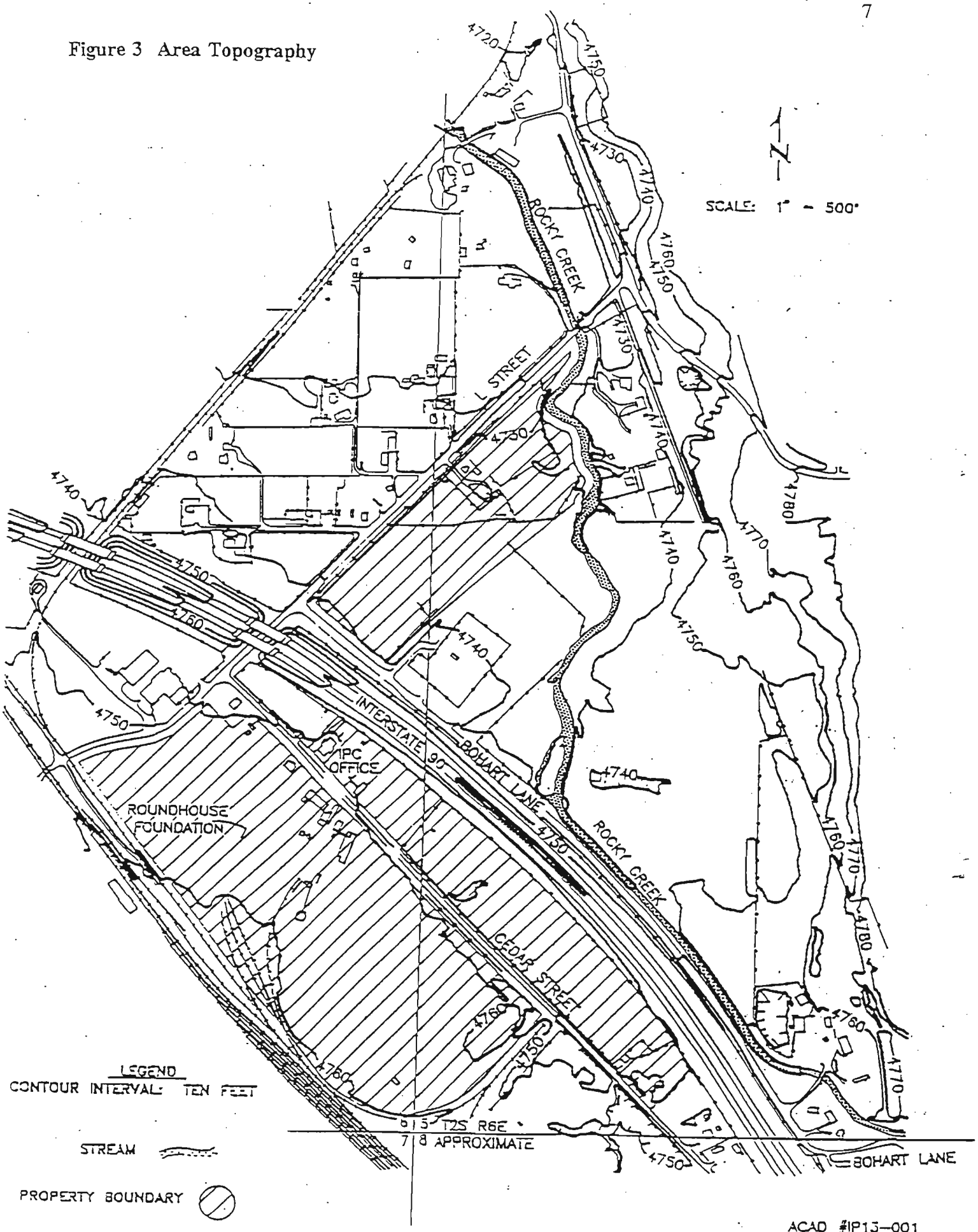
V. SITE CHARACTERISTICS

Site Geology and Hydrology

As shown in Figure 3, the Site is located near Rocky Creek. The Rocky Creek floodplain lies in the Upper East Gallatin subarea. There are only a few delineated horizons at the Site: a surficial clay, an intermediate silt at 25 feet below ground surface (bgs), a silty clay at 35 feet bgs and a second silty clay at 50 feet bgs.

Several feet of fill material have been placed in the pole plant area overlying the surficial clay. Horizontal and vertical variations in the subsurface units play an important role in ground water and contaminant movement. The horizons are of variable thickness and permeability and are generally continuous but probably not over the entire Site. Aquifers are associated with each of the permeable zones. Bedrock depth has not been established. The principal surface water features are Rocky Creek and Mill Creek on the northern and eastern edges of the Site. There are also several intermittently flowing ditches that carry surface runoff from rain or snow melt and high ground water. Bozeman Creek is about 1/4 mile to the west of the Site but is not in the direction of ground water flow from the Site. No

Figure 3 Area Topography



IDAHO POLE COMPANY SITE TOPOGRAPHIC MAP

attempt was made to evaluate Bozeman Creek's relationship to ground water.

The Rocky and Mill Creek 100 year floodplain is close to the streams while the 500 year floodplain reaches near the IPC facility and into the nearby residential neighborhood. Anticipated remedial activity will occur within the 500 year floodplain.

Ground water elevation at the Site is generally within 12 feet of ground surface. During recharge times, levels may actually reach ground surface. The alluvial aquifers are fairly transmissive. Ground water occurs in thin sand and gravel seams that are laterally and vertically discontinuous. The degree of interconnection is difficult to determine.

There are 16 wells downgradient within 1/4 mile of the Site. Many other wells are downgradient but are across potential hydrogeologic boundaries. Aquifer flow is basically to the northeast at a gradient of .011 ft/ft. Currently, one ground water supply at an occupied residence is contaminated with pentachlorophenol greater than the promulgated maximum contaminant level (MCL) of 1.0 μg/L.

Mill Creek is used during the irrigation season as an upstream diversion from Bozeman Creek. Mill Creek remains bank full throughout the summer thereby creating a ground water mound and limiting the amount of contaminated ground water that may flow into Mill Creek.

Rocky Creek appears to form a hydrologic divide along the northern and eastern edges of the Site. A series of flow monitoring stations were operated during the RI. Continuous recorders on both stream stage levels and ground water levels indicated that ground water discharges to Rocky Creek at least a portion of the year. Very low contaminant levels were measured in Rocky Creek during low flow conditions but other sampling events showed dilution of contaminants of concern to below detection limits.

Nature and Extent of Contamination

Wood treating operations at the Site are among the suspected sources of contamination. Past disposal practices pertaining to the sludges accumulated in the thermal treatment vats are unknown. Two boil overs of wood treating fluids occurred in 1981 and 1987. These spills were associated with the retort building and the butt vat. One of the two long vats that was decommissioned in 1978 was also reported to have leaked significant amounts of treating fluids.

Contaminants of concern

Hazardous substances that have been released at the Site, include the following:

Pentachlorophenol and other chlorinated phenols

A mild acid with an hydroxyl group, pentachlorophenol is a hazardous substance as defined by CERCLA § 101(14). Pentachlorophenol ionizes in solution to form pentachlorophenate anion. The pH dependent ionization leads to higher solubility for pentachlorophenol than its normal aqueous solubility of 14.0 mg/L. Once pentachlorophenol dissolves in water, its adsorptive behavior begins to control its fate. As aqueous solubility decreases, the adsorption increases. Ground water Ph is generally in the neutral range at the Site, rendering pentachlorophenol more mobile in ground water than the other contaminants of concern. Site aquifers are comprised of fairly transmissive sands and gravels, resulting in rapid migration of pentachlorophenol.

Pentachlorophenol is known to be biodegradable under both aerobic and anaerobic conditions. Anaerobic degradation rates are generally 10 to 100 times slower than aerobic degradation; therefore, if remediation time is critical, a method of oxygen enhancement is recommended (Woodward-Clyde, 1988). Other related chlorinated phenols have been identified at the Site. Chlorinated phenols are present in pentachlorophenol as manufacturing byproducts. They may also result from breakdown of pentachlorophenol. Pentachlorophenol is identified as a probable human carcinogen.

Polynuclear aromatic hydrocarbons

Several polynuclear aromatic hydrocarbons (PAHs), defined as hazardous substances by CERCLA § 101(14), have been identified at the Site. These include: anthracene, benzo(a)pyrene, benzo(a)anthracene, benzo(k)fluoranthene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, indeno(c,d)pyrene, benzo(g,h,i)perylene, phenanthrene, chrysene, fluoranthene, fluorene, naphthalene and pyrene. The majority of the compounds do not contain active functional groups and have low aqueous solubilities.

The low molecular weight PAHs are comparatively more soluble in water than high molecular weight PAHs and have lower organic carbon partition coefficients. This indicates that these low molecular weight compounds will be more mobile in the environment than the high molecular weight PAHs.

PAH compounds are known to be biodegradable under both aerobic and anaerobic conditions. The rate of transformation of PAH compounds by soil microorganisms is related to the compound's molecular weight as well as the acclimation of the soil microbes to the PAH compounds. Thus, the low molecular weight PAHs biologically degrade at a faster rate than the high molecular weight PAHs. The four and five ringed PAHs found at the Site are suspected probable human (B2) carcinogens. The two and three ringed PAHs found at the Site are not probable human carcinogens; however, they present noncarcinogenic health hazards.

Polychlorinated dibenzo-p-dioxins and Polychlorinated dibenzofurans

Polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) are hazardous substances as defined by CERCLA § 101(14). PCDDs and PCDFs are a family of aromatic compounds that appear to be primarily byproducts of chemical manufacturing or combustion processes involving precursor compounds and heat.

The biological degradation rate of these compounds appears to be very slow when compared to other organic compounds. Because PCDDs and PCDFs have very low vapor pressures, they do not readily evaporate or volatilize to the atmosphere. The compounds adhere tightly to soil particles and do not migrate readily or leach into ground water or surface water unless the contaminated soil particles themselves migrate via erosion processes (Freeman, 1989). The family of compounds are suspected probable human carcinogens of varying toxicity. One isomer, 2,3,7,8-tetrachlorophenol dibenzo-p-dioxin (TCDD), has been determined to be the most toxic. Concentrations of the other less toxic isomers must be multiplied by toxicity equivalence factors to determine their risk relative to 2,3,7,8-TCDD. The toxicity equivalence for each PCDD and PCDF analyzed for a sample is added together to result in one concentration value and the summation is expressed as TCDD toxicity equivalence (TE).

Contaminated media

The estimated areas and volumes of contaminated media presented in this section were calculated by determining the approximate volumes of media with contaminant concentrations at or above the proposed Site-specific cleanup level for each media.

The spillage of oily wood treating fluid has resulted in soil, including ditch sediments, and ground water contamination onsite and offsite in the surrounding vicinity. In addition, since the oily wood treating fluid is lighter or less dense than water, a product layer exists beneath the Site, above ground water.

Site contamination exists in three media:

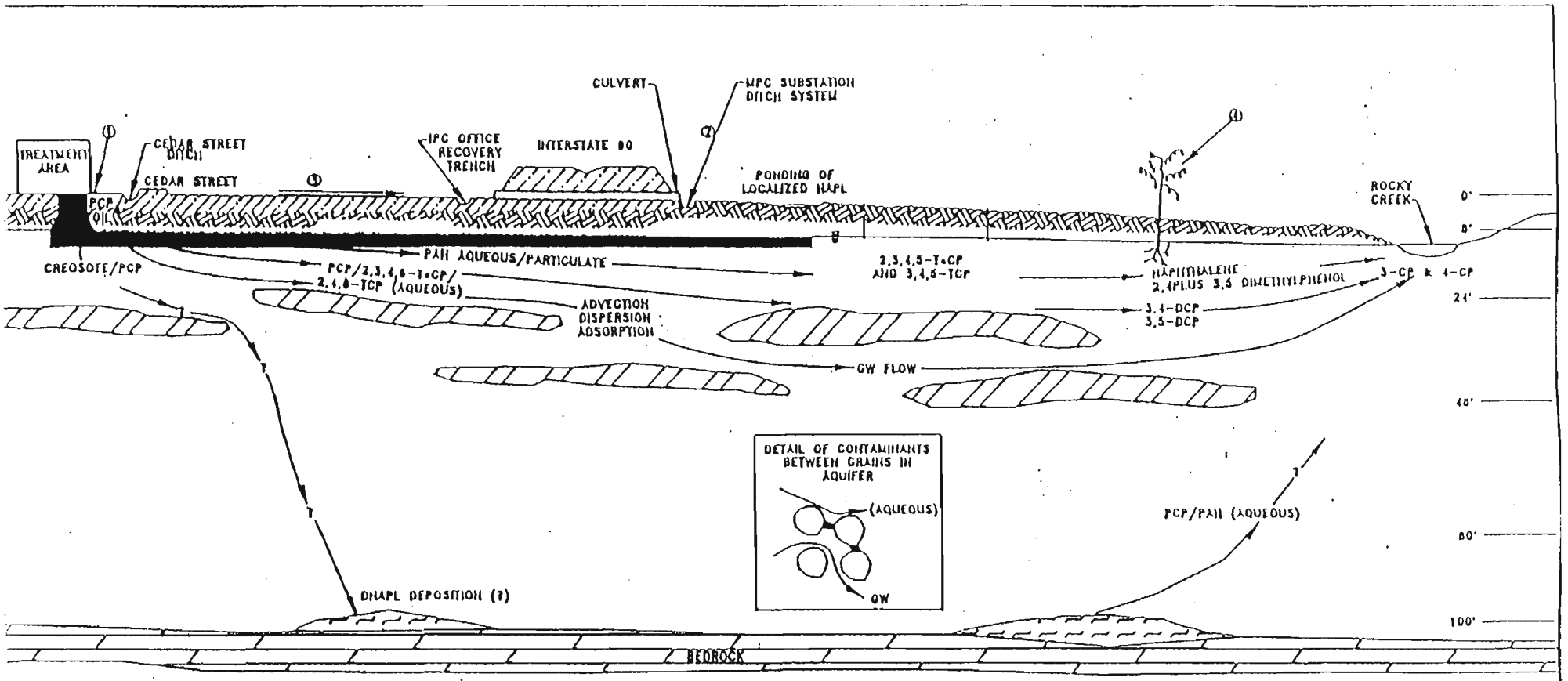
- contaminated sediments in the Cedar Street ditch, the substation ditch, the L Street ditch, a small stretch of Rocky Creek, and portions of the Bohart Lane ditch;

- contaminated surface and subsurface soils in the vicinity of the pole plant facility extending north to the pasture and in the former roundhouse area; and

- contaminated ground water that migrates from the pole plant area north and northeast towards Rocky Creek and a residential area.

These contaminated media are illustrated in Figure 4, the Site Conceptual model. The drawing visually describes contaminant movement from the treatment plant area, past I-90

Figure 4 Site Conceptual Model



1. SURFACE SOILS AS SOURCE OF PARTICULATE (VIA FUGITIVE AND MECHANICAL ENTRAINMENT)
2. SPILLS OF PCP INTO ONSITE DITCH SYSTEM AND RECEPTOR POINT OF CONTAMINATED SEDIMENT DURING RUNOFF EVENTS AND OFF SITE TRANSPORT
3. STORMWATER, MELTWATER RUN OFF WITH SEDIMENT
4. GROUNDWATER/SOIL/PLANT PATHWAY WITH RODENT-RAPTOR, COW/MILK/HUMAN AND GARDEN PRODUCE/ HUMAN "FOOD CHAINS"

HORIZONTAL SCALE: 1"=100' (APPROXIMATE)
VERTICAL SCALE: 4X OF HORIZONTAL (APPROXIMATE)

LEGEND
FILL
EARTH
CLAY

MSE Inc.
ACAD#: IP07-012
REV: - DATE: 3/24/92
DRAFTER: SEL
PLOT SCALE: 1 = 100

TABLE 1
AVERAGE AND MAXIMUM CONTAMINANT CONCENTRATION DATA SUMMARY FOR DITCH SEDIMENTS
(μg/kg)

	Cedar Street		MPC Substation		Bohart Lane		L. Street		Groundwater Drainage	
Contaminant	Avg. (S.D.)[a]	Max.	Avg. (S.D.)	Max.	Avg. (S.D.)	Max.	Avg. (S.D.)	Max.	Avg. (S.D.)	Max.
Pentachlorophenol	15,640(8,363)	22,000	10,667(9,783)	25,000	410	410	1,330(936)	2,400	-------	640U
Fluoranthene	725(620)J[b]	1,700J	55J	55J	88(88)J	150	166(69)J	260J	75(27)J	94J
Benzo(a)pyrene	410(439)J	720J	410(127)J	500J	62J	62J	85J	85J	110J	110J
Anthracene	346(204)J	520J	65(17)J	77J	27J	27J	38(16)	50J	32J	32J
Pyrene	4,257(7,783)J	20,000J	84(37)J	110J	84(93)J	150	270(136)	460	100J	100J
Benzo(a)anthracene	1,910(2,361)J	4,600J	----------	510U	80J	80J	115J	115J	66J	66J
Benzo(b)fluoranthene	766(364)J	1,200J	228(243)J	400J	95(106)J	170	259(144)	440	120	120
Benzo(k)fluoranthene	---------	1,900U	380J	380J	--------	97U	--------	320U	-------	190U
Benzo(g,h,i)perylene	168(144)J	270J	210J	210J	54J	54J	54J	54J	-------	190U
Chrysene	2,920(3,664)J	7,100J	----------	510U	120	120	197(70)J	270J	65J	65J
Indeno(1,2,3-cd)pyrene	172(124)J	260J	220J	220J	41J	41J	--------	320U		190U
Phenanthrene	1,001(947)	2,300	205(78)J	260	69(72)J	120	182(89)J	280J	128(88)	190
TCDD TE	34.2		2.33		--------		0.055		-------	

Notes: a. Average concentration with standard deviation.
b. Data qualifier codes are as follows: J = an estimated quantity, U = compound was analyzed for, but was not detected.

Source: Baseline Risk Assessment, MSE, March 1992

and the pasture and towards Rocky Creek. The various compounds identified are assumed transformations of pentachlorophenol to lesser chlorinated phenols. Potential pathways of contaminant migration in addition to specific populations and environments that could be affected by the contaminants are described in section VI, Summary of Site Risks.

Sediments

Contaminants of concern in ditch sediments are pentachlorophenol, 2,4,6-trichlorophenol, PAHs (anthracene, benzo(a)pyrene, fluoranthene and pyrene), and PCDDs/PDCFs (TCDD TE). Table 1 summarizes average and maximum concentrations of contaminants in ditch sediments and includes data for other compounds evaluated.

Areas and volumes of contaminated intermittent ditch sediments or soils were estimated assuming a depth of contamination of three feet below ground surface. There were two ditches identified for remediation: the substation ditch that receives surface runoff from the interceptor trench area and the Cedar Street ditch that receives runoff from the retort area. The other intermittent ditches investigated did not have contaminants of concern exceeding cleanup levels. Table 2 summarizes estimated areas and volumes of Site sediments and other contaminated media identified for remediation.

TABLE 2
ESTIMATED CONTAMINATED AREAS AND VOLUMES

	AREA (acres)	VOLUME
sediments	0.6	2683 yd^3
soils	7.4	39,304 yd^3
ground water	61.4	210 million gal

Because only one sample to measure TCDD TE was taken from each ditch, the extent of ditch sediments to be remediated is based upon pentachlorophenol and B2 PAH contamination levels. Volumes for remediation were estimated assuming that the amount of sediment in the two ditches that exceeded the preliminary remediation goal of 10 mg/kg pentachlorophenol or 1.0 mg/kg for B2 PAHs was the same as the amount of sediment that exceeded the cleanup level of 1.0 μg/kg for TCDD TE.

Rocky Creek sediment volumes were not estimated due to low concentrations of contaminants and the identified lack of adverse impact to surface water. Rocky Creek sediments are not identified for remedial action. Table 3 summarizes average and maximum concentrations in creek sediments and includes data for other compounds evaluated.

Soils

Contaminants of concern for soils are pentachlorophenol, PAHs (anthracene, benzo(a)pyrene, fluoranthene and pyrene), and PCDDs/PCDFs (TCDD TE). Table 4 summarizes average and maximum concentrations in soils and includes data for other compounds evaluated.

The areal extent and volume of contaminated soil were determined by evaluation of analytical results for the contaminants of concern, visual observations made while conducting specific investigations and by computer modeling. The computer modeling evaluations were conducted in the treatment plant area and in the former roundhouse area. Volumes of contaminated soils were obtained by evaluating contaminant concentration data collected from test pit samples. The evaluation produced contour maps of contaminant concentrations at each zone or depth for which adequate discrete data was available. The estimated volume of contaminated soils in the treatment plant area is approximately 6594 cubic yards over an area of about 0.7 acres.

The RI determined that the majority of contaminated soils at the Site originate in the pole plant area and extend northward in close association with the oily wood treating fluid plume. Contamination of subsurface soils within the bounds of the oily wood treating fluid contamination area is due to smearing of oily wood treating fluid caused by the seasonally fluctuating water table. During high water table conditions, the oily wood treating fluid has reached ground surface in the pasture resulting in pools of oily wood treating fluid. The approximate boundary of soils containing the oily wood treating fluid is presented in Figure 5.

This area has been determined to be approximately 6.7 acres and was delineated primarily by visual observations during the field investigations. Given the potential for a 3-foot seasonal fluctuation of the static water level in this area, approximately 32,410 cubic yards of soil are potentially contaminated with the oily wood treating fluid. Additionally, 300 yd^3 of contaminated soils has been estimated in the former roundhouse area. The total estimated volume of contaminated soils is 39,304 cubic yards and 7.4 acres.

The oily wood treating fluid contains high concentrations of pentachlorophenol, B2 PAHs and PCDDs/PCDFs (TCDD TE). Oily wood treating fluid was sampled very infrequently but concentrations of 280 mg/kg, 283 mg/kg and 407 ug/kg, respectively, for pentachlorophenol, B2 PAHs and TCDD TE, are representative of contaminant levels. Oily wood treating fluid is the principal source of contamination to soils, sediments and ground water.

Based on the results of an oily wood treating fluid plume investigation conducted as part of the remedial investigation, the average thickness of the oily wood treating fluid area has been determined to be approximately 0.5 feet. This value weighs free product pockets exceeding 1 foot in thickness in some areas and practically no product in others, and takes into account significant amounts of product suspended in the soils due to the smearing effect. Given the

TABLE 3
AVERAGE AND MAXIMUM CONTAMINANT CONCENTRATION FOR CREEK SEDIMENTS
(μg/kg)

Contaminants	Rocky Creek		Mill Creek	
	Avg. (S.D.)[a]	Max.	Avg. (S.D.)	Max.
Pentachlorophenol	760J[b]	760J	420J	420J
Fluoranthene	175(98)	310	205(120)J	290
Benzo(a)pyrene	-------	730U	---------	940U
Anthracene	180J	180J	---------	940U
Pyrene	118(58)J	210	170(0)J	170J
Benzo(a)anthracene	62J	62J	94J	94J
Benzo(b)fluoranthene	82(23)J	120J	190(14)J	200J
Benzo(k)fluoranthene	-------	730U	180J	180J
Benzo(g,h,i)perylene	-------	730U	--------	940U
Chrysene	91(34)J	120J	114(23)J	130J
Indeno(1,2,3-cd)pyrene	-------	730U	--------	940U
Phenanthrene	200(105)J	400	182(124)J	270J

Notes: a. Average concentration with standard deviation.
b. Data qualifier codes are as follows: J = an estimated quantity, U = compound was analyzed for, but was not detected.

Source: Baseline Risk Assessment, MSE, March 1992

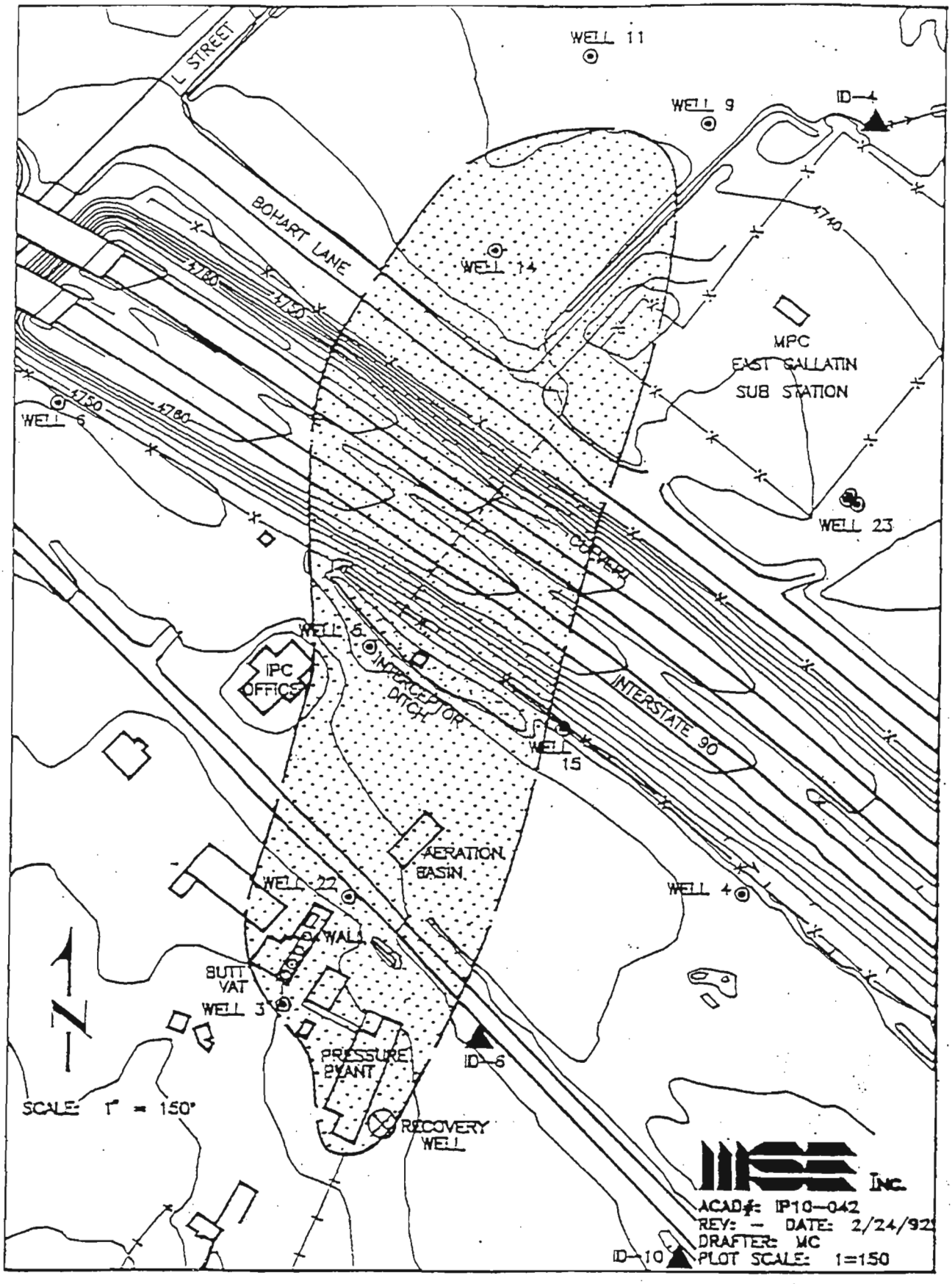
TABLE 4
AVERAGE AND MAXIMUM DATA SUMMARY FOR SOILS
(μg/kg)

Contaminant	Former Roundhouse Area Soils Avg.(S.D.)[a]	Former Roundhouse Area Soils Max.	Wood Treating Soils (WTS) Avg.(S.D.)	Wood Treating Soils (WTS) Max.	Other Potential Sources[c] (OPS) Avg.(S.D.)	Other Potential Sources[c] (OPS) Max.	IPC Pole Yard Areas (IYA) Avg.(S.D.)	IPC Pole Yard Areas (IYA) Max.
Pentachlorophenol	272(222)J[b]	650J	50,456(101,297)	380,000	4,487(6,241)	10,000	713(506)	1,200
Fluoranthene	1,444(1,958)	5,300	2,093(3,275)	12,000	96J	96J	122(94)J	230
Benzo(a)pyrene	1,066(1,561)	4,800	657(1,068)	4,100	49J	49J	89J	89J
Anthracene	552(585)	1,500	864(1,860)	8,100	---	100U	28(13)J	37J
Pyrene	2,233(3,160)	8,500	1,654(2,714)	10,000	200(99)J	270J	119(70)J	200
Benzo(a)anthracene	1,272(1,846)	5,700	768(1,410)	5,800	59J	59J	64(50)	100
Benzo(b)fluoranthene	1,588(2,367)	6,700	1,574(2,978)	13,000	120J	120J	116(98)J	230
Benzo(k)fluoranthene	1,552(2,363)	6,700	54(40)J	82J	120J	120J	------	98U
Benzo(g,h,i)perylene	553(652)J	1,700	462(616)	2,200	----	1,800U	68J	68J
Chrysene	1,555(2,096)	5,900	1,368(2,427)	10,000	80J	80J	108(87)	170
Indeno(1,2,3-cd)pyrene	462(552)J	1,500	536(754)	2,700	---	1,800U	68J	68J
Phenanthrene	1,312(2,010)	6,500	3,266(9,276)	46,000	---	1,800U	102(67)	180
TCDD TE			1.79[d]		0.42[d]			

Notes:
a. Average concentration with standard deviation.
b. Data qualifier codes are as follows: J = an estimated quantity, U = compound was analyzed for, but was not detected.
c. Sample locations include drainage channel, retort area and surface water pits.
d. Soil from IPC pasture overlying oily wood treating fluid.
only one sample collected.

Source: Baseline Risk Assessment, MSE, March 1992

Figure 5 Oily Wood Treating Fluid Plume



APPROXIMATE LNAPL CONTAMINATION AREA

oily wood treating fluid contamination area, a porosity of 0.3 and the average thickness of 0.5 foot, the estimated volume of oily wood treating fluid present is 327,000 gallons. This volume may be less due to ongoing product recovery efforts and conservative estimation methods.

Ground water

Contaminants of concern for ground water are pentachlorophenol, 2,4,6-trichlorophenol and PAHs (anthracene, benzo(a)pyrene, fluoranthene, fluorene, naphthalene and pyrene). Table 5 summarizes average concentrations of contaminants in ground water and includes data for other compounds evaluated.

The areal extent and volume of contaminated ground water associated with the dissolved plume has been determined using ground water modeling results presented in the RI. Figure 6 presents an illustration of the approximate dissolved plume boundary.

The dissolved plume containing pentachlorophenol at 1.0 μg/L or greater is approximately 61.4 acres. The average thickness of the contaminated ground water has been estimated at 35 feet, which includes the upper three aquifers. The average porosity value is 0.3. Based on these values, approximately 210 million gallons of ground water are contaminated with pentachlorophenol concentrations at or above 1.0 μg/L. Ground water above 1.0 μg/L was used for the volume estimate because 1.0 μg/L represents the promulgated Maximum Contaminant Level (MCL) for pentachlorophenol as established by the Safe Drinking Water Act. Ground water concentrations as high as 600 μg/L have been identified at the downgradient monitoring well furthest from the pole plant.

VI. SUMMARY OF SITE RISKS

The baseline risk assessment provides the basis for taking action and indicates the exposure pathways that need to be addressed by the remedial action. It serves as the baseline for indicating what risks could exist if no action were taken at the Site. This section of the Record of Decision reports the results of the baseline risk assessment conducted for this Site.

As part of the remedial investigation and feasibility study, human health and ecological risk assessments, which together comprise the baseline risk assessment, were developed to help MDHES and EPA determine actions necessary to reduce actual and potential risks from hazardous substances at the Site. Risk assessments were conducted at the Site with the following objectives:

- provide an analysis of baseline risk (potential risk if no remedy occurs) and help determine the need for action;

- provide a basis for determining cleanup levels (concentrations) that are protective of public health and the environment;

TABLE 5
AVERAGE CONCENTRATIONS OF CONTAMINANTS OF CONCERN IN GROUNDWATER (UG/L)[a,b]

Contaminants	Upgrad. AUB	Downgrad. Avg.
	A WELLS	
PCP	≤0.10	3,799(_)
2,4,6 - TCP	≤0.005	769J
Fluoranthene	≤0.050	360(_)
Phenanthrene	≤0.030	515(_)
Pyrene	≤0.020	386(_)
Chrysene	≤0.005	198J
Benzo(b)fluoranthene	≤0.001	46J
Benzo(k)fluoranthene	≤0.003	94J
Benzo(a)anthracene	≤0.002	146J
Fluorene	≤0.010	165(_)
Anthracene	≤0.010	154J
Benzo(a)pyrene	≤0.005	74J
Naphthalene	≤0.020	140J
2, 3, 7, 8- TeCDD TE	≤0.0005	≤0.05[c]

Contaminants	Upgrad. AUB	Downgrad. Avg.
	B WELLS	
PCP	≤3	321(_)
2,4,6 - TCP	≤2	4.8J
Fluoranthene	≤3	8.0J
Phenanthrene	≤5	8.9J
Pyrene	≤3	13.3J
Chrysene	≤5	82.4J
Benzo(b)fluoranthene	≤4	0.30J
Benzo(k)fluoranthene	≤2	3.1J
Benzo(a)anthracene	≤2	6.4J
Fluorene	≤3	5.2J
Anthracene	≤3	5.3J
Benzo(a)pyrene	≤2	0.57J
Naphthalene	≤5	4.0J
2, 3, 7, 8- TeCDD TE	≤0.05	≤0.1[d]

Contaminants	Upgrad. AUB	Downgrad. Avg.
	C WELLS	
PCP	≤0.10	03.1(_)
2,4,6 - TCP	≤0.005	(5.8U-12U)
Fluoranthene	≤0.050	(0.25U-2-1U)
Phenanthrene	≤0.030	(0.25U-6.4U)
Pyrene	≤0.020	(0.50U-2.7U)
Chrysene	≤0.005	(0.38U-1.5U)
Benzo(b)fluoranthene	≤0.001	(0.3U-0.18U)
Benzo(k)fluoranthene	≤0.003	(0.01U-0.17U)
Benzo(a)anthracene	≤0.002	0.13±OU
Fluorene	≤0.010	2.3J
Anthracene	≤0.010	(0.01U-6.6U)
Benzo(a)pyrene	≤0.005	(0.05U-0.23U)
Naphthalene	≤0.020	4.0(_)
2, 3, 7, 8- TeCDD TE	≤0.0005	No data (ND)

NOTES: [a] Based upon validated data from the May and August 1990 sampling plus the March and June 1991 sampling episodes; AUB = assumed upper bound for contaminant-specific background level, based upon literature review.

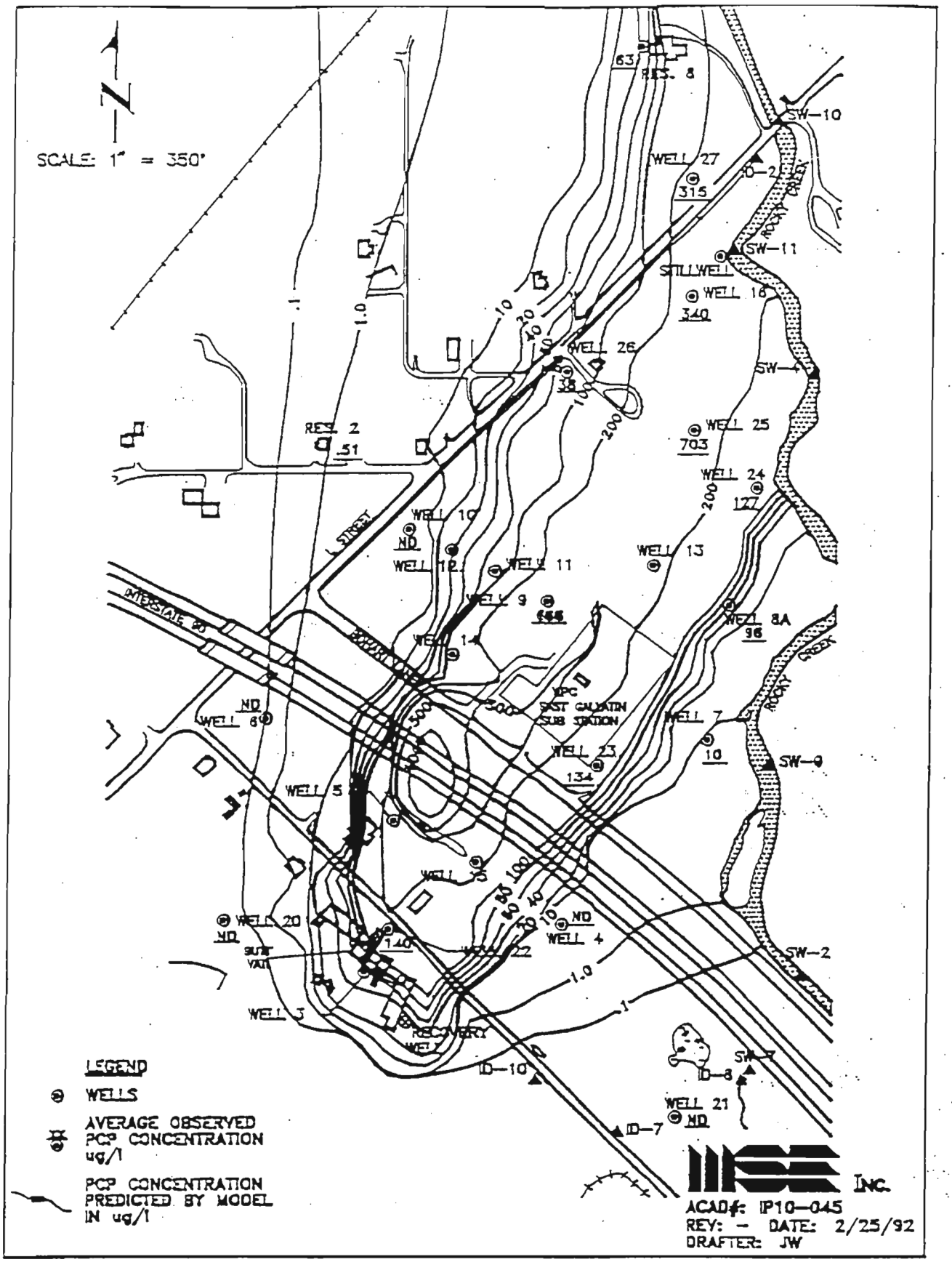
[b] J = estimated quantity, (_) = data with no qualifications attached, U = compound was analyzed for, but was not detected.

[c] Based upon August 1990 data from monitoring well 9A.

[d] Based upon May 1987 data from Well 16B.

SOURCE: Baseline Risk Assessment MSE March 1992.

Figure 6 Ground water plume



GROUNDWATER DISSOLVED PCP PLUME
BOUNDARY AND ASSOCIATED CONCENTRATION CONTOURS AS
DERIVED FROM THE CALIBRATED TRANSPORT MODEL

- provide a basis to compare potential public health and ecological impacts of various cleanup alternatives; and

- provide a consistent process to evaluate and document potential public health and ecological threats at the Site.

The Baseline Risk Assessment indicates that the principal threats stem from subsurface soils, oily wood treating fluid, and to a lesser extent surface soils. The low level threats stem from ditch and creek sediments. This determination is based on concentrations and estimated volumes of contaminated media. The primary pathways are ingestion of and direct contact with contaminated ground water, ingestion of or direct contact with soils and inhalation of air entrained soils; secondary pathways are ingestion of and direct contact with surface water and ingestion of vegetation. Potentially affected receptors include human beings and terrestrial and aquatic biota.

Human Health Risks

The Baseline Risk Assessment indicates that there are excessive human health cancer risks and excessive non-cancer health hazards associated with hazardous substances at the Site: Remedial action is required in order to reduce these potential risks.

Selection of contaminants of concern

The selection of contaminants of concern was based upon the presence of contaminants in various media at the Site and the reference dose (RfD) or cancer slope factor (SF) associated with the contaminants.

This evaluation was completed for ditch and creek sediments, soils (including air entrained soil particles), ground and surface water and oily wood treating fluid. The contaminants of concern consist of semivolatile organic compounds. Volatiles and heavy metals were eliminated from consideration after an initial round of sampling and analysis indicated no significant concentrations. Table 6 summarizes contaminants of concern identified for use in the Baseline Risk Assessment.

Toxicity assessment summary

RfDs have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting noncarcinogenic effects. RfDs are expressed in units of mg/kg-day. RfDs estimate (with uncertainty spanning an order of magnitude) daily exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on

TABLE 6
SUMMARY OF CONTAMINANTS OF CONCERN SELECTED FOR QUANTITATIVE AND QUALITATIVE RISK ASSESSMENT

PART A. QUANTITATIVE RISK ASSESSMENT[a]

Contaminants of Concern	Media: Soils	Sediment	Groundwater	Air	IPC Pasture Soils
Pentachlorophenol	x	x	x	x	x
2,4,6-trichlorophenol	--	x	x	-	-
Anthracene	x	x	x		-
Benzo(a)pyrene	x	x	x	x	x
Fluoranthene	x	x	x	-	-
Fluorene	-	-	x	-	-
Naphthalene	-	-	x	-	-
Pyrene	x	x	x	-	-
(TCDD TE)	x	x	x	x	x

PART B. QUALITATIVE RISK ASSESSMENT[b]

Contaminants of Concern	Media: Soils	Sediment	Groundwater	Air	IPC Pasture Soils
Benzo(a)anthracene	x	x	x	T	x
Benzo(b)fluoranthene	x	x	x	T	x
Benzo(k)fluoranthene	x	x	x	T	x
Benzo(g,h,i)perylene	x	x	-	T	x
Chrysene	x	x	x	T	x
Indeno(1,2,3-cd)pyrene	x	x	-	T	x
Dibenzo(a,h) anthracene	x	x	x	x	x

Notes: [a] Compounds for which inhalation and/or oral reference doses plus inhalation and/or oral cancer potency factors exist in IRIS (EPA, 1991a) or HEAST (EPA, 1991b).
[b] Compounds for which the above factors do not exist in IRIS (EPA, 1991a) or HEAST (EPA, 1991b).
[c] Tentative.

Source: Baseline Risk Assessment MSE, March 1992.

humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects.

SFs have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. SFs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to provide an upper-bound estimate of the excess cancer risk.

SFs are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied (e.g., to account for the use of animal data to predict effects on humans). Use of this approach makes underestimation of the actual cancer risk highly unlikely. Table 7 lists RfDs and SFs for the contaminants of concern.

Assumptions and exposure scenarios

Reasonable maximum exposure scenarios were developed for onsite and offsite receptors for current and future land use conditions. Two reasonable maximum exposure populations were developed for each condition. These were determined by consideration of continuing pole plant operations and a nearby residential neighborhood. The current onsite population was identified as pole plant workers and intruders. The current offsite receptor point was identified as the currently unoccupied residence in the contaminated ground water plume. This residence is located in the nearby residential neighborhood and could be reoccupied. The future reasonable maximum exposure onsite and offsite populations were defined by assuming that a trailer court will exist on the pole plant grounds and that the residence located in the ground water plume will be occupied. Table 8 summarizes the assumed reasonable maximum exposure populations.

TABLE 8
ASSUMED REASONABLE MAXIMUM EXPOSURE POPULATIONS

group	Onsite	Offsite
current	workers (adults) intruders (6-18 yrs)	adults children (6-12 yrs)
future	adults children (1-6 yrs)	adults children (6-12 yrs)

A principal difference between the onsite and offsite receptors was that only the offsite receptors were assumed to be exposed to contaminated ground water through use of domestic well water. This is a reasonable assumption since the pole plant facility is within the city limits and currently receives city water. The residence used for the offsite scenarios is

TABLE 7
TOXICITY VALUES FOR CONTAMINANTS OF CONCERN

Compound	Cancer Slope Factor $(mg/kg/day)^{-1}$		Oral Reference Dose(mg/kg/day)	
	Oral	Inhalation	Chronic	Subchronic
Pentachlorophenol	1.2×10^{-1}	ND	0.03	0.03
Anthracene	----------	----------	0.30	3.0
Benzo(a)pyrene	5.79×10^{0}	6.1×10^{0}		
Fluoranthene	----------	----------	0.04	0.40
Pyrene	----------	----------	0.03	0.30
TCDD TE	1.5×10^{5}	1.5×10^{5}		

NOTES: Baseline Risk Assessment, MSE, Inc., March 1992 and IRIS, EPA, 1992.

outside of the city and has used ground water for domestic purposes.

Reasonable maximum exposure point concentrations were developed for each of the exposure populations identified in Table 8 for pentachlorophenol, PAHs (anthracene, benzo(a)pyrene, fluoranthene and pyrene), and TCDD TE. Reasonable maximum exposure point concentrations are summarized in the baseline risk assessment.

Risk characterization summary

Excess lifetime cancer risks are determined by multiplying the intake level of a contaminant with the SF. These risks are probabilities that are generally expressed in scientific notation (e.g., $1x10^{-6}$ or 1E-06). An excess lifetime risk of 1×10^{-6} indicates there is a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site.

For carcinogens, risks are estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the carcinogen. Excess lifetime cancer risk is calculated from the following equation:

$$\text{Risk} = \text{CDI} \times \text{SF}$$

where:

Risk = a unitless probability (e.g., 2×10^{-5}) of an individual developing cancer;
CDI = chronic daily intake averaged over 70 years (mg/kg-day); and
SF = slope-factor, expressed as $(\text{mg/kg-day})^{-1}$.

Potential concern for noncarcinogenic effects of a single contaminant in a single medium is expressed as the hazard quotient (HQ) or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose. By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

The HQ is calculated as follows:

$$\text{Non-cancer HQ} = \text{CDI/RfD}$$

where:

CDI = Chronic Daily Intake expressed as (mg/kg-day) and
RfD = reference dose expressed as (mg/kg-day).

CDI and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

Because of elevated levels of contaminants, a major concern is use of ground water downgradient from the Site as a domestic water source. For example, arithmetic average concentrations of B2 PAHs relative to their respective, proposed maximum contaminant levels (MCL) standards result in excess cancer risk ranging from 2.6×10^{-4} to 1.5×10^{-2}. Although applicable to public water supplies, MCLs are relevant and appropriate to offsite residences not connected to city water. The intent of these standards is reduction, if possible, of lifetime risk of excess incidence of cancer to the one-in-one-million (1×10^{-6}) level.

Pursuant to the National Contingency Plan, the goal of the remedial action is to bring potential cancer risk to a range of between 1 in 10,000 (1×10^{-4}) and 1 in 1,000,000 (1×10^{-6}) additional cancers caused by site contamination. Potential noncancerous adverse health effects are evaluated against the health hazard index of 1.0. The baseline risk assessment identified potential cancer risks greater than 1 in 1,000 (1×10^{-3}) and health hazard indices exceeding 1.0 indicating that remedial action is needed. Tables 9, 10, 11, and 12 summarize current and future human health risks estimated for the Site. The results of the baseline risk assessment indicate that existing conditions at the Site pose an excess lifetime cancer risk of as high as 1.8×10^{-4} from exposure to contaminated soils and as high as 9.0×10^{-3} from ingestion of contaminated ground water.

Cleanup Levels

The purpose of this response action is to control risks posed by direct contact, ingestion and inhalation of soils and ground water and to minimize migration of contaminants to ground and surface water and air. Concentrations of contaminants in sediments, soils and ground water remaining after Site cleanup will correspond to lifetime cancer risks within the acceptable range of 1×10^{-4} to 1×10^{-6}. The cleanup levels for compounds having noncarcinogenic effects will result in a collective health hazard index below 1.0.

Since no federal or state chemical specific applicable or relevant and appropriate requirements (ARARs) exist for soil or sediments, soil cleanup levels were determined through site specific risk analysis. Ground water cleanup levels were established at the final MCL for pentachlorophenol, benzo(a)pyrene and 2, 3, 7, 8 - TCDD (dioxin) and at proposed MCLs for other carcinogenic PAHs. Ground water will be treated to cleanup levels prior to reinjection into the aquifer or discharge to a publicly owned treatment works. For discharges to a publicly owned treatment works, pretreatment standards may require additional treatment. Treatment will be monitored to ensure that cleanup levels are achieved and maintained.

Cleanup which addresses potential cancer risks will also address potential non-cancer health hazards. The cleanup levels for the Site are presented in Table 13.

TABLE 9
SUMMARY OF HEALTH HAZARD QUOTIENTS FOR NONCARCINOGENIC CONTAMINANTS OF CONCERN ASSOCIATED WITH THE CURRENT LAND USE SCENARIOS.[a]

PART A. ON-SITE INDIVIDUALS

	Route of Exposure					
	Ingestion		Inhalation		Direct Contact	
Contaminants of Concern	Adults	Intruders[b]	Adults	Intruders	Adults	Intruders
Anthracene	1.7E-06	2.0E-08	NA[c]	NA	3.1E-07	1.8E-07
Fluoranthene	5.4E-05	6.3E-07	NA	NA	9.9E-06	5.3E-06
PCP	8.9E-04	1.0E-05	NA	NA	1.6E-04	2.0E-02
Pyrene	4.3E-05	5.6E-07	NA	NA	7.8E-06	4.7E-06

PART B. OFF-SITE INDIVIDUALS

	Ingestion		Inhalation		Direct Contact	
Contaminants of Concern	Adults	Children[d]	Adults	Children	Adults	Children
Anthracene	9.9E-04	2.4E-03	NA	NA	7.6E-07	1.4E-06
Fluoranthene	1.1E-02	2.7E-02	NA	NA	8.4E-06	4.6E-05
PCP	1.9E+00	4.5E+00	NA	NA	1.7E+00	9.9E-01
Pyrene	2.5E-02	6.0E-02	NA	NA	1.8E-05	1.4E-05

NOTES:
[a] Source of these values are presented in Appendix A of the Baseline Risk Assessment; HQ values are calculated by dividing the exposure estimates (Table 3-7) by Contaminants of Concern/route-specific reference dose values (Table 4-1).
[b] Between the ages of 6 through 18 years.
[c] NA - No RfD available
[d] Between the ages of 6 through 12 years.

SOURCE: Baseline Risk Assessment, MSE, March 1992.

TABLE 10
SUMMARY OF EXCESS INCIDENCE OF CANCER ESTIMATES FOR CARCINOGENIC CONTAMINANTS OF CONCERN ASSOCIATED WITH THE CURRENT LAND USE SCENARIOS.[a]

PART A. ON-SITE INDIVIDUALS

	Route of Exposure					
	Ingestion		Inhalation		Direct Contact	
Contaminants of Concern	Adults	Intruders[b]	Adults	Intruders	Adults	Intruders
Benzo(a)pyrene	1.7E-06	1.1E-08	2.3E-08	4.6E-10	3.1E-07	9.6E-08
TCDD TE	1.8E-04	1.0E-06	1.2E-06	2.3E-08	3.3E-05	8.2E-06
PCP	1.2E-06	6.4E-09	NA[c]	NA	2.1E-07	1.2E-05

PART B. OFF-SITE INDIVIDUALS

	Ingestion		Inhalation		Direct Contact	
Contaminants of Concern	Adults	Children[d]	Adults	Children	Adults	Children
Benzo(a)pyrene	2.7E-04	4.9E-04	2.4E-09	1.6E-09	1.9E-07	1.2E-07
TCDD TE	3.0E-01	5.6E-01	1.5E-07	9.8E-08	1.3E-04	5.3E-05
PCP	4.9E-03	9.0E-03		NA	2.6E-03	3.6E-04

NOTES:
[a] Source of these values are presented in Appendix A of the Baseline Risk Assessment; excess cancer risk values are calculated by multiplying the lifetime exposure estimates (Table 3-8) by Contaminant of Concern/rate-specific carcinogenic potency factors (Table 4-1)
[b] Between the ages of 6 through 18 years.
[c] NA - No cancer slope factor available.
[d] Between the ages of 6 through 12 years.

SOURCE: Baseline Risk Assessment, MSE, March 1992.

TABLE 11
SUMMARY OF HEALTH HAZARD QUOTIENTS FOR NONCARCINOGENIC CONTAMINANTS OF CONCERN ASSOCIATED WITH THE FUTURE LAND USE SCENARIOS.[a]

PART A. ON-SITE INDIVIDUALS

	Route of Exposure					
	Ingestion		Inhalation		Direct Contact	
Contaminants of Concern	Adults	Young Children[b]	Adults	Young Children	Adults	Young Children
Anthracene	1.3E-07	1.5E-07	NA[c]	NA	4.5E-09	2.7E-08
Fluoranthene	7.0E-06	7.8E-06	NA	NA	3.0E-07	1.2E-06
PCP	4.0E-06	2.6E-04	NA	NA	5.9E-07	5.2E-05
Pyrene	4.5E-05	1.9E-05	NA	NA	2.0E-06	2.2E-06

PART B. OFF-SITE INDIVIDUALS

	Ingestion		Inhalation		Direct Contact	
Contaminants of Concern	Adults	Children[d]	Adults	Children	Adults	Children
Anthracene	2.4E-04	5.8E-04	NA	NA	1.9E-07	1.0E-06
Fluoranthene	2.8E-03	6.8E-03	NA	NA	2.1E-06	4.5E-05
PCP	4.7E-01	1.1E+00	NA	NA	4.2E-01	2.5E-01
Pyrene	1.2E-02	3.0E-02	NA	NA	9.0E-06	1.3E-05

NOTES:
[a] Source of these values are presented in Appendix B of the Baseline Risk Assessment; values are calculated by dividing the exposure estimates (Table 3-8) by Contaminant of Concern/route-specific reference dose values (Table 4-1).
[b] Between the ages of 1 through 6 years.
[c] NA - No RfD available.
[d] Between the ages of 6 through 12 years.

SOURCE: Baseline Risk Assessment, MSE, March 1992.

TABLE 12
SUMMARY OF EXCESS INCIDENCE OF CANCER ESTIMATES FOR CARCINOGENIC CONTAMINANTS OF CONCERN ASSOCIATED WITH THE FUTURE LAND USE SCENARIOS.[a]

PART A. ON-SITE INDIVIDUALS

	Route of Exposure					
	Ingestion		Inhalation		Direct Contact	
Contaminants of Concern	Adults	Young Children[b]	Adults	Young Children[b]	Adults	Young Children[b]
Benzo(a)pyrene	8.1E-07	1.9E-06	4.1E-09	3.2E-09	3.5E-08	3.1E-07
TCDD TE	4.0E-05	8.5E-05	8.1E-07	6.4E-07	7.8E-06	1.6E-05
PCP	6.2E-09	8.0E-08	NA[c]	NA	9.1E-10	1.6E-08

PART B. OFF-SITE INDIVIDUALS

	Ingestion		Inhalation		Direct Contact	
Contaminants of Concern	Adults	Children[d]	Adults	Children	Adults	Children
Benzo(a)pyrene	6.6E-05	1.2E-04	3.0E-10	2.0E-10	4.8E-08	1.5E-07
TCDD TE	7.3E-02	1.5E-01	7.4E-08	4.9E-08	3.2E-05	3.3E-05
PCP	1.2E-03	2.2E-03	NA	NA	6.4E-04	8.8E-05

NOTES:
[a] Source of these values are presented in Appendix B of the Baseline Risk Assessment; values are calculated by multiplying the lifetime exposure estimates (Table 3-9) by Contaminants of Concern/rate-specific carcinogenic potency factors (Table 4-1)
[b] Between the ages of 1 through 6 years.
[c] No cancer slope factor available
[d] Between the ages of 6 through 12 years.

SOURCE: Baseline Risk Assessment, MSE, March 1992.

TABLE 13
CLEANUP LEVELS AND CORRESPONDING RISKS

Medium	Contaminant	Cleanup level	Basis	Cancer Risk (industrial use for soil, residential use for ground water)	Noncancer health hazard quotient
Soils and sediments (mg/kg)	PCP	48.0	risk	1.0×10^{-6}	ND[b]
	Total B2 PAHs	15.0[a]	risk	1.0×10^{-6}	ND
	Total D PAHs	145	hazard quotient	NA	0.1
	TCDD TE	.001	risk	1×10^{-6}	ND
Ground water (μg/L)	PCP	1.0	MCL	3×10^{-6}	ND
	B2 PAHs				
	Benzo(a)pyrene	0.2	MCL	2.7×10^{-5}	ND
	Benz(a)anthracene	0.1	MCL	5.5×10^{-5}	NA[c]
	Benzo(b)fluoranthene	0.2	MCL	5.5×10^{-5}	NA
	Benzo(k)fluoranthene	0.2	MCL	5.5×10^{-5}	NA
	Chrysene	0.2	MCL	5.5×10^{-5}	NA
	Dibenz(a,h)anthracene	0.3	MCL	5.5×10^{-5}	NA
	Indeno(1,2,3-CD)pyrene	0.4	MCL	5.5×10^{-5}	NA
	D PAHs	146	hazard quotient	NA	.9
	2,3,7,8-TCDD (Dioxin)	3.0×10^{-5}	MCL	1.3×10^{-4}	NA

Notes:
[a] Adjusted for recently identified cancer slope factor of 5.79 $(mg/kg/day)^{-1}$.
[b] ND - Not determined, cleanup level for carcinogenic effects results in noncarcinogenic health hazard of <1.0.
[c] NA - Not available, cleanup level established from proposed MCLs 54 Fed. Reg. 22062, 22155-57 (May 22, 1989), 55 Fed. Reg. 30370, 30445 (July 25, 1990) and promulgated MCLs 57 Fed. Reg. 31816 (July 17, 1992).
[d] This contaminant has not been identified in ground water. If identified, the risk level achieved by compliance with the MCL would be higher (for this contaminant) than the risk level specified in the ROD for ground water cleanup.

Source: Defined by MDHES and EPA based on preliminary remediation goals presented in Feasibility Study, MSE, April 1992.

Ecological Risks

The Ecological Risk Assessment for the Site evaluated the potential for harm to terrestrial and aquatic populations and food chains following the ingestion of contaminants. Deer, river otter, beaver, waterfowl, skunk, songbirds and fishing birds reside within the area. Endangered species using the Site, but not living or nesting there, are bald eagles and peregrine falcons. Rainbow trout, brown trout, sculpin, whitefish and suckers are common in Rocky Creek. The Baseline Risk Assessment found that fish occupying various portions of Rocky Creek in the study area are more likely impacted by stream and riparian habitat than by Site contaminants. A steady influx of contaminants has not been identified.

Selection of contaminants of concern

Pentachlorophenol, benzo(a)pyrene and TCDD TE were selected as the contaminants of concern for use in the Ecological Risk Assessment for their identified toxic impacts to mammals, avian and fish species. Concentrations of contaminants of concern found at the Site used for the Ecological Risk Assessment are summarized in Table 14 for aquatic species and in Table 15 for terrestrial species.

Toxicity assessment summary

The Ecological Risk Assessment focused on the oral exposure route using toxicological data representative of species evaluated. Inhalation and direct contact were not evaluated due to a lack of RfDs or SFs. Table 16 summarizes toxicological endpoints used in the Ecological Risk Assessment.

Assumptions and exposure scenarios,

Soils, vegetation, and surface oily wood treating fluid in the pasture and in sediments, and ground and surface water are potential exposure points to the indicator species.

Three food chain scenarios were evaluated in the Ecological Risk Assessment: 1) Deer mouse/falcon, 2) cow/milk/child and 3) fish/fish fillet/child. The scenarios all represent current conditions in the pasture area or creeks. The subsequent child receptor was added to identify potential food chain impacts.

Effects on critical habitat and endangered species appear to be minimal. The surfacing of oily wood treating fluid in the pasture is the only obvious soil impact resulting in no vegetation. There is no indication that surface water habitat has been impacted. No endangered species have been identified on Site, although there may be some in the area that occasionally pass through the Site.

TABLE 14
AQUATIC DATA USED IN THE ECOLOGICAL RISK ASSESSMENT[a]

PART A. ROCKY CREEK DATA

Contaminants of Concern	Surface Water (μg/L)	Sediments(μg/kg)
PCP	(1U-50U)[b]	1,605±1,195J
B(a)P	0.037	(190U-510U)
TCDD TE	No Analysis (NA)	NA

PART B. MPC SUBSTATION DITCH DATA

Contaminants of Concern	Surface Water	Sediments
PCP	88±74J	10,667±9,783
B(a)P	10U	410±127J
TCD TE	NA	34.2

PART C. GROUNDWATER QUALITY FOR LIVESTOCK WATERING

Contaminants of Concern	Res - 10A	Downgradient Arithmetic Averages
PCP	(5.9U-25U)	3,799
B(a)P	(0.05U-0.23U)	74J
TCDD TE	NA	≤0.003

NOTES: [a] Detailed discussions of sampling methodologies and consequent data interpretation for these media are found in Section 2.1 of the Baseline Risk Assessment, MSE, 1992.
[b] "U" data in parentheses indicates the range of undetects; "J" data are estimated.

SOURCE: Ecological Risk Assessment, MSE, March 1992.

TABLE 15
TERRESTRIAL DATA USED IN THE ECOLOGICAL RISK ASSESSMENT [a]

PART A. PASTURE SOILS AND VEGETATION

Contaminants of Concern	Sample Site (Veg./Soil) V1/R23	V2/R24	V3/R25	Background Soils A/B
PCP	6,000U[b]/1,100	5,000U/760U	10,000/350U	320U/370U
B(a)P	1,800U/200U	1,500U/230U	3,000U/260U	97U/110U
TCDD TE[c]	0.57/0.43	0.31/0.42	0.30/0.13	0.38/0.68

PART B. SURFACE OILY WOOD TREATING FLUID

Contaminants of Concern	Sample Site N1	N2
PCP	280,000	170,000
B(a)P	14,000J	8,700J
TCDD TE[d]	407.2J	342.8

NOTES:
- [a] All data are in units of μg/kg; detailed discussion of sampling methodology and consequent data presentation/interpretation are found in Section 2.1.5 of the Baseline Risk Assessment, MSE, 1992.
- [b] Data qualifier codes used are as follows: U = compound was analyzed for, but was not detected, J = an estimated quantity; otherwise, no qualifications are attached to the above data.
- [c] Calculated using the 1989 toxicity equivalent factors (EPA, 1989c) and assuming that "U" values represent actual concentrations (e.g., 1U = 1 μg/kg).
- [d] Calculated using the 1989 TEFs (EPA, 1989c) and using "non-U" data only.

SOURCE: Ecological Risk Assessment, MSE, March 1992.

TABLE 16
ECOLOGICAL RISK CHARACTERIZATION TOXICOLOGICAL DATA

PART A. MAMMALIAN SPECIES

	Oral Route Toxicological End-Points (mg/kg.d)a								
	Mice (M. musculus)					Dairy Cows (B. taurus)			
CoC	LD_{50}	LDLo	LDLo(Ter.)	LDLo(Eta.)	NOAEL	LD_{50}	TD_{50}	LOAEL	NOAEL
PCP	65-252	ND[b]	ND	ND	3-10	140	15-20	0.2-2.0	0.05-0.5
B(a)P	50	ND	ND	0.002	0.0002	ND	ND	0.002	0.0002
TCDD TE	0.114-2.57	0.03	0.03	0.001	1E-06	ND	2E-06	ND	ND

PART B. AVIAN SPECIES[c]

	Oral Route Toxicological End-Points (mg/kg.d)		
CoC	LD_{50}	LDLo	NOAEL
PCP	205-740	≥1	≤10
B(a)P	ND	0.002	ND
TCDD TE	0.01-0.8	0.001-0.010	1E-06

PART C. AQUATIC SPECIES

	Toxicological End-Points (μg/L)			
	Macroinvertebrates[d]		Trout (Salmo) Species	
CoC	LC_{50}(<24 hrs.)	TD(96 hrs.)	LC_{50}(24 hrs.)	TD(>96 hrs.)
PCP	48-55	<3.2	20-40	10-20
B(a)P	≤1,000	≤5.0	≥50	≥5
TCDD TE	≥0.2	<0.2	≤0.01	≥0.001

NOTES:

a Toxicological end-point codes are as follows: LD_{50} = calculated dose of CoC which is expected to cause the death of 50 percent of the exposed population; LDLo = the lowest does (other than LD_{50}) of a CoC introduced by any route (other than inhalation) over any given period of time and reported to have caused death in the exposed population; TD = the dose which results in some quantifiable adverse effect, other than death in the exposed individual; LOAEL = lowest observed adverse effect (dosage level; NOAEL = no observed adverse effect (dosage) level; Rep. = reproductive effects (e.g., resorption of embryos); Ter. = teratogenic effects (e.g., cleft palate); Eta. = equivocal tumorigenic agent at the given dose, and often resulting in well defined neoplastic or carcinogenic effects at higher doses; LC_{50} = lethal concentration to 50 percent of the exposed population.

b ND - no data

c Species include Northern bobwhite, ringed turtle-dove, mallards and domestic chickens.

d Species include freshwater snails, worms and Daphnia spp.

Risk characterization

In order to evaluate adverse impacts, an environmental harm quotient (EQ) was developed and used similarly to the HQ for human noncarcinogenic impacts. An EQ less than 1.0 represents no adverse impact while an EQ of 1.0 or greater represents adverse impact. SFs were also used to evaluate cancer risk to children at the end of the food chain. The Ecological Risk Assessment findings are summarized in Table 17. All of the EQs for the species evaluated are less than 1.0 indicating no adverse impact. Additionally, food chain carcinogenic impacts evaluated for the subsequent child receptor indicate no likely excess cancer risk. Population level effects on terrestrial and aquatic indicator species are not likely, at least through the oral route of exposure. However, adverse effects to particularly sensitive individuals cannot be ruled out.

VII. DESCRIPTION OF ALTERNATIVES

A brief description of the Site cleanup alternatives considered in the FS report follows. As discussed in section IV, Scope and Role of Response Action, three general types of contaminated media are found at the Site. Since soils and sediments provide sources of continuing contamination to ground water, and soils and sediments are closely associated with each other, one set of alternatives that addresses all soils and sediments was developed. Separate remedial cleanup alternatives were developed for ground water.

There are some elements common to all of the alternatives. Institutional controls would be used in conjunction with soil and ground water alternatives and may include restrictions on ground water use, residential well drilling and residential and commercial land use. Installation and maintenance of additional temporary residential water treatment systems may be necessary if private well monitoring results indicate a potential health risk or exceedance of cleanup levels.

The estimated cost of each alternative includes capital costs and annual operation and maintenance costs. The estimated costs for the soil and ground water alternatives represent a cleanup level protective for the current onsite and offsite scenarios as depicted in the Baseline Risk Assessment and briefly discussed in section VI, Site Risks. The estimated costs for the soil alternatives except Alternative 6 represent a cleanup level for residential land use that would reduce the excess cancer risks to less than 1 in 100,000 (1×10^{-5}) and for industrial land use to less than 1 in 1,000,000 (1×10^{-6}). Alternative 6, Soil Flushing/*In Situ* Biological Treatment in conjunction with other alternatives would reduce the excess cancer risk to 1 in 10,000 (1×10^{-4}) for residential use and 1 in 100,000 (1×10^{-5}) for industrial land use. Costs associated with the ground water alternatives represent a cleanup level for residential land use that would reduce the excess cancer risk to less than 5.5 in 100,000 (5.5×10^{-5}.

TABLE 17
SUMMARY OF ECOLOGICAL RISK CHARACTERIZATION ESTIMATES

PART A. DEER MOUSE-PEREGRINE FALCON SCENARIO

Indicator Species	Intake(mg/kg.d)	Toxicological End Point (mg/kg.d)	EQ[a]	Comments
Deer Mouse				
- PCP	1.1E-02	NOAEL[b] 3	3.7E-03	----------
- B(a)P	1.4E-03	LDLo(Eta.)[c], 2E-03	7.0E-01	EQ = 7E+00 for NOAEL., 2E-04
- TCDD TE	3.6E-06	LDLo(Eta.), 1E-03	3.6E-03	EQ = 3.6E+00 for NOAEL, 1E-06.
Peregrine Falcon				
- PCP	1.1E-05	LDLo, 1	1.1E-05	----------
- B(a)P	2.9E-08	LDLo, 2E-04	1.4E-04	----------
- TCDD TE	5.7E-09	NOAEL, 1E-06	5.7E-03	----------

PART B. COW-MILK-CHILD SCENARIO

Indicator Species	Intake(mg/kg.d)	Toxicological End Point (mg/kg.d)	EQ	Excess Cancer Risk (Humans)
Dairy Cow				-
- PCP	5.4E-03	NOAEL, 5E-02	1.1E 01	----------
- B(a)P	9.8E-05	NOAEL, 2E-04	4.9E-01	----------
- TCDD TE	7.0E-07	TD[d] (monkeys) 2E-06	3.5E-01	----------
Young Child (1-7 yrs)				
- PCP	2.2E-08	Excess cancer incidence	HQ=8.3E-06	2.6E-09
- B(a)P	5.6E-09	Excess cancer incidence	---------	6.4E-08
- TCDD TE	3.5E-11	Excess cancer incidence	---------	5.2E-06

PART C. FISH-FISH FILLET-CHILD SCENARIO

Indicator Species	Surface Water	TD(>96 hrs.)	Intake(mg/kg.d)	Toxicological End Point	Excess Cancer Risk (Humans)
Rainbow Trout					
- PCP	≤1	10	----------	----------	----------
- B(a)P	0.037	≤5	----------	----------	----------
- TCDD TE	≤0.003	≥0.0001	----------	----------	----------
Young Child (1-7 yrs)					
- PCP	----------	----------	9.0E-08	Excess cancer risk	1.1E-08
- B(a)P	----------	----------	7.9E-10	Excess cancer risk	9.1E-09
- TCDD TE	----------	----------	8.0E-10	Excess cancer risk	1.2E-04

NOTE:
- [a] Environmental harm quotient.
- [b] No observed adverse effect level.
- [c] Lethal dose (equivocal tumorigenic agent)
- [d] Toxic dose not resulting in death.

SOURCE: Ecological Risk Assessment, MSE, March 1992.

Soil Alternatives

Soil Alternative 2, Surface Capping, would only be considered for cleanup of the roundhouse area because the roundhouse area is not a source of ground water contamination and all of the identified direct contact risks posed by this area can be eliminated by surface capping. Contaminated soils, exceeding cleanup levels, found in other locations of the Site, contribute to ground water contamination and must undergo treatment to reduce soil and ground water exposure risks to an acceptable level. Therefore, capping was not considered for other areas. For purposes of cost comparison, however, the unit soil remediation costs of Alternatives 3, 4 and 5 have been calculated and have been used for comparison to the cost of Surface Capping (Alternative 2) in section VIII, Summary of Comparative Analysis of Alternatives.

Soil Alternatives 3 (Thermal Treatment), 4 (Biological Treatment) and 5 (Solvent Extraction) would require excavation of all of the contaminated soils on the Site exceeding remediation levels, including soils underneath I-90 and the IPC treating plant structures. The excavated soils would then be stockpiled and subsequently processed in the appropriate treatment unit. The costs of these alternatives are directly comparable because each of the alternatives remediate the same volume of contaminated soils.

Soil Alternative 6, *In Situ* Treatment Using Steam/Hot Water Flushing, would involve treating all of the contaminated soils at the Site, exceeding remediation levels, except the soils in the roundhouse area and in the drainage ditches. The contaminants in the soil in the roundhouse area are not as amenable to soil flushing techniques as soils in the other areas of the Site. The primary contaminants in the roundhouse soils are PAHs that are very difficult to separate from soil particles. The ditch sediments must be excavated for treatment, rather than being treated *in situ*, because of the long narrow area in which the contaminated sediments are located. Installation of a soil flushing system that would effectively reduce contaminant levels in the ditch sediments was determined to be not practicable. Alternative 6 does not require excavation of soils from under the IPC structures or from beneath I-90.

The estimated costs for soils remediation by Alternatives 3, 4, 5, or 6 have been calculated and are contained in Section VIII. The unit costs for treating one cubic yard of soil to the Site remediation level may be calculated for Alternatives 3, 4, 5 and 6.

Alternative 1: No Action

Superfund law requires the consideration of a no action alternative. This alternative is used as a baseline against which to compare the other alternatives. As defined in the Idaho Pole RI/FS, no action means that a remedy would not be conducted, and that remediation goals would not be met. The quantity of untreated waste would remain at current levels and the degree of risk posed by such waste would remain constant.

No ARARs, risk-based levels, or to be considered standards (TBCs) would be met under this alternative.

Estimated cost: $0
Estimated time: 0 year

Alternative 2: Surface Capping

This alternative would involve covering contaminated areas with a clean, impermeable material such as asphalt pavement.

Contaminated material would be stored in a unit similar to a landfill. This alternative was only considered for the former roundhouse area. Under this alternative, neither the volume nor the toxicity of contaminated soil would be reduced, since no treatment would occur.

Surface capping was considered for remediation of only the roundhouse soils because the risk associated with the roundhouse soils is from direct contact. The roundhouse soils are not a source of ground water contamination and therefore would remain untreated under this alternative without impacting risks from ground water. Contaminated soils in the other areas of the IPC Site are contaminant sources for ground water and would require excavation and/or treatment to allow the remediation goals for ground water to be met.

The surface cap would require one construction season to install. This alternative could be implemented as a temporary measure in order to reduce health risks associated with direct contact or ingestion of PAH contaminated soils.

If this alternative were selected as a permanent remedy, construction of the cap would comply with RCRA performance standards. RCRA landfill regulations would apply to this alternative. The cap design and construction must withstand heavy equipment use at the IPC facility throughout future wood treating operations in the roundhouse area.

To protect the integrity of the cap, fencing, land use control, and deed restrictions would be required. Capping would reduce risks associated with direct contact and ingestion pathways and would potentially reduce the amount of infiltration that could impact ground water. However, this alternative is not regarded as a solution to ground water contamination.

Estimated cost: $1,329,577
Estimated time: 1 year

Alternative 3: Excavation And Treatment Using An Onsite or Offsite Thermal Process

Under this alternative all contaminated solid media would be excavated and incinerated including soils in the roundhouse area, under I-90 and in the IPC plant area. I-90 would be dismantled and demolition of the treating plant structures would be required.

There are three different thermal processes that have been evaluated under this alternative: 1) onsite incineration using a mobile incinerator on a rent or lease basis; 2) design and

construction of a transportable or stationary large scale incinerator, with incineration being performed onsite; and 3) excavation and transport of contaminated materials to an offsite incinerator.

The three different processes evaluated all involve the use of a rotary kiln type incinerator. Rotary kiln incinerators are the most universally applicable incinerators for destruction of a wide variety of waste types and characteristics. A rotary kiln incinerator can process wastes having variable moisture content and variable clay content without a pretreatment step.

This alternative addresses all contaminated soils and sediments exceeding cleanup levels established for the Site. The alternative would involve incineration of approximately 42,000 yd^3 of contaminated material.

In a properly operated incinerator at least 99.99% of all pentachlorophenol (PCP) and PAHs and at least 99.9999% of polychlorinated dibenzo-p-dioxins and polychlorinated-dibenzofurans (PCDDs and PCDFs) would be destroyed.

Process waste streams from an onsite incinerator including kiln ash, fly ash and purge water would be sampled and the substantive requirements for a hazardous waste delisting petition review would be met because the wastes being incinerated are RCRA listed hazardous waste (FO32 and F034) and wastes streams from incinerating these listed hazardous wastes are also hazardous wastes. These waste streams are expected to meet standards for delisting RCRA waste and therefore would not require disposal as hazardous wastes. The ash materials would be landfilled onsite in a unit designed to meet RCRA Subtitle D standards for solid waste management. The amount of ash resulting from the incineration process would be approximately 75% of the original waste volume. Purge water would be discharged directly to a publicly owned treatment works (POTW) or to surface water.

Residual concentrations of PCDDs and PCDFs and other principal organic hazardous constituents of concern (POHC) in by-product scrubber blowdown water and kiln ash are typically found to be negligible (i.e., less than one part per trillion), while stack emissions typically do not pose an unacceptable health threat to surrounding communities. The methods used to measure the effectiveness of an incinerator and establish compliance are very comprehensive and well proven; consequently, the uncertainty level of this alternative is very low.

If an onsite incinerator is utilized, the substantive requirements for a RCRA permitted incinerator would be met. Offsite incineration requires compliance with both substantive and procedural RCRA requirements, including obtaining all necessary permits for the offsite incinerator. RCRA permit-by-rule requirements and Clean Water Act pretreatment requirements would apply to discharges to publicly owned treatment works if excess process water is to be disposed of offsite. Floodplain Management and Protection of Wetlands requirements would be followed to ensure that construction of treatment units or the excavation of contaminated soils does not encroach on the Rocky Creek and Mill Creek

floodplains and wetlands. Construction of a waste storage pile to stage soils for incineration would require compliance with regulations for the safe operation of waste piles. For the offsite incineration option, standards established in 40 CFR 263 for transport of hazardous waste to the offsite incinerator would apply.

Treatability testing has not been conducted due to the proven capability of incineration; however, initial startup testing would be necessary to ensure proper functioning of the incinerator.

Figures 7 and 8 present conceptual process flow diagrams for a mobile rotary kiln incinerator, and an onsite, large scale rotary kiln incinerator, respectively. An offsite incinerator would be identical to the unit represented in Figure 8. The conceptual process flow diagrams also identify the waste streams associated with each process. Although the volume of process waste to be managed varies depending upon the amount of contaminated material that is incinerated, the waste streams are nearly identical.

Onsite Mobile Unit -

Feed Rate: 2 tons/hour
Estimated Cost: $63,000,000
Estimated Time: 5 years

Onsite Large Scale Unit -

Feed Rate: 9 tons/hour
Estimated Cost: $93,000,000
Estimated Time: 1.5 years

Offsite Large Scale -

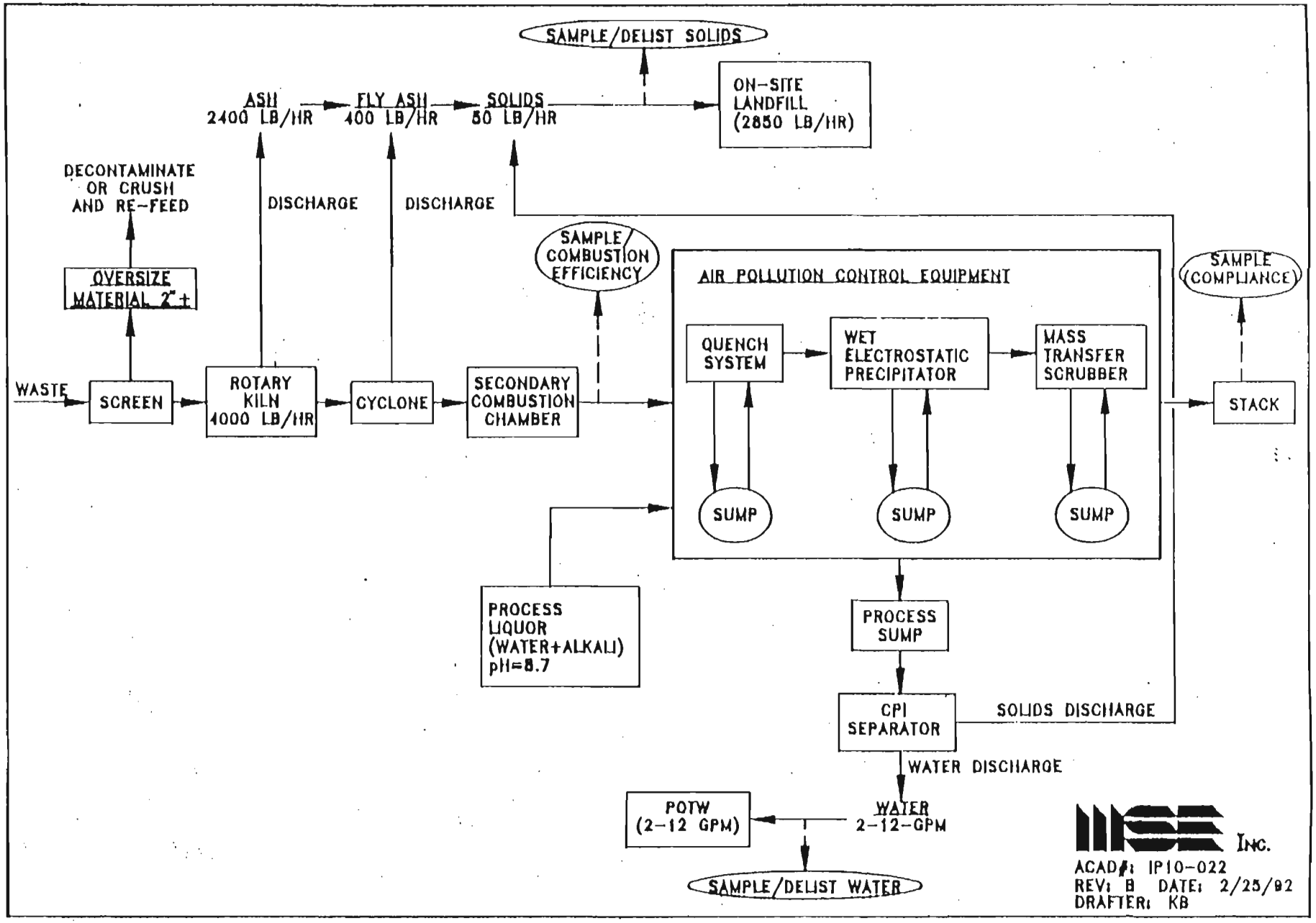
Feed Rate: 7 tons/hour
Estimated Cost: $211,900,000
Estimated Time: 2 years

Alternative 4: Excavation, Oily Wood Treating Fluid Recovery, and Solid-Phase (Surface Land) Biological Treatment Or Slurry-Phase Biological Treatment

(Preferred Remedy for Accessible Soils only)

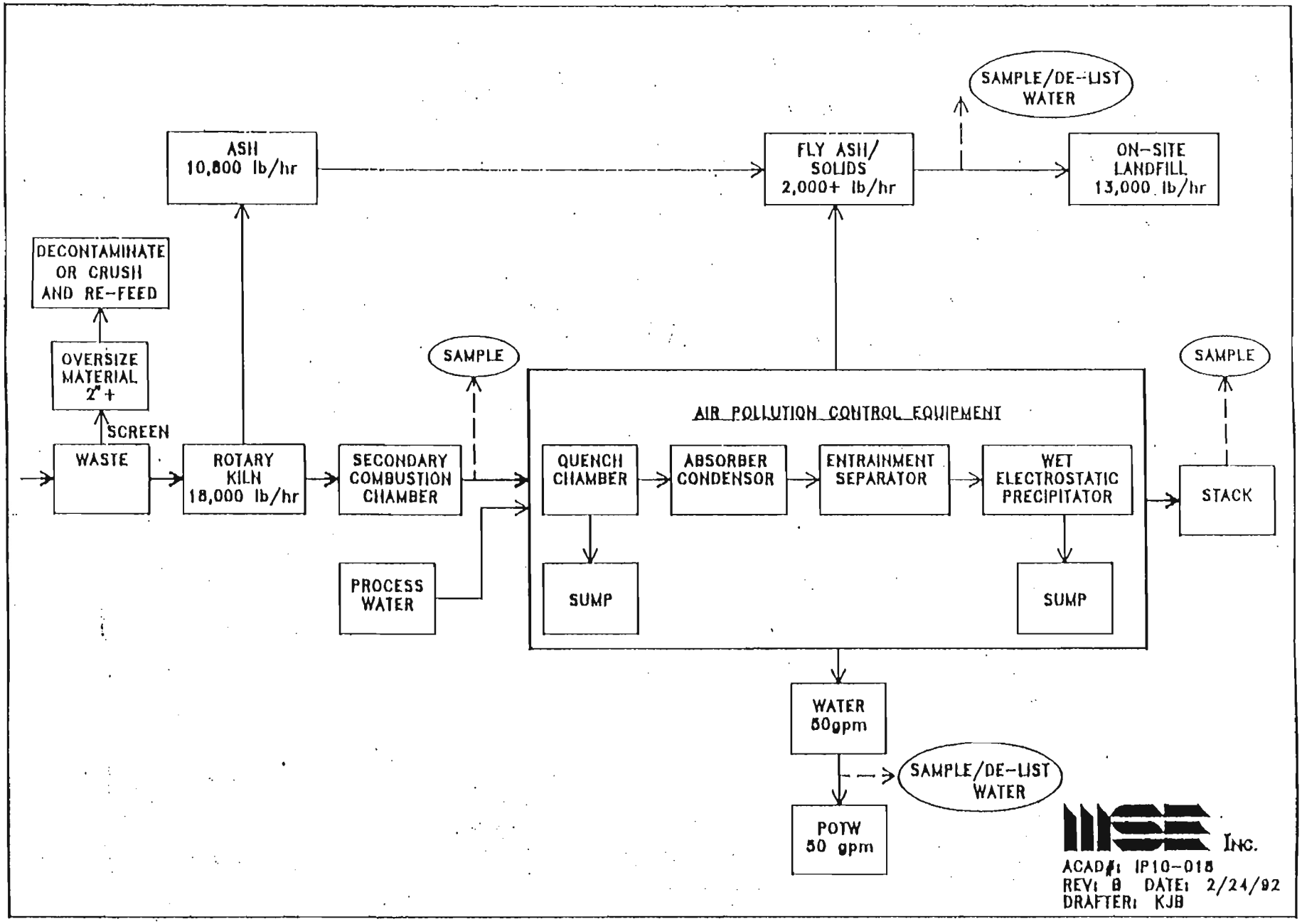
Under this alternative, all contaminated soils including the soil in the roundhouse area, under I-90 and in the IPC plant area and ditch sediments would be excavated. I-90 would be dismantled and the treating plant structures would be demolished.

Figure 7 Mobile rotary kiln incinerator



MOBILE INCINERATOR PROCESS FLOW DIAGRAM FOR THE (15MM BTU/HR.)

Figure 8 Large Scale Rotary Kiln Incinerator



STATIONARY ON-SITE ROTARY KILN INCINERATOR (50M BTU/HOUR)

Excavated soil would be stored in a waste pile constructed for staging prior to treatment. The soil would then be pretreated to remove the oily wood treating fluid. The recovered oily wood treating fluid would be recycled or disposed offsite. The soil would then be treated biologically in either a surface land treatment unit or a slurry-phase biological reactor to reduce the contaminant concentrations in the soil.

This alternative addresses all contaminated soils, sediments and oily wood treating fluid exceeding cleanup levels established for the Site. The alternative would biologically treat approximately 42,000 yd^3 of contaminated material.

Slurry-Phase Biological Treatment

The bioreactor would provide for treatment of soil contamination by providing contact between microorganisms growing on a fixed surface in the reactor and the slurry containing soil contaminants. The microorganisms use the contaminants as an energy source and degrade or destroy them to provide cell growth.

Excavated soils would undergo initial screening to remove debris by using stationary or moving screens. Oversize materials would be washed with high pressure hot water to remove contaminants. Materials passing through the screen would be washed and classified by size. The cleaned, relatively coarse materials would be stockpiled while the more contaminated silt/clay fraction would be slurried to a multistage, submerged fixed-film bioreactor.

The treated soils would be remixed with the clean coarse materials and used to backfill the excavated area if they meet remediation goals. If remediation goals are not fully achieved in the bioreactor system, a small RCRA Subtitle C land treatment unit would have to be constructed to provide additional contaminant reduction.

Effluent from the slurry units would be biologically treated in another treatment unit and discharged to a POTW.

Slurry-phase treatment should reduce contaminant levels by 90% for PCP, 85% for B2 PAHs, 90% for D PAHs and 70% for PCDDs and PCDFs.

Solid-Phase Biological Treatment (Land Treatment)

The Solid-Phase Biological Treatment option consists of an engineered land treatment unit (LTU) for treatment of the soils from contaminated areas. If significantly different waste types are excavated, an additional LTU would be considered because of the variable contamination. This could happen if contamination from one area consists primarily of PAH's and contamination from the other areas is primarily PCP. The LTU for the site soils would cover approximately 4 acres.

A perimeter berm or dike would be constructed around the outer edge of each unit and, if determined necessary during the engineering design phase, a bottom liner and leachate collection system would be installed. Excavated soil would be placed in the unit in layers up to one foot deep and would be routinely plowed and irrigated. Areas where soil is excavated would be backfilled with clean soil to eliminate any potential hazard associated with the open excavations.

Treatment takes place in the unit by enhancing the conditions in which naturally occurring microorganisms live and reproduce. Plowing adds oxygen to the soil and irrigation and nutrient addition (nitrogen and phosphorus) serves to promote biodegradation. As with the slurry option, the microorganisms use contaminants in the soil as an energy source and degrade or destroy them.

Before additional layers of soil would be added to the LTU, soil remediation levels would have to be achieved. When all of the contaminated soil has been applied to the LTU and treatment is complete, the unit will be closed by capping.

The solid-phase process should reduce contaminant levels by 90% for PCP, 85% for B2 PAHs, 85% for D PAHs and 40% for PCDDs and PCDFs.

Land treatment would require compliance with RCRA requirements. Land disposal restrictions would apply if treatment standards for F032 and F034 listed wastes are finalized prior to the Record of Decision.

RCRA permit-by-rule requirements and Clean Water Act pretreatment requirements would apply to discharges of treated slurry unit effluent to publicly owned treatment works. The Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) requirements would apply to reuse/recycling of recovered oily wood treating fluid. If the oily wood treating fluid did not meet substantive FIFRA standards, the oily wood treating fluid would be transported to an offsite RCRA Subtitle C disposal facility and disposed of in accordance with RCRA. RCRA Subtitle C regulations for operation of waste piles would be followed.

There are different implementation requirements and time frames for each method. Solid phase treatment will require a minimum of 10 years to reach remedial goals mainly due to the restricted area available at the Site to place a land treatment unit. The slurry phase biological treatment could be effected in 2 years.

Institutional controls required for this alternative include deed restrictions and land use controls to prevent new well construction and to prevent interference with the treatment units. Fencing would also be necessary to prevent access to LTUs.

Figures 9 and 10 provide conceptual process flow diagrams for the soil slurry reactor phase and solid phase treatments respectively.

Slurry-Phase -

Estimated Cost: $12,816,185
Estimated Time: 2 years

Solid-Phase -

Estimated Cost: $8,164,357
Estimated Time: 10 years

Alternative 5: Excavation, Oily Wood Treating Fluid Recovery, and Critical Fluid Solvent Extraction

Contaminated soil, including soil in the roundhouse area, under I-90, and in the IPC plant area and ditch sediments would be excavated and stored in a waste pile constructed in accordance with RCRA Subtitle C requirements. I-90 would be dismantled and the treating plant structures would be demolished.

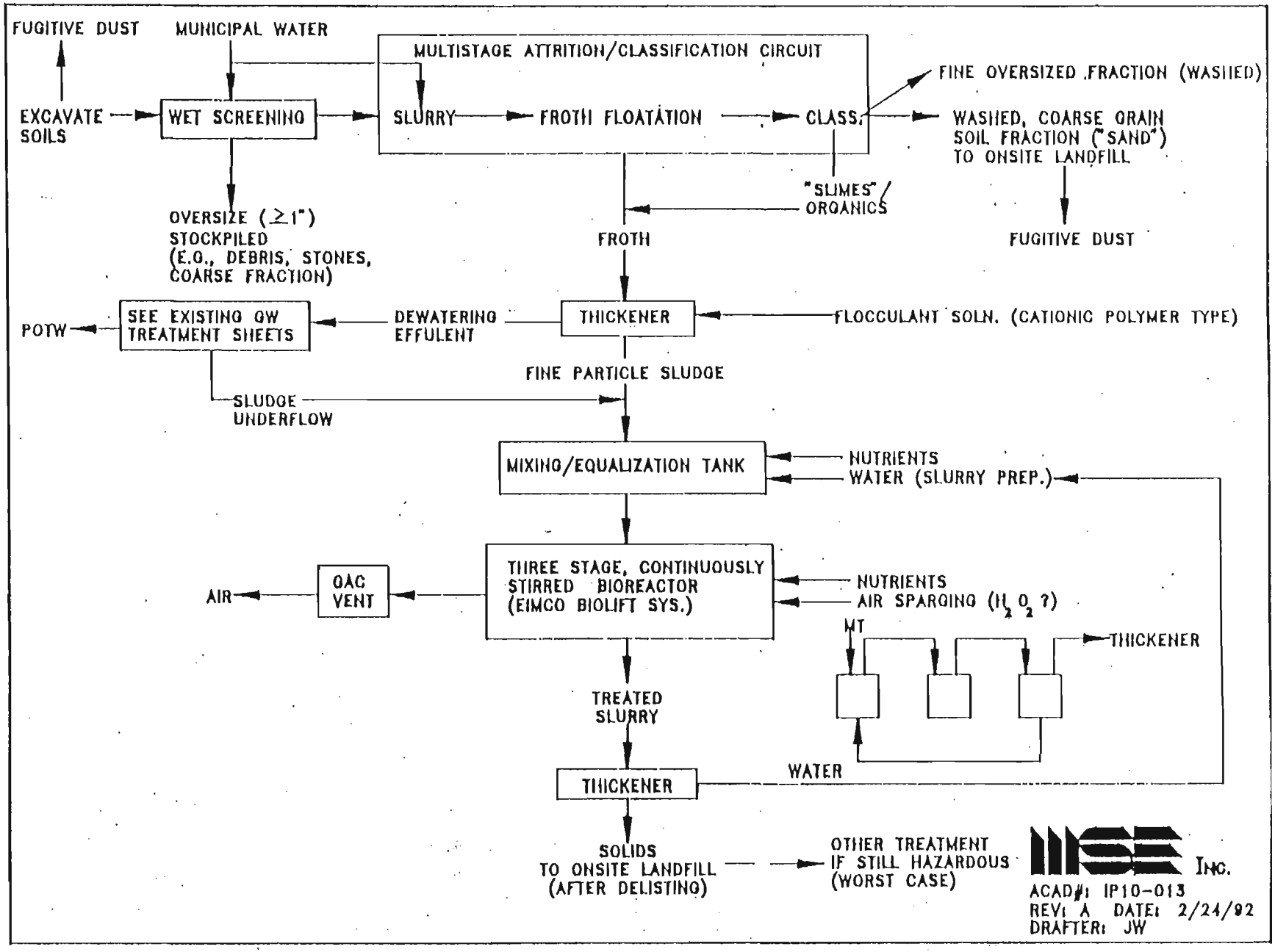
Oily wood treating fluid would be recovered and recycled, treated or disposed offsite in accordance with RCRA Subtitle C requirements. Hazardous substances would be extracted from the soil using liquified propane in a series of tanks. After treatment, the soil would be returned to the excavated area or a repository and recovered hazardous substances would be recycled or disposed offsite in accordance with RCRA Subtitle C requirements.

This alternative addresses all contaminated soils and sediments exceeding cleanup levels established for the Site, approximately 42,000 yd^3. The process could treat as much as 200 tons/day with a 97% reduction in contaminant concentration.

The specific process evaluated under this alternative is the CF Systems Organics Extraction Process. In this process, a series of reactors are designed to achieve the specified cleanup levels. Within the extractor vessel of the reactor, at or near the solvent's critical pressure and temperature, the hazardous organic substances in the contaminated media waste dissolve into the solvent. Extracted organics are then removed with the solvent, while clean soils and water are removed through an underflow. The extracted organics and solvent then go to a second decanter vessel, where the pressure and temperature are decreased, causing the hazardous substances to separate from the solvent. The gaseous solvent is sent to a recovery column where it is liquified by addition of heat and pressure and then recycled back to the extractor vessel. Addition of heat may be required to maintain reactor temperatures above 60°F.

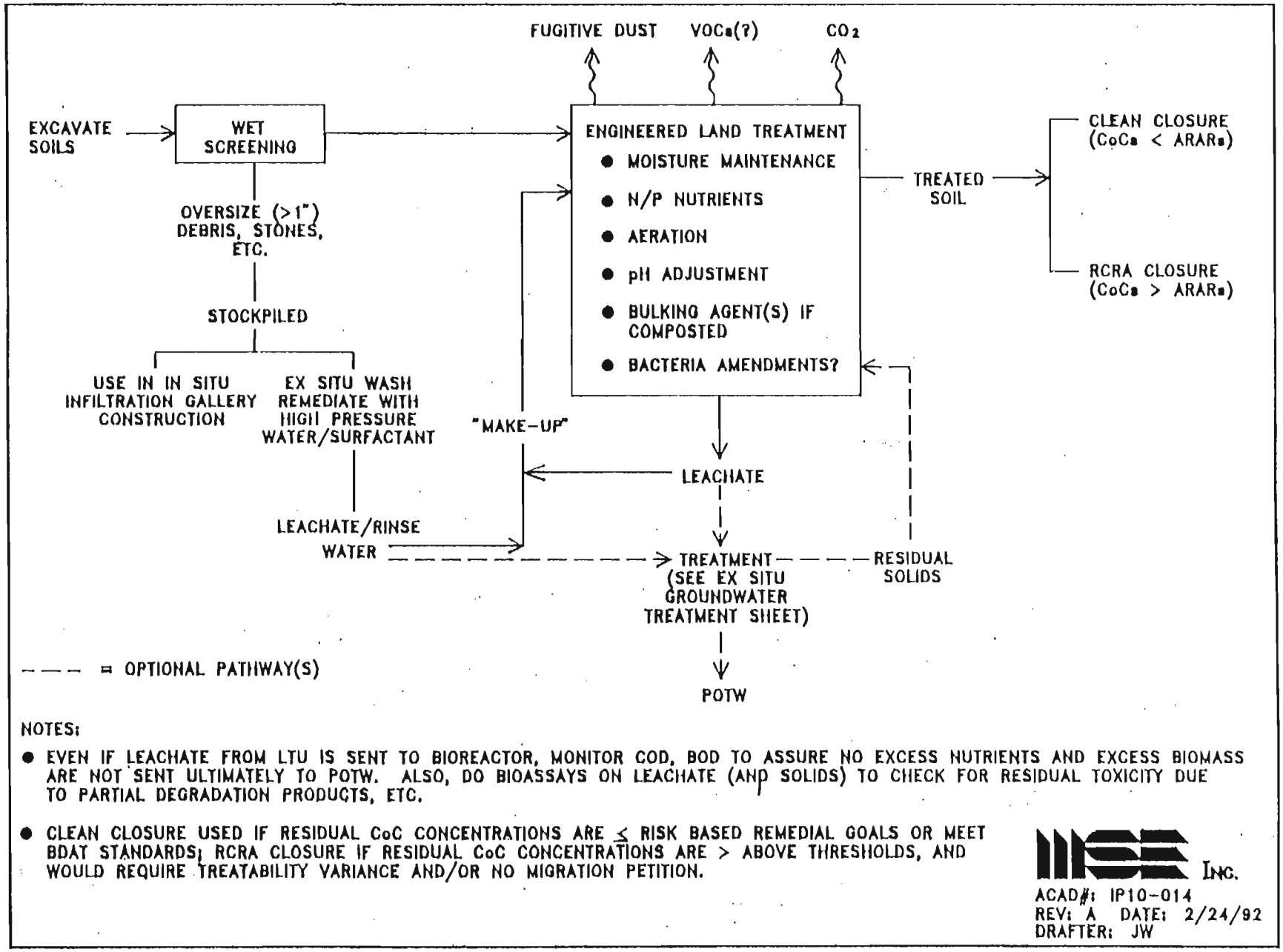
Treated soils would be used to backfill the excavated area if treatment levels are met. If treatment levels were not achieved during the extraction process, additional treatment in an LTU might be required. Recovered organics would be recycled if they meet FIFRA standards; otherwise they would be disposed of offsite in accordance with RCRA Subtitle C requirements, in a RCRA Subtitle C disposal facility.

Figure 9 Soil Slurry Reactor



EX SITU SOILS TREATMENT: SLURRY OPTION

Figure 10 Solid Phase Treatment



EX SITU SOILS TREATMENT: SOLID PHASE OPTION

Any land treatment occurring under this alternative would require compliance with RCRA Subtitle C requirements. Land disposal restrictions would apply if treatment standards for F032 and F034 wastes are finalized prior to the Record of Decision.

Risks would be reduced to the 1×10^{-6} level for industrial use. Treatability testing has not been conducted and the effectiveness of the extraction process has not been determined. Process design testing would be required before full scale implementation.

RCRA permit-by-rule requirements and Clean Water Act pretreatment requirements would apply to discharges from the extraction process dewatering system to a POTW. FIFRA requirements would apply to reuse/recycling of recovered oily wood treating fluid. FIFRA requires that a material used as a pesticide (wood treating fluid is classified as a pesticide by FIFRA), meet the formulation requirements. Recovered wood treating fluid would be analyzed and that analysis would be compared to the requirements to determine if the recovered fluid could be reused. If it could not be reused, RCRA Subtitle C requirements would apply to the offsite disposal of the oily wood treating fluid.

If an LTU is deemed necessary, deed restrictions would be required in order to prevent development and well drilling in and around the land treatment unit. Fencing would be required around the treating units to prevent unauthorized entry.

Figure 11 presents a simplified process flow diagram for CF System's Critical Fluid Solvent Extraction process and specifies the waste streams associated with the process.

Estimated cost: $82,232,520
Estimated time: 1-1/2 years

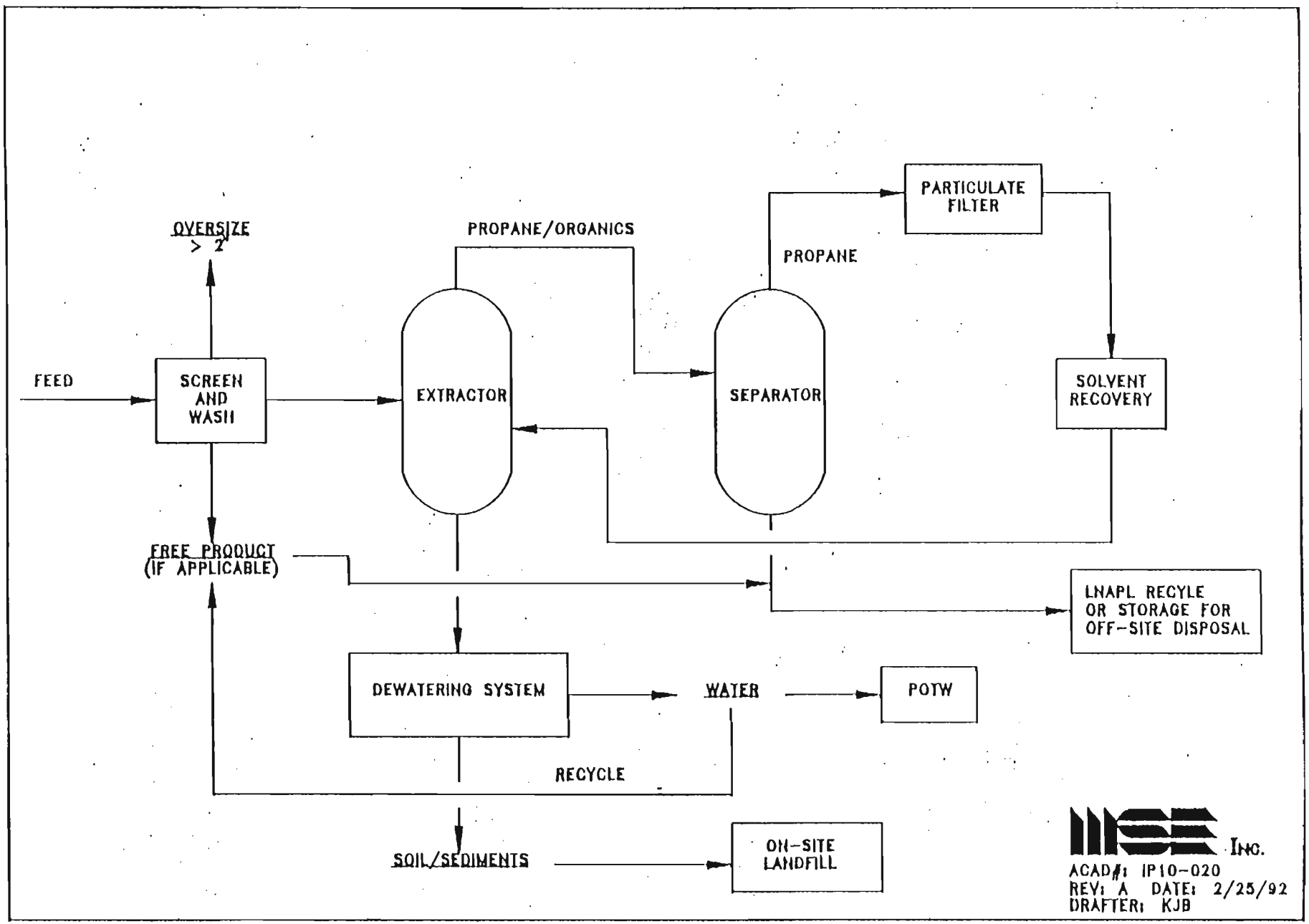
Alternative 6: Soil Flushing/*In Situ* Biological Treatment

(Preferred remedy for Soils Beneath the Treatment Plant and I-90)

As analyzed in the FS, this alternative addresses all contaminated soils at the IPC Site with the exception of soils in the roundhouse area and sediments in the drainage ditches. Soils in the treating plant area and underneath I-90 would not be excavated under this alternative. Structures on the Site would not be demolished and I-90 would not be temporarily removed. Ditch sediments and former roundhouse soils would be addressed by one of the other soil alternatives. This alternative treats approximately 39,000 yd^3 of contaminated soil.

The contaminants in the soil in the roundhouse area are not as amenable to soil flushing techniques as soils in the other areas of the Site. The primary contaminants in the roundhouse soils are PAHs that are very difficult to separate from soil particles. The ditch

Figure 11 Critical Fluid Solvent Extraction



SIMPLIFIED PROCESS FLOW DIAGRAM FOR CF SYSTEMS PROPANE EXTRACTION

sediments must be excavated for treatment, rather than being treated *in situ*, because of the long narrow area in which the contaminated soils are located. Installation of a soil flushing system that would effectively reduce contaminant levels in the ditch sediments was determined to be not practicable.

Under this alternative, soil contaminated with oily wood treating fluid would be left in place and flushed with hot water or steam and, if initial test or pilot runs indicated the need, a nonhazardous surfactant which would cause the oily wood treating fluid to wash out would be added. The nonhazardous surfactant would not have an adverse impact on domestic ground water use. The flushed water, associated contaminants and flushed oily wood treating fluid would be collected in a series of trenches on both sides of I-90. The oily wood treating fluid would be skimmed from the water for recycling or treatment and disposal and the water would be treated in a separate system along with ground water. An oxygen source such as hydrogen peroxide and possibly nutrients would be added to the system to enhance biological degradation of soil contaminants.

The soil flushing system would be designed to flood the soil pores in the soil above the water table. Flushing solution would be distributed by an infiltration gallery designed to provide maximum contact between the flushing solution and the course grained soils associated with the pole plant area. Application of flushing solution would continue at a steady-state condition until desired residual concentrations were reached.

Oily wood treating fluid would be recycled or disposed of offsite. FIFRA requirements would apply to reuse/recycling of recovered oily wood treating fluid. FIFRA requires that a material used as a pesticide (wood treating fluid is classified as a pesticide by FIFRA), meet the formulation requirements. Recovered wood treating fluid would be analyzed and that analysis would be compared to the requirements to determine if the recovered fluid could be reused. If it could not be reused, RCRA Subtitle C requirements would apply to the offsite disposal of the oily wood treating fluid.

With the exception of soil removed for the installation of operating components, all contaminated soils would be left in place. Soils removed for the installation of process components, and the ditch sediments and former roundhouse soils will be addressed under another soil alternative.

Water used to recover contaminants during the soil flushing process could be treated in a fixed film biological reactor to remove contaminants. A portion of the water would then be reinjected within the contaminated zone to assist in the flushing process. The remaining volume of treated water would be discharged to a POTW or to surface water in compliance with Clean Water Act requirements.

About 40-80% of the oily wood treating fluid would be removed by flushing and approximately 70% of the contaminants that adhere to the soils would be removed. Recovery efficiencies would largely be dependent on how much oily wood treating fluid is

currently present as free product versus the amount tied up as residual concentrations within the soils. Mathematical modeling has been conducted to refine this estimation and is summarized in the FS. However, testing would be necessary to provide site-specific information with sufficient accuracy to design and implement this process.

It has been estimated that the active *in situ* flushing and contaminant recovery activities would take one year to complete and follow-up *in situ* biological treatment of soils would take up to 10 years.

Safe Drinking Water Act requirements would apply to Class IV injection wells needed to inject hot water or steam into the subsurface.

Figure 12 presents a conceptual process flow diagram for the soil flushing, steam/hot water enhanced recovery process and specifies the waste streams associated with the process.

Estimated cost: $10,841,429
Estimated time: 10 years

Ground Water Alternatives

Costs for conducting the ground water alternatives were calculated in a manner similar to the soil alternatives cost calculations. This was done so that costs of the ground water alternatives could be compared. The cost for each ground water alternative involving extraction and treatment (Alternatives 2 and 3) was calculated assuming that each system would treat 200 gallons of water per minute for approximately 10 years or a total volume of 1 billion gallons. The cost of the *in situ* ground water alternative (Alternative 4) was based on treating a total volume of 210 million gallons.

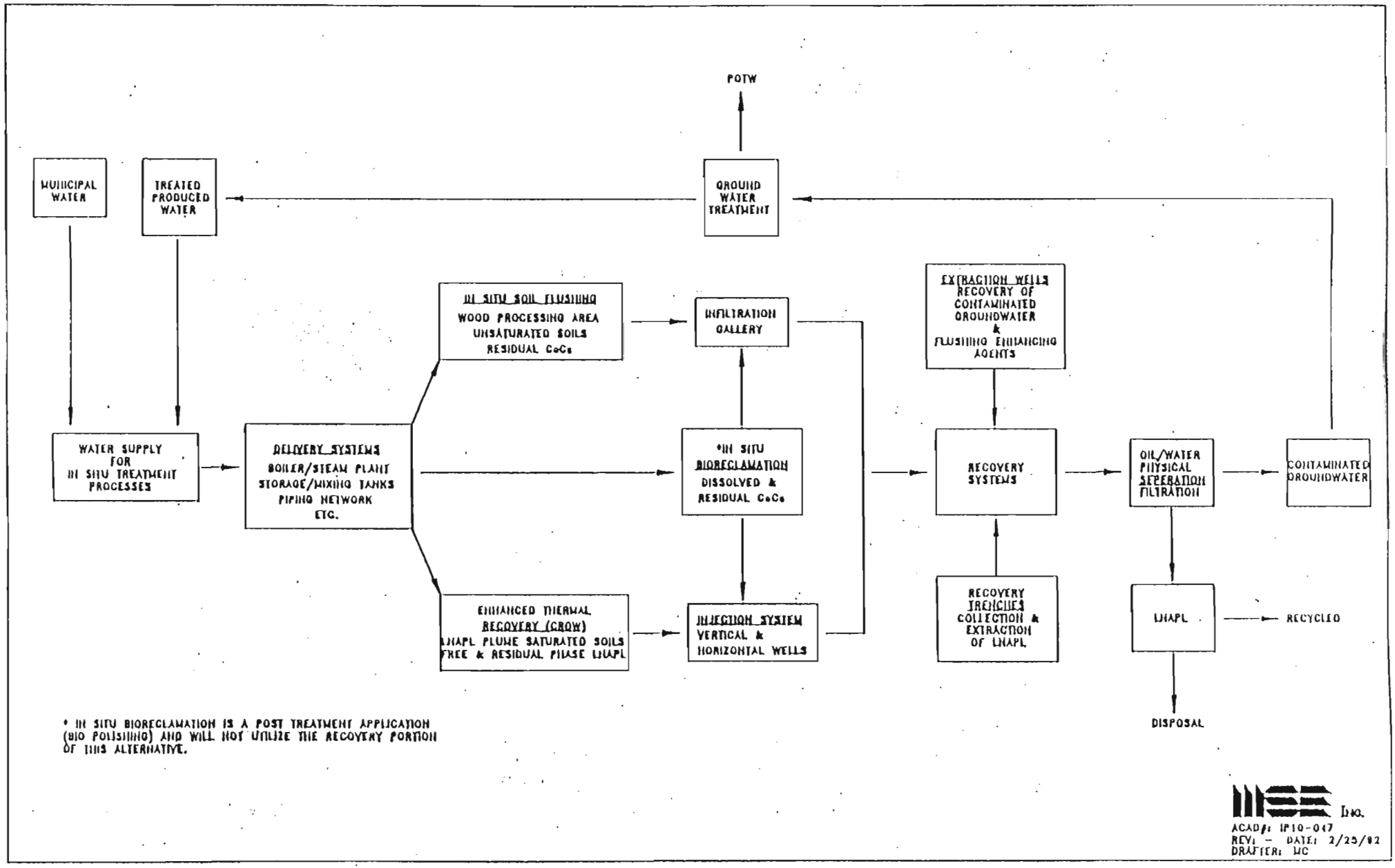
Alternative 1: No Action

Superfund law requires the consideration of a no action alternative. This alternative is used as a baseline against which to compare the other alternatives. As defined in the Idaho Pole RI/FS, no action means that a remedy would not be conducted. The quantity of untreated waste would remain at current levels and the degree of risk posed by such waste would remain constant.

The only activity that would occur under this alternative is routine ground water monitoring. ARARs, risk based levels and TBCs would not be met.

Estimated cost: $45,000
Estimated time: annually

Figure 12 Soil Flushing and Recovery



CONCEPTUAL PROCESS FLOW DIAGRAM FOR IN SITU SOIL FLUSHING, THERMAL ENHANCED LNAPL RECOVERY (CROW PROCESS) AND IN SITU BIORECLAMATION

Alternative 2: Pump and Treat Using Activated Carbon Adsorption

This alternative involves the design of a ground water extraction system to capture the dissolved contaminant plume. Conventional activated carbon adsorption units would be used to remove contaminants from the ground water. Pretreatment of the extracted ground water to remove suspended solids and oily liquid would be required to prevent the activated carbon units from becoming overloaded.

Solid materials removed during the pretreatment process would be addressed through the selected soils alternative and oily fluids would be either reused in the wood treating process if FIFRA requirements were met, or disposed of offsite in accordance with RCRA Subtitle C requirements at a RCRA Subtitle C facility.

Treatability data collected at the Site indicate that excessive carbon loading and plugging due to dissolved organic and inorganic constituents will not significantly impact the operational life of the activated carbon.

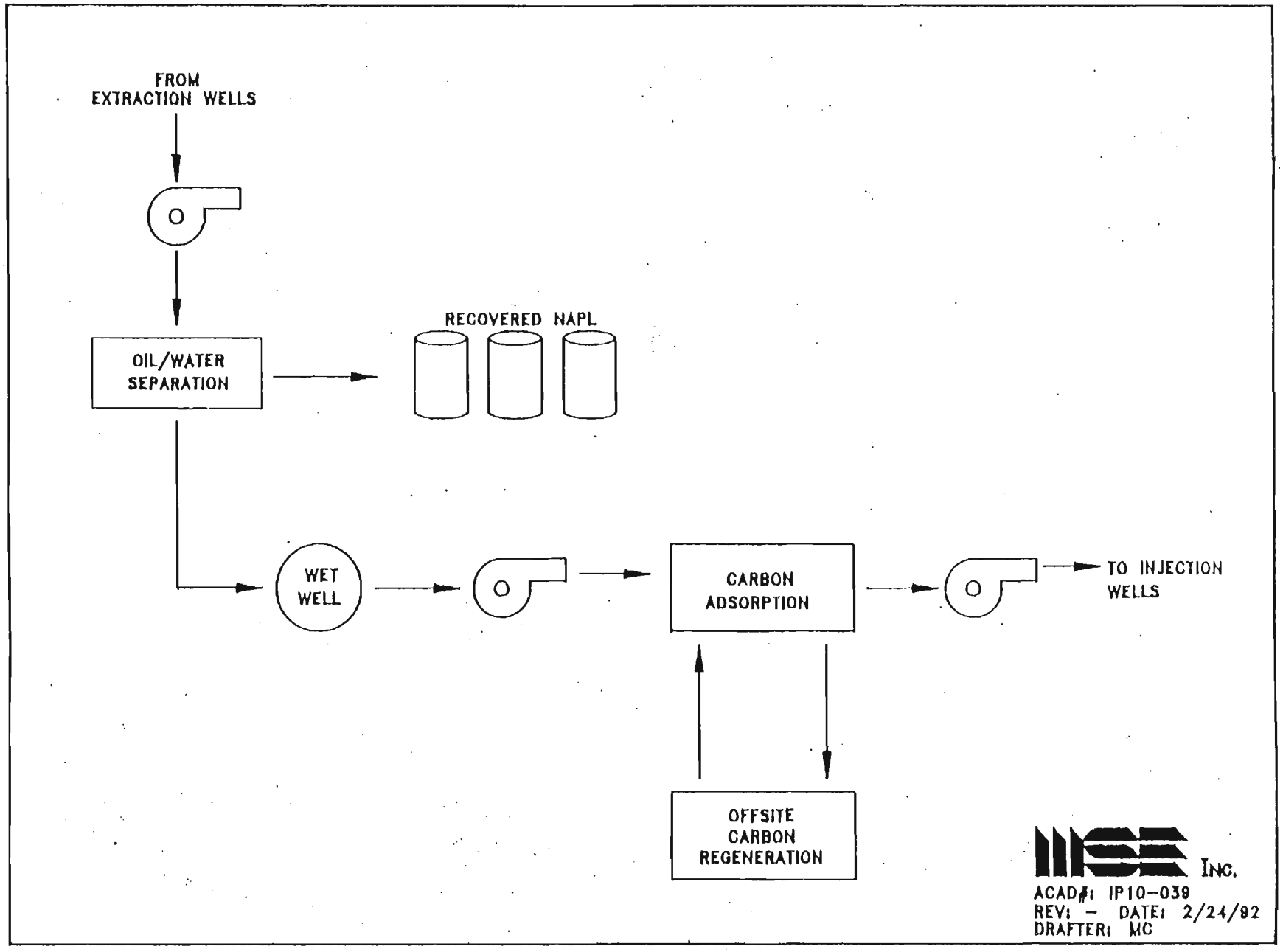
Spent carbon would be reactivated using thermal or biological methods onsite or be sent offsite to a commercial carbon reactivation process. Reactivation of carbon by either thermal or biological methods destroys the contaminants adsorbed to the carbon. Transport of spent activated carbon to an offsite reactivation facility would require compliance with RCRA requirements because the carbon would contain the contaminants removed from the ground water and would be classified as a hazardous waste.

Treated ground water would be reinjected through a series of wells or trenches depending on which process is determined to be the more effective during design phase evaluations. Excess water would be discharged to a POTW in compliance with Clean Water Act pretreatment requirements. Injection wells used to return treated water to the aquifer are classified as Class IV Wells and would have to meet Safe Drinking Water Act requirements.

The design of the extraction system would focus on the volume of ground water having high contaminant concentrations. The alternative was evaluated with a conceptual extraction and reinjection plan; however, specific criteria would be developed during remedial design. Ideally, the treated extracted water would be reinjected. Pumping rates would remain low in order to prevent draw down of the water table causing subsequent vertical enlargement of the contaminated zone. The extraction and reinjection system would be designed to stimulate flushing of contaminants and to limit migration of contaminants. Figure 13 illustrates the carbon adsorption treatment process.

Estimated cost: $4,413,555
Estimated time: 10 years

Figure 13 Activated Carbon Adsorption



CONCEPTUAL PROCESS FLOW DIAGRAM FOR
ACTIVATED CARBON ABSORPTION TEATMENT.

Alternative 3: Pump and Treat Using A Fixed Film Biological Reactor

(Preferred Remedy to be Used in Conjunction with Ground Water Alternative 4)

Contaminated ground water would be extracted by wells located along the axis or centerline of the contaminated plume and would be sent for pretreatment in an onsite oil/water separator-clarifier/filtration plant. Suspended solids would be removed from the water in the clarifier/filtration plant. Solids removed during this phase of the ground water treatment process would be addressed through the selected soils alternative and oily wood treatment fluid removed by the oil/water separator would be recycled if FIFRA requirements were met or disposed of offsite in accordance with RCRA Subtitle C requirements at a RCRA Subtitle C facility.

After the pretreatment steps described above, the water would enter a mix tank where the pH and temperature would be adjusted and microbes that have been acclimated to the contaminants would be added. Water then would pass into the submerged fixed film bioreactor. The water would remain in the reactor long enough for the contaminants to be degraded to a level that would allow for reinjection or discharge to a POTW or to surface water. The design of the extraction system would focus on the volume of ground water having high contaminant concentrations. The alternative was evaluated with a conceptual extraction and reinjection plan; however, specific criteria would be developed during remedial design. Ideally, all of the treated extracted water would be reinjected. Pumping rates would remain low in order to prevent a draw down of the water table and subsequent vertical enlargement of the contaminated zone. The extraction and reinjection system would be designed to stimulate flushing of contaminants and to limit migration of contaminants. Injection wells would comply with Safe Drinking Water Act requirements for Class IV injection wells. Discharge to a POTW or to surface water would be in compliance with the Clean Water Act. Figure 14 illustrates the biological treatment process.

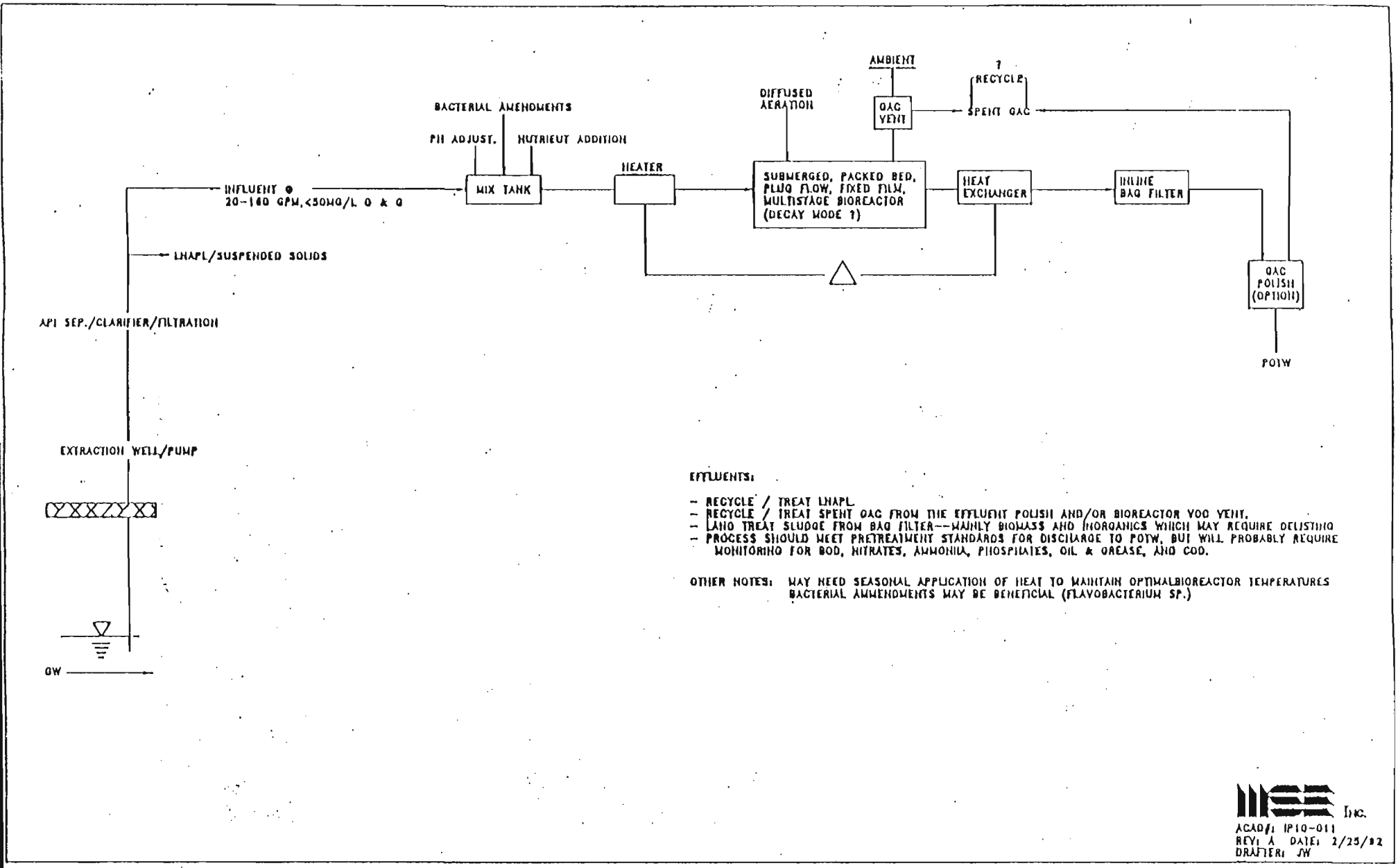
Estimated cost: $2,519,235
Estimated time: 15 years

Alternative 4: *In Situ* Biological Treatment

(Preferred Remedy to be Used in Conjunction with Ground Water Alternative 3)

The principal objective of this alternative is to enhance the treatment of ground water and soil beneath the water table in the pasture area north of I-90 by adding oxygen and nutrients to the subsurface environment. The oxygen and nutrients would be carried to the subsurface in water that has been extracted from the aquifer and treated under one of the other remedial ground water alternatives.

Figure 14 Fixed Film Biological Reactor



CONCEPTUAL PROCESS FLOW
DIAGRAM OF THE FIXED-FILM BIOREACTOR

The injection of this oxygen and nutrient rich solution into the contaminated ground water plume would enhance oxidation and biodegradation of contaminants by native bacteria. The bacteria utilize the contaminants in the ground water and in the saturated soil below the ground water table as an energy source, destroying contaminants by converting them to other nonhazardous forms. Injection wells used to transfer solution to the aquifer would comply with Safe Drinking Water Act requirements for Class IV injection wells.

Treatability information indicates that the addition of nutrients and an oxygen source will enhance biological degradation of the contaminants in the ground water.

The extraction well locations and pumping rates would be determined during remedial design by modelling. Modelling results may indicate the need for limited hydrologic plume management to prevent spread of the plume boundaries. Field-scale process treatability testing will be necessary to determine actual effectiveness of this technology. Figure 15 portrays the *in situ* biological treatment process.

Estimated cost: $1,878,447
Estimated time: 10 years

VIII. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Section 300.430(e)(9) of the NCP requires that the agencies evaluate and compare the remedial cleanup alternatives based on the nine criteria listed below. The first two criteria are threshold criteria and must be met. The selected remedy must represent the best balance of the selection criteria.

Evaluation and Comparison Criteria

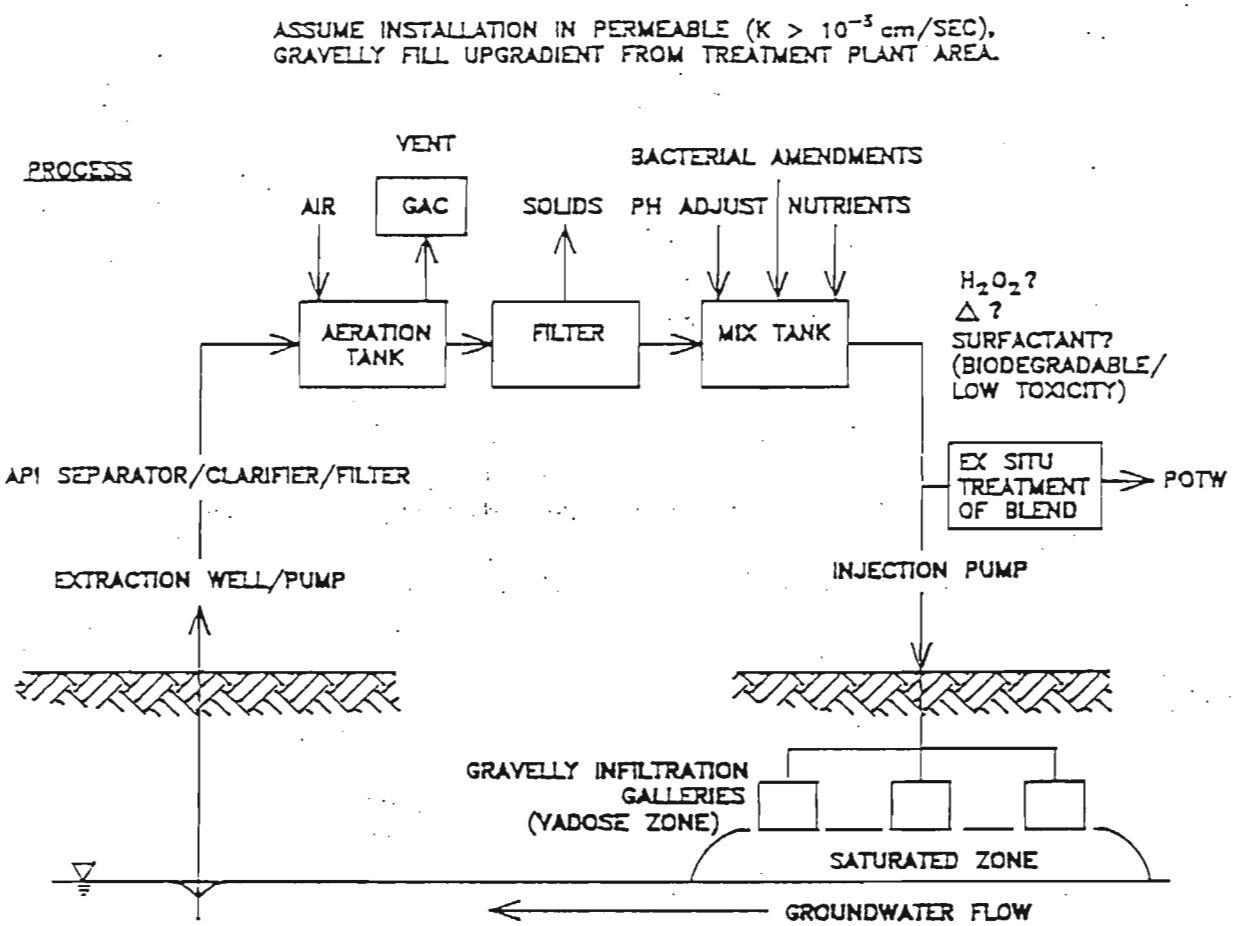
1. Overall protection of human health and environment addresses whether or not a remedy provides adequate protection and describes how potential risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls or institutional controls.

2. Compliance with applicable or relevant and appropriate requirements addresses whether or not a remedy will comply with federal and state environmental laws and/or provide grounds for invoking a waiver.

3. Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

4. Reduction of toxicity, mobility and volume through treatment refers to the degree that the remedy reduces toxicity, mobility and volume of the contamination.

Figure 15 *In Situ* Biological Treatment



EFFLUENTS

FILTER CAKE WILL NEED TCLP ANALYSIS TO ALLOW DELISTING. FOLLOWED BY ON SITE TREATMENT/DISPOSAL. TREATMENT REQUIRED IF ORGANICS CONTAIN CoCs > ARARs ALLOWANCE, OTHERWISE COULD BE LAND—FILLED AS SOLID WASTE.

SPENT GAC MAY NEED TCLP ANALYSIS TO DELIST; RECYCLE PREFERRED.

SEE "BIOTROL" SHEET FOR DETAILS, RE: EXISTING TREATMENT OF EXCESS WATER.

NOTES

ADDITION OF H^2O^2 (●100—200 mg/L) TO THE INJECTED EFFLUENT WOULD STIMULATE IN SITU TREATMENT OF VADOSE ZONE SOILS BELOW INFILTRATION GALLERIES.

NEED DOWNGRADIENT MONITORING (FROM EXTRACTION WELLS) TO EVALUATE PROGRESS IN REDUCING CoC CONCENTRATIONS AND TO ASSURE NUTRIENT LEVELS (N/P) ARE NOT FURTHER DEGRADING AQUIFER QUALITY OR EXCEEDING MCLs.

EXTRACTION PUMPING RATE > REINJECTION RATE (NYER, P. 17, BIOREMEDIATION SEMINAR). THUS EXCESS WATER MAY HAVE TO BE DISCHARGED OFF SITE IF NOT USED FOR EX SITU CLEANUP OF VADOSE ZONE, ETC.

INC.

ACAD#: IP10—009
REV: A DATE: 2/24/92
DRAFTER: JW

CONCEPTUAL PROCESS FLOW DIAGRAM
OF THE IN SITU GROUNDWATER BIORECLAMATION

5. Short-term effectiveness addresses the period of time needed to complete the remedy, and any adverse impact on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

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

7. Cost evaluates the estimated capital costs, operation and maintenance costs and present worth costs of each alternative.

8. State agency acceptance indicates whether, based on its review of the information, the state (MDHES) concurs with, opposes or has no comment on the preferred alternative. However, for the Site, the state (MDHES) is the lead management agency and EPA is the support agency. As such, the State has identified the selected remedy and EPA has agreed with that identification.

9. Community acceptance is based on whether community concerns are addressed by the selected remedy and whether or not the community has a preference for a remedy. Although public comment is an important part of the final decision, MDHES and EPA are compelled by law to balance community concerns with all of the other criteria. A complete record of the responses to specific categories of comments is summarized in the Responsiveness Summary.

The following summary of the evaluation and comparison of alternatives is presented in greater detail in the FS. The initial discussion covers the soil alternatives, followed by a discussion of the ground water alternatives. The alternatives are discussed in order of relative rank, with alternatives ranking the highest discussed first and alternatives ranking the lowest, discussed last.

Soil Alternatives

Overall Protection of Human Health and the Environment:

This criterion evaluates how the alternatives provide human health and environmental protection and describes how risks posed through each pathway are eliminated, reduced or controlled through treatment, engineering controls or institutional controls.

All of the soil alternatives, except No Action, Surface Capping and Soil Flushing/*In Situ* Biological Treatment, are expected to provide overall protection of human health and the environment by eliminating, reducing or controlling risks associated with contaminated soils at the Site. However, Surface Capping and Soil Flushing/*In Situ* Biological Treatment, could provide adequate protection within limited areas of the Site. Each of the soil alternatives with the exception of Surface Capping and No Action would use treatment to eliminate or

reduce risks. Institutional controls would be used to supplement each alternative's ability to provide further protection.

Alternative 3: Excavation and Thermal Treatment, would be the most protective alternative because the high temperature thermal process would destroy all (more than 99%) of the site contaminants in a single step, either onsite or offsite. Remaining risks for residential land use would be less than 1×10^{-6} related to remaining untreated contaminants.

Alternative 5: Excavation and Critical Fluid Solvent Extraction, is slightly less effective than incineration. This alternative has a 97% contaminant removal efficiency. Oversize materials must be pretreated prior to introduction into the extraction process to assure complete contaminant reduction. Remaining risks for residential land use would be less than 1×10^{-5} resulting from untreated material and treatment residuals.

Alternative 4: Excavation and Biological Treatment, would biologically remove or reduce contaminant concentrations in the soil to protective remediation levels as has been demonstrated at a number of wood treating sites currently undergoing remediation. Slurry phase and solid phase processes are the two options under this alternative and result in nearly identical ranking. Slurry phase treatment is somewhat better than solid phase treatment at contaminant removal. Removal efficiencies for slurry phase for pentachlorophenol, B2 PAHs, D PAHs and PCDDs/PCDFs are 90%, 85%, 90% and 70%, respectively, and for solid phase, 90%, 85%, 85%, and 40%, respectively. Remaining risks for residential land use would be less than 1×10^{-5} for both options.

Alternative 6: Soil Flushing/*In situ* Biological Treatment, is ranked lower than the previous alternatives because of lesser expected contaminant removal. The range of removal is estimated to be from 40% to 80%. This alternative has been considered in order to avoid the need to demolish and excavate the IPC facility and the highway. This alternative does not directly address surface soils or ditch sediments. Since this alternative requires minimal excavation during installation of system components any surface soil and sediments would be treated along with the excavated material under another alternative. As a stand-alone alternative, this alternative may not meet 1×10^{-4} risk level but in conjunction with other soil and ground water alternatives remaining risks would be reduced to less than 1×10^{-4} for residential use. The areas where this alternative would be implemented are sources of ground water contamination that must be remediated to reach site cleanup levels.

Alternative 2: Surface Capping, would only provide protection where direct contact is the primary risk to human health. Areas of ground water contamination would not be protected by this alternative; therefore, Surface Capping is ranked lower than the other alternatives except for Alternative 1, No Action. This alternative would not be as protective as Alternatives 3, 5, 4 or 6 because it would not treat contaminants and would rely on the continuing integrity of the cap to prevent exposure. Remaining risks relating to untreated materials would be less than 1×10^{-5}.

Alternative 1: No Action, would not provide protection to human health and the environment from site contaminants. All soil pathways would remain and no treatment would occur. Without treatment, site contamination will persist indefinitely and will continue to affect residential water supply wells. Risks would remain constant.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Applicable requirements are those cleanup standards, and other substantive requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, or location, at a CERCLA site. Relevant and appropriate requirements are similar requirements that, while not applicable, clearly address problems or situations sufficiently similar to those encountered at a CERCLA site such that their use is well suited to the particular site. An evaluation of Federal and State ARARs for the selected remedy is provided in Appendix A. Remedial action Alternatives 3, 4, and 5 would comply with the ARARs. Alternative 2 would only meet ARARs that are related to direct contact and inhalation exposures; ground water ARARs would not be met; therefore surface capping will only be discussed for application in the roundhouse area. Alternative 6 would not meet ARARs as a stand-alone alternative. It will be discussed for use in conjunction with another alternative. Since the No Action alternative does not meet the two threshold criteria, it will no longer be discussed in the comparative analysis.

Long Term Effectiveness and Permanence

Long term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time. This criterion includes the consideration of residual risk and the adequacy and reliability of institutional controls.

Although institutional controls, consisting of land use restrictions and prohibitions on aquifer use, would be implemented in conjunction with the remedy, the effectiveness and reliability of institutional controls is considered to be less than that of engineered controls.

Because the soil cleanup levels established in this ROD for some areas of the Site are health based standards for industrial use, and not unlimited use with unrestricted exposure, and because the contaminants will remain onsite, the remedial action alternative selected requires five year reviews under Section 121(c) of CERCLA, and Section 300.430(f)(4)(ii) of the NCP, to assure the long term effectiveness of the remedy.

Alternatives 3: Excavation and Thermal Treatment, reduces the risks associated with site contaminants by permanently destroying contaminants and achieves a higher destruction efficiency than the other treatment alternatives. This alternative has been proven reliable and would be adequate to address contaminants of concern. Treatment residuals would be clean of hazardous substances resulting in minimal risks.

Alternative 5: Excavation and Critical Fluid Solvent Extraction, has good reliability, but since residuals may have slightly greater contaminant levels than Alternative 3, this alternative is ranked below Alternative 3. Long term management of residuals would be necessary. There are also some uncertainties concerning the fate of extracted hazardous substances, because contaminants of concern are concentrated in the extract but are not destroyed and may pose residual risk.

Alternative 4: Excavation and Biological Treatment, provides for long term effectiveness through destruction of contaminants of concern, although it would be necessary to evaluate the operational processes on a site specific basis to estimate efficiency. Long term management of both solid phase and slurry phase treatment residuals would be necessary. Uncertainties are greater with solid phase than slurry because of the time required to meet cleanup levels and the area necessary to complete the treatment process. Slurry phase would rank ahead of solid phase due to slightly better reduction of concentration levels. This alternative ranks below Alternatives 5 and 3 because residual contamination would be higher.

Alternative 2: Surface Capping, would not provide permanent risk reduction even in a limited area. Capping could meet performance specifications but the need for long term maintenance and management is great. It is likely that replacement and repair of the cap would be necessary to maintain protectiveness. The degree of long term effectiveness of the capping alternative would depend on maintenance of the cap and on the effectiveness of institutional controls protecting the cap. This alternative only ranks ahead of Alternative 6.

Alternative 6: Soil Flushing/*In situ* Biological Treatment, would require the implementation of an additional ground water remedy to increase contaminant destruction for long term effectiveness. If this alternative were used as a stand-alone alternative, remaining risks could be greater than 1×10^{-4}, which is higher than remaining risks for other alternatives. This alternative is ranked lower than other alternatives. Longterm management would be required to evaluate the effectiveness of Alternative 6. There would be considerable design testing necessary to optimize this alternative. Contaminants would be degraded to a lesser extent under this alternative than Alternatives 3, 4 or 5, although this alternative has the capability of reaching soils other alternatives might not, especially soils underneath structures.

Reduction of Toxicity, Mobility and Volume

Congress has expressed a preference under CERCLA for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility or volume of hazardous substances as their principal element.

Alternative 3: Excavation and Thermal Treatment, would reduce the toxicity, mobility and volume of soil contaminants at the Site better than other alternatives. This alternative addresses all excavated material with an irreversible treatment process. Any treatment residuals would have minimal risks and would meet treatment goals. This alternative

satisfies the preference for treatment.

Alternative 4: Excavation and Biological Treatment, would reduce the toxicity, mobility and volume of soil contaminants on the Site. Slurry phase treatment would provide more complete destruction than solid phase but the two options are ranked together after Alternative 3. Alternative 4 would convert contaminants to nontoxic compounds. The treatment process would be irreversible. The preference for treatment would be satisfied.

Alternative 5: Excavation and Critical Fluid Solvent Extraction, would reduce the mobility and volume of soil contaminants at the Site better than Alternatives 2 and 6 but not as well as Alternatives 3 and 4. Hazardous substances are not destroyed in this process but are extracted in the form of a concentrate that would require additional treatment or recycling. The preference for treatment is satisfied.

Alternative 6: Soil Flushing/*In situ* Biological Treatment, would address the principal threat by removing contaminants of concern from the environment and also by breaking them down thus reducing toxicity, mobility and volume. However, this alternative does not provide as great a percent of reduction as the previous alternatives do. Additionally there are special requirements necessary for this alternative, such as a suitable soil matrix to flush oily wood treating fluid and hazardous substances as well as hydrological controls to control the flushing solution and the *in situ* bioremediation. This alternative meets the preference for treatment.

Alternative 2: Surface Capping, would reduce the mobility of soil contaminants by covering them and by minimizing or eliminating surface water infiltration and air entrainment, but would not reduce the toxicity or volume of contaminants. The alternative does not employ an irreversible treatment or destruction process and it does not meet the preference for treatment as a principal element of the remedy. Therefore, this alternative is ranked the lowest.

Short Term Effectiveness

Short term effectiveness refers to the period of time needed to complete the remedy and any adverse impacts on human health and the environment that may be posed during the construction and implementation of the remedy.

Alternative 2: Surface Capping, would rank the highest under this criterion, primarily because it involves the least amount of work, can be completed in the shortest time and results in minimal risks to workers and the community. It could be conducted in one construction season and would present little risk to workers (less than 1×10^{-5}) constructing the cap and little risk to the community (less than 1×10^{-6}) during construction. Environmental impacts would be expected to be little, with some increased chance for surface water runoff that previously infiltrated the soils.

Alternative 4: Excavation and Biological Treatment, would take longer to conduct remedial action than Alternative 2. Slurry phase ranks higher than solid phase treatment but both rank relatively close to one another. Slurry phase presents minimal risk to workers (1×10^{-5}) and the community (1×10^{-6}).

Solid phase treatment would result in low worker risks (1×10^{-5}) and community risks (1×10^{-6}) but requires a much longer time frame, from 5 to 10 years to achieve remediation levels. The size of the land treatment unit used for solid phase treatment would determine the length of the soils treatment period. A larger land treatment unit would require fewer layers of soil and treatment would be completed in less time.

Exposure to dust from excavation of soils would be of concern for Alternatives 3, 4 and 5 but could be addressed through dust suppression techniques.

Alternative 6: Soil Flushing/*In situ* Biological Treatment, would take a longer time than other alternatives to achieve remediation levels. Alternative 6 would not pose any significant risks to workers or others during implementation other than potential ground water impacts that would require monitoring. This alternative results in a lower ranking than Alternatives 2 or 4 but ahead of Alternatives 3 and 5 because of limited worker risks.

Alternative 3: Excavation and Thermal Treatment, would present the highest opportunity for impacts to site workers and the environment from air emissions. There is also the potential for adverse impacts to offsite populations from air emissions resulting from emission control system malfunctions. There would also be potentially significant risks associated with the offsite incineration option since large quantities of hazardous substances would be transported over public roads. The time required to complete this remedy, however, is relatively short: 1.5 years for an onsite large scale unit to 5 years for an onsite mobile unit.

Alternative 5: Excavation and Critical Fluid Solvent Extraction, would only take approximately 1.5 years to decontaminate site soils. However, it would pose a threat to onsite workers if not properly designed or operated from air emissions and the use of pressurized solvent. Community risks would be minimal as long as the system is operated within specifications. Workers may also encounter risks from concentrated extract and from treatment residuals. Environmental impacts would be limited if correct design and operation were followed. This alternative ranks lowest primarily due to worker risks.

Implementability

Implementability refers to the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement the remedy. This criterion also includes coordination of Federal, State and local governments to clean up the Site.

Alternative 2: Surface Capping, is considered to be a standard construction practice and could be accomplished in a short period of time. Design methods are well understood and

materials are readily available. Additional action to improve the cap would be available. No excavation of soils or sediments would be necessary. These factors all result in this alternative being the most implementable.

Alternative 4: Excavation and Biological Treatment, is somewhat less implementable than Alternative 2, but more so than the remaining alternatives. A solid phase surface land treatment unit would require no special equipment or treatment units. The land treatment unit would be operated like an agricultural farm field and would be constructed in a short time using standard earth moving equipment. The slurry reactor option of Alternative 4 would not be required to withstand high temperatures and pressures as equipment under Alternatives 3 and 5, so it would be easier to construct. Alternative 4 would require some planning with local government especially for the slurry option if discharges to a POTW were found to be necessary. This alternative ranks as the second most easily implemented alternative.

Alternative 6: Soil Flushing/*In situ* Biological Treatment, would require equipment and services that are readily available. The drilling techniques required to introduce hot water/steam into the area under I-90 would be challenging, but not insurmountable. This makes this alternative less implementable than 2 and 4 but more so than Alternatives 3 and 5.

Alterative 3: Excavation and Thermal Treatment, would likely be the most difficult to implement other than Alternative 5, both administratively and technically. There is not currently an offsite commercial incinerator that is permitted to burn dioxin containing wastes. There are a limited number of mobile incinerators available for onsite use. Construction of an onsite incinerator is feasible and many vendors offer design, construction and training services for operation and maintenance of full scale units, however, thermal treatment has a history of opposition by the public and local governments. This alternative would entail considerable planning with local government. The offsite option would require coordination with the Department of Transportation.

Alternative 5: Excavation and Critical Fluid Solvent Extraction, requires a specially designed and constructed unit that would be used to contain the waste material during the treatment process. This alternative would be the most difficult to implement. There is a vendor available, but there may be delays in optimizing the process. This alternative would require extensive system monitoring. Additional remedial action could be undertaken in the form of additional excavation but capital investment in solvent extraction would make use of another technology difficult. This alternative would require planning with the local government.

Cost

This criterion evaluates the estimated costs for each remedial alternative. For comparison, capital and annual operation and maintenance costs are used to calculate a present worth cost for each alternative.

The alternatives' approximate present worth costs for site wide implementation are shown below:

Alternative 1, No Action

- $0

Alternative 2, Surface Capping,

- $18,000,000 (cost for entire Site based on unit cost developed for former roundhouse area soils)

Alternative 3, Excavation and Thermal Treatment,

- $63,000,000 Mobile Onsite
  $93,000,000 Large Scale Onsite
  $212,000,000 Offsite

Alternative 4, Excavation and Biological Treatment,

- $13,000,000 Slurry Phase
  $8,000,000 Solid Phase (Land treatment unit)

Alternative 5, Excavation and Critical Fluid Solvent Extraction,

- $82,000,000

Alternative 6, Soil Flushing/*In situ* Biological Treatment,

- $11,000,000.

The alternatives, in order of increasing costs, are as follows: Alternative 1, No Action; Alternative 4, Solid Phase Biological Treatment; Alternative 4 Slurry Phase Biological Treatment; Alternative 6, Soil Flushing *In Situ*; Alternative 2, Surface Capping; Alternative 3, Thermal Treatment (onsite mobile) and Alternative 5, Solvent Extraction.

In order to evaluate the costs of the alternatives for implementation in only the roundhouse area the following estimated costs have been prepared. The estimated costs in the FS for Alternative 2 were only for the roundhouse area. The estimated costs for the other alternatives were not in the FS comparative analysis and do not result in the same unit costs as the costs described above because those costs do not include demolition or I-90 disruption.

Alternative 1, No Action

- $0

Alternative 2, Surface Capping,

- $1,300,000

Alternative 3, Excavation and Thermal Treatment,

- $7,800,000 Mobile Onsite

Alternative 4, Excavation and Biological Treatment,

- $960,000 Slurry Phase
  $600,000 Solid Phase (Land treatment unit)

Alternative 5, Excavation and Critical Fluid Solvent Extraction,

- $55,000,000

Alternative 6, Soil Flushing/*In situ* Biological Treatment,

- $1,100,000.

The Alternatives, in order of increasing costs, for the roundhouse area, are as follows: Alternative 1, No Action; Alternative 4, Solid Phase; Alternative 4, Slurry Phase; Alternative 6, Soil Flushing *In Situ*; Alternative 2, Surface Capping; Alternative 3, Thermal (onsite mobile) and Alternative 5, Solvent Extraction. Since the ranking of alternatives based on cost estimates is the same over the Site and over the roundhouse area, the alternatives retain their relative ranking regardless of area of implementation.

State Acceptance

The State of Montana has been the lead agency for the development of this Record of Decision and has selected the remedy contained herein. EPA has participated in the remedial process as the support agency and has concurred with the remedy selection.

Community Acceptance

Public comment on the Remedial Investigation, Feasibility Study and Proposed Plan was solicited during formal public comment periods extending from April 1, 1992 until June 16, 1992. Comments received from the community indicate no opposition to the preferred remedy with the exception of a late comment expressing opposition to the remedy and support for the remedy proposed by IPC. Additionally, at least one person and the local government requested that the cleanup be expedited if possible. The City of Bozeman expressed concern about possible discharges to the publicly owned treatment works. Response to the community comments are found in the Responsiveness Summary.

During the public comment period, MDHES and EPA received extensive comments from two Potentially Responsible Parties (PRPs) that have been identified for the Site. The PRP comments object to the RI procedures, the Baseline Risk Assessment development and the FS as well as the preferred remedy. As part of the written comments, the Idaho Pole Company submitted their proposed remedy consisting primarily of *in situ* biological treatment of soils. PRP comments with MDHES and EPA responses are also found in the Responsiveness Summary.

Ground Water Alternatives

Ground water beneath the Site has become contaminated with oily wood treating fluid that has been spilled, dripped or discharged onto the ground surface. The oily wood treating fluid has migrated downward, contaminating the soil that it passed through, and has entered the ground water. Some of the oily wood treating fluid is found at the surface of the ground water, and some of the fluid is attached to soil particles above and below the water table. A portion of the fluid has dissolved in the ground water and will have to be removed to reach site remediation goals.

In order to assure long term protection of the ground water, the soil, acting as a source of oily treating fluid contamination, must be cleaned up to a level that no longer contributes contaminants to the ground water. If the source areas are not remediated, none of the ground water alternatives would be considered permanent remedies. The effectiveness of implementation of the ground water alternatives is dependent upon effective soil remediation. Institutional controls preventing the construction of new water supply wells during site remediation and installation of on-tap treatment devices at residences with contaminated wells would provide additional protection.

Overall Protection of Human Health and the Environment

Alternative 2: Carbon Treatment, would be expected to provide protection of human health and the environment by eliminating or reducing the risks posed by contaminated ground water better than the other alternatives. Remaining risks would be less than 5×10^{-6}.

Alternative 3: Fixed Film Bioreactor, would also be expected to provide protection of human health and the environment by eliminating or reducing the risks posed by contaminated ground water although this alternative would not be as protective as Alternative 2. Remaining risks would be less than 5.5×10^{-5}.

Alternative 4: *In Situ* Bioreclamation, would be expected to provide protection of human health and the environment by eliminating or reducing the risks posed by contaminated ground water only if it were used in conjunction with alternative 2 or 3. Alternative 4 would not meet protective cleanup levels alone. However, Alternative 4 would enhance Alternatives 2 or 3 by reaching ground water that they can't reach. If Alternative 4 were used with Alternative 3, for example, remaining risks would be less than 5.5×10^{-5}.

Alternative 1: No Action, would not provide protection of human health since the untreated ground water would continue to pose risks. Risk levels would remain constant. The only activity identified under this alternative would be ground water monitoring.

Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)

Applicable requirements are those cleanup standards, and other substantive requirements, criteria, or limitations promulgated under Federal or State law that specifically address a hazardous substance, pollutant, contaminant, remedial action, or location, at a CERCLA site. Relevant and appropriate requirements are similar requirements that, while not applicable, clearly address problems or situations sufficiently similar to those encountered at a CERCLA site such that their use is well suited to the particular site. An evaluation of Federal and State ARARs for the selected remedy is provided in Appendix A. Alternatives 2 and 3 would meet ARARs for all ground water that is pumped to the surface for treatment. Nevertheless, pump and treat systems have been shown to not be completely able to reach cleanup levels in the ground water without additional *in situ* treatment. Alternative 4 would meet ARARs only if used in conjunction with other ground water alternatives. Since the No Action alternative does not meet the two threshold criteria, it will no longer be discussed in the comparative analysis.

Long Term Effectiveness and Permanence

Alternative 2: Carbon Treatment, would offer a high degree of permanence in the reduction of risk associated with ground water if combined with a soil alternative that effectively removes the potential for recontamination. This alternative would be expected to attain MCLs and proposed MCLs in treated ground water, resulting in minimal risk from contaminant residuals in ground water. Because of the length of time for remediation, remedial action conducted under this alternative would require five year reviews and periodic monitoring to assure the long term effectiveness of this remedy. In addition, there would be need for long term maintenance of the treatment units and the need to treat or dispose of the spent carbon that contains the contaminants would be required. This alternative would offer the best long term effectiveness of any of the alternatives.

Alternative 3: Fixed Film Bioreactor, would offer a good degree of permanence in the reduction of risk associated with the ground water if combined with a soil alternative that effectively removes the potential for recontamination. This alternative would be expected to attain MCLs or proposed MCLs in treated ground water, but not as quickly as Alternative 2 because the biologic system is not as efficient at removing contaminants as the carbon treatment system. Operational monitoring would be required. Because of the length of time for remediation, remedial action conducted under this alternative would require five year reviews and periodic monitoring to assure the long term effectiveness of these remedies.

Alternative 4: *In Situ* Bioreclamation, would offer a lesser degree of permanence in the reduction of risk associated with the ground water. The technology has been implemented at other Sites but there would be uncertainties related to design and degree of contaminant

reduction. Because of the length of time for remediation, remedial actions conducted under this alternative would require five year reviews and periodic monitoring to assure the long term effectiveness of these remedies. An advantage that this alternative would offer is the ability to treat residual ground water contaminants that could not be pumped to the surface for treatment under alternatives 2 or 3.

Reduction of Toxicity, Mobility and Volume

Alternative 3: Fixed Film Bioreactor, would provide a reduction in toxicity, mobility and volume of contaminants in ground water through treatment. This alternative degrades ground water contaminants that are extracted by approximately 95%. This alternative is ranked higher than Alternative 2 even though it has a slightly lower per cent reduction in concentrations, because this technology offers direct destruction of contaminants while Alternative 2 only transfers contaminants from one medium (ground water) to another (carbon). The contaminant breakdown under Alternative 3 is irreversible and treatment residuals would be land disposed onsite. This alternative meets the preference for treatment.

Alternative 2: Carbon Treatment, would transfer contaminants from the ground water to activated carbon which must be regenerated at regular intervals either onsite or offsite. This alternative would meet the preference for treatment, with approximately 99% contaminant removal. The initial carbon treatment process is not irreversible, but the subsequent carbon regeneration would be. This alternative ranks ahead of Alternative 4.

Alternative 4: *In Situ* Bioreclamation, would provide for treatment of contaminated ground water to remove residual contamination in the aquifer. This alternative may not adequately degrade contaminants by itself to remediation levels. An advantage of this alternative is that no treatment residuals would be generated. This alternative results in irreversible degradation and meets the preference for treatment.

Short Term Effectiveness

Alternative 4: *In Situ* Bioreclamation, would take about 10 years to reach remediation levels in the ground water. Construction workers health risks associated with this alternative would be minimal, less than 1×10^{-5}. The principal hazard might be working with concentrated hydrogen peroxide, if that compound is selected to provide the oxygen enrichment source. Community risks would be very low during implementation of this alternative. Any potential risks presented by construction activities could be controlled or eliminated by proper construction and health and safety practices. Due to the length of treatment time and minimal risks this alternative ranks highest in short term effectiveness.

Alternative 3: Fixed Film Bioreactor, would take about 10 to 15 years to reach remediation levels in the ground water. Construction workers health risks would be less than 1×10^{-5}, with risks related to well installation, bioreactor operation and treatment residual disposal. Any potential risks presented by construction activities could be controlled or eliminated by proper construction and health and safety practices. This alternative ranks

ahead of Alternative 2.

Alternative 2: Carbon Treatment, would take about 10 to 15 years to reach remediation levels in the ground water. Construction workers health risks associated with this alternative would be less than 1×10^{-5}. However, there would be additional risks incurred during regeneration of carbon, relating to either transportation or thermal regeneration. Any potential risks presented by construction activities could be controlled or eliminated by proper construction and health and safety practices.

Implementability

Alternative 2: Carbon Treatment, would require preconstructed units that could be installed very quickly. Since Carbon Treatment is well established and proven, it would be easy to implement and operate this type of system. Monitoring the effectiveness of the system would be easily accomplished. Possible delays related to biofouling and to discharges to the POTW or to surface water could occur under this alternative. Equipment for this technology is readily available. There would be a need to coordinate with the local government for discharges to POTW. This alternative would be the most easily implemented.

Alternative 3: Fixed Film Bioreactor, would require pilot testing; however, modular treatment units are commercially available for full scale use. This alternative would require specifically designed units that could be developed locally. Since Alternative 3 is relatively well proven, it would be easy to implement and operate. Possible delays would relate to operational testing and the ability of the system design to handle the volume of ground water for treatment. Other delays might relate to discharges to the POTW or to surface water. There would be a need to coordinate with the local government for discharges to a POTW. This alternative is more implementable than Alternative 4.

Alternative 4: *In Situ* Bioreclamation, would require no special equipment for implementation although the design of the system may require pilot testing. There have been successful demonstrations of the *in situ* system, and this alternative has been implemented in the state. System design would need to accommodate hydrogen peroxide if that compound is selected for the oxygen enrichment source. Another operational delay might be the ability of introducing oxygen and nutrient enrichment compounds to ground water zones of contamination. Additional remedial action would be easily accomplished either by expanding the network or by initiating a pump and treat technology. Monitoring effectiveness would be relatively easy. This alternative may require out of state assistance in proper startup and operation. No coordination with local government would be required.

Cost

The total 30 year present worth cost for each ground water alternative is estimated below:

Alternative 1, No Action

- $45,000 (annually)

Alternative 2, Carbon Treatment

- $4,400,000

Alternative 3, Fixed Film Bioreactor

- $2,500,000

Alternative 4, *In Situ* Bioreclamation

- $1,800,000

State Acceptance

The State of Montana has been the lead agency for the development of this ROD and has selected the remedy contained herein. EPA has participated in the remedial process as the support agency and has concurred with the remedy selection.

Community Acceptance

Public comment on the Remedial Investigation, Feasibility Study and Proposed Plan was solicited during formal public comment periods extending from April 1, 1992 until June 16, 1992. Comments received from the community indicate no opposition to the preferred remedy with the exception of a late comment expressing opposition to the remedy and support for the remedy proposed by IPC. Additionally, at least one person and the local government requested that the cleanup be expedited if possible. The City of Bozeman expressed concern about possible discharges to the publicly owned treatment works. Response to the community comments are found in the Responsiveness Summary.

During the public comment period, MDHES and EPA received extensive comments from two potentially responsible parties that have been identified for the Site. The PRP comments object to the RI procedures, the Baseline Risk Assessment development and the FS as well as the preferred remedy. As part of the written comments, the Idaho Pole Company submitted their proposed remedy consisting primarily of *in situ* biological treatment of soils and ground water. Potentially Responsible Party comments with MDHES and EPA responses are also found in the Responsiveness Summary.

IX. SELECTED REMEDY

Based upon consideration of CERCLA requirements, the detailed analysis of alternatives, and public comments, MDHES and EPA have determined that a combination of Soil Alternatives 4 (Excavation and Biological Treatment) and 6 (Soil Flushing and *In Situ* Biological

Treatment) and Ground Water Alternatives 3 (Pump and Biological Treatment) and 4 (*In Situ* Biological Treatment) is the most appropriate remedy for the Site. No single soil or ground water alternative will provide complete remediation of soils or ground water over the entire Site. It is necessary to combine several alternatives to achieve site wide cleanup.

Remedy for Soils and Sediments

Two soil alternatives have been selected to address the physical features of the Site. In recognition of cost and the fact that the IPC pole plant is currently operating, MDHES and EPA believe that Soil Flushing and *In Situ* Soil Biological Treatment (Alternative 6), under treating plant structures and under I-90 is appropriate. Excavation and Biological Treatment (Alternative 4) has been selected as the remedy for soils that are accessible and will afford a greater opportunity to achieve cleanup levels. The solid phase biological treatment option in Alternative 4 has been selected over slurry phase bioremediation because of more proven implementation at hazardous waste sites.

Alternative 6 is the only soil alternative evaluated that can be implemented in the active plant area without requiring demolition of the existing structures and excavation of contaminated soils and that provides a reduction in toxicity and mobility through treatment. Although Alternative 6 is not as effective as a stand-alone remedy at meeting some of the selection criteria as some of the other remedies, it will allow continued operation of the plant and will reduce exposure risks to within the acceptable range. Surface Capping, Alternative 2, does not provide reduction in toxicity or volume and was eliminated from consideration for application in the plant area.

Remediation of soils under I-90 without replacement of the highway can only be accomplished by Alternative 6, Soil Flushing and *In Situ* Biological Treatment. MDHES and EPA have determined that replacement of I-90 is not practicable for this remedial action, therefore soil treatment must take place without excavation.

Alternative 4, Excavation and Solid Phase Biological Treatment, will be implemented to remediate all other areas. This alternative has been selected because it best meets the selection criteria. Solid phase biological treatment is a proven remediation technology that has met community acceptance at other sites, and is relatively inexpensive. In addition, biological treatment in a surface land treatment unit is readily implementable and converts contaminants to non-toxic compounds.

As discussed above, each of the soil alternatives will be implemented in separate areas of the Site, generally determined by accessibility to contaminated soils or sediments. The following summarizes the alternatives and implementation areas:

- Soils Alternative 4 (Excavation and Solid Phase Biological Treatment) will be implemented in the pole plant soils between Cedar Street and I-90, round house area soils, the pasture north of I-90 and ditch sediments (or bottom

soils) from the Cedar Street and substation ditches.

- Soil Alternative 6 (Soil Flushing and *In Situ* Biological Treatment) will be implemented under and around the pole plant treatment facility south of Cedar Street and under I-90.

- Institutional controls will be implemented to protect closed land treatment units.

Contaminated soil will be excavated and will be stored in a waste pile constructed in accordance with RCRA Subtitle C requirements. The soil will then be pretreated with an oil/solids separator to remove the oily wood treating fluid. The recovered oily wood treating fluid and material removed by the oil/water separator will be recycled if substantive FIFRA requirements are met or disposed of offsite in accordance with RCRA and other applicable requirements. The soil will then be treated biologically in a surface land treatment unit to reduce the concentrations of the contaminants of concern in the soil.

The LTU for the soils will cover approximately four acres. Excavated soil will be placed in the unit in layers up to one foot deep and will be routinely plowed and irrigated. Areas where soil is excavated will be back-filled with clean soil to eliminate any potential hazard associated with the open excavations.

Before additional layers of soil are added to the LTU, soil remediation levels will have to be achieved. When all of the contaminated soil has been applied to the LTU and treatment is complete, the unit will be closed by capping in accordance with RCRA Subtitle C requirements.

Soil in inaccessible locations such as under buildings and I-90 contaminated with oily wood treating fluid will be left in place and flushed with hot water or steam. The flushed water, associated contaminants and flushed oily wood treating fluid will be collected in a series of trenches on both sides of I-90. The oily wood treating fluid will be skimmed from the water and will be recycled if substantive FIFRA requirements are met or disposed of offsite in accordance with RCRA and other applicable requirements. The water will be treated with ground water under Ground Water Alternative 3. *In situ* biological degradation of soil contaminants will then be enhanced by addition of oxygen and nutrient sources to the soils.

<u>Remedy for Ground Water</u>

Two ground water alternatives have been selected in order to conduct a complementary cleanup. In order to provide the most effective ground water cleanup, *in situ* bioremediation was selected to complement the pump and treatment process. Biological pump and treat was selected over carbon adsorption because it costs much less to implement and it more fully satisfies the preference for treatment and reduction in mobility, toxicity and volume, since contaminants are degraded rather than transferred to another medium.

The ground water alternatives will be conducted in concert with each other generally in and around the oily wood treating fluid plume.

- Ground Water Alternative 3 (Pump and Biological Treatment) will be implemented within the boundaries of the oily wood treating fluid plume.

- Ground Water Alternative 4 (*In Situ* Biological Treatment) will be implemented along the boundaries of the oily wood treating fluid plume and downgradient within the ground water plume.

- Institutional controls will be implemented to prevent access to contaminated ground water.

Contaminated ground water will be extracted by wells located along the axis or centerline of the contaminated plume and will be sent to an oil/water separator-clarifier/filtration plant. Suspended solids will be removed from the water in the clarifier/filtration plant. Solids removed during this phase of the ground water treatment process will be treated in the LTU developed under Soil Alternative 4. Extracted ground water will then be treated in the fixed film bioreactor described in Ground Water Alternative 3. The extraction and reinjection system will be designed to stimulate flushing of contaminants and to limit migration of contaminants.

In situ biological degradation of ground water will enhance the treatment of ground water and soil beneath the water table in the pasture area north of I-90 by adding oxygen and nutrients to the subsurface environment. The oxygen will be delivered to the subsurface in a manner determined during remedial design. Nutrients will be carried to the subsurface in water that has been extracted from the aquifer and treated in a bioreactor on the surface to remove contaminants.

If design and implementation of the ground water treatment prove to require a discharge of water other than reinjection, then additional treatment such as carbon polishing may be necessary to meet pretreatment standards prior to discharging to a publicly owned treatment works or to meet surface water quality standards and nondegradation standards prior to discharge to surface water.

Sludge composed of exhausted microbes from the bioreactor will be captured in a bag filter and applied to the LTU developed under Soil Alternative 4 for treatment.

Additionally, throughout the cleanup of the Site, ground water monitoring will be conducted to evaluate cleanup efficiency and potential contaminant release. As part of the monitoring program, residential wells in the potentially impacted neighborhood will be sampled not less than quarterly for contaminants of concern. Residential wells exhibiting concentrations exceeding MCLs or risk based cleanup levels shall have an in-home carbon/reverse osmosis treatment system installed, operated and maintained until cleanup levels in ground water are achieved.

Estimated Costs of the Remedy

The estimated cost summary for this combination of alternatives is presented in Table 18. Costs for Soil Alternatives 4 and 6, and Ground Water Alternatives 3 and 6 are less than those presented in Sections VII and VIII of this document, because these alternatives will address smaller areas and volumes than was assumed in Sections VII and VIII. Soil Alternative 4, Excavation and Biological Treatment will address 19,000 cubic yards and Soil Alternative 6, Soil Flushing/*In Situ* Biological Treatment will address 23,000 cubic yards. Ground Water Alternative 3 will address up to 1.0 billion gallons and Ground Water Alternative 4 will address up to 210 million gallons. The selected remedy cleanup areas are depicted in Figure 16.

The selected remedy may change as a result of engineering processes during remedial design. Furthermore, specific design and startup testing will be necessary to fully evaluate the selected remedy.

Performance Standards for Soils and Sediments

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 and through development of preliminary remediation goals.

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

- Excavation of all soil and sediments at the Site with contaminant levels exceeding concentrations identified in Table 13; the exception being those inaccessible soils under the pole plant structures and I-90;

- Recovery of oily wood treating fluid from excavated soils or from flushed soils to a level that is technically practicable as determined by MDHES and EPA, and recycling to active pole plant operations, or offsite disposal in accordance with RCRA and other applicable requirements if the oily wood treating fluid does not meet substantive FIFRA requirements;

- Treatment of all excavated soils and sediments in land treatment units onsite to cleanup levels identified in Table 13;

- Placement of clean fill in all excavated areas;

- Closure of the land treatment units in accordance with RCRA Subtitle C requirements;

- Implementation of engineering and institutional controls to prevent access, to limit

the spread of contamination and to protect the integrity of the treatment units;

- Flushing of the inaccessible soils under the pole plant structures and I-90 for a minimum period of one year or until oily wood treating fluid is no longer recovered and contaminant levels have plateaued; and

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

Sampling will be performed during the response action to verify that all media contaminated above the cleanup levels are treated. Additional contaminated media will be moved to the treatment areas prior to the completion of land treatment, as necessary, until attainment of soils cleanup levels and protectiveness are ensured. The sampling program shall be developed during remedial design.

Performance Standards for Ground Water

Remediation goals for ground water include the restoration of contaminated ground water to its potential future uses, protection of uncontaminated ground water by minimizing migration of contaminants with the ground water, and ensuring that the level of contaminants remaining in the ground water poses no unacceptable risk to human health or the environment. Since the current and future use of the ground water aquifer is for domestic use, cleanup levels for ground water are either promulgated or proposed MCLs established by the Safe Drinking Water Act. Attainment of these cleanup levels will be protective of human health and the environment and will restore the ground water to potential beneficial uses.

The specific performance standards which will be used to ensure attainment of the remediation goals for ground water are:

- Reduction of contaminant levels in ground water within the attainment area to cleanup levels identified in Table 13; the attainment area is the contaminated ground water aquifer bounded by Rocky Creek, Bozeman Creek and I-90;

- Extraction of ground water at the Site with contaminant concentrations exceeding the cleanup levels in Table 13;

- Treatment of extracted ground water to cleanup levels in Table 13;

- Reinjection of treated and nutrient enhanced ground water to the contaminated ground water aquifer to stimulate *in situ* biological degradation of contaminants to the cleanup levels in Table 13; and, if necessary, discharge to the publicly owned treatment works or to surface water, in accordance with the applicable discharge requirements;

- Evaluation of monitoring well 17 abandonment procedures and, if necessary, reabandonment;

TABLE 18
ESTIMATED COSTS FOR THE SELECTED REMEDY

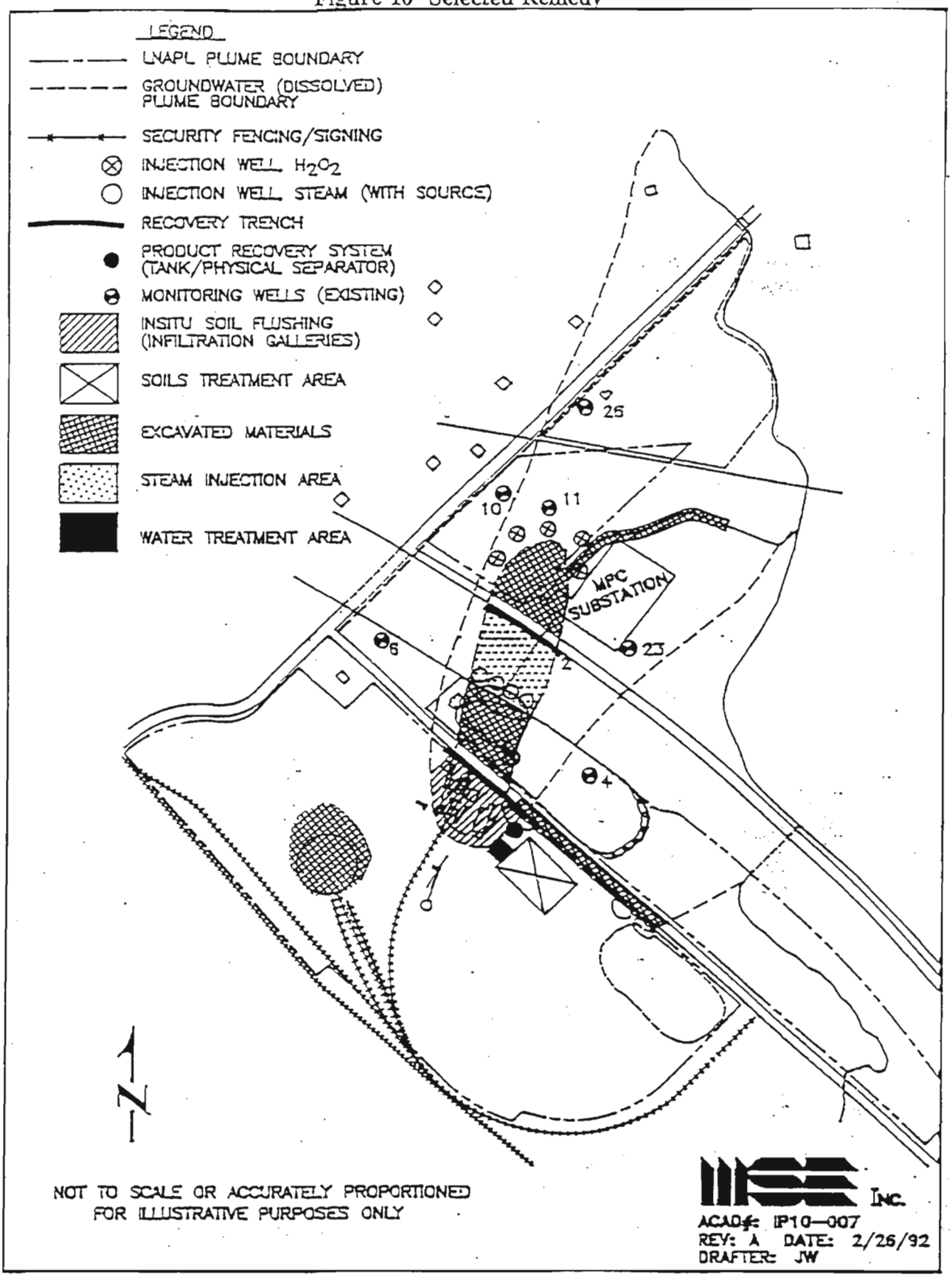
Soils/Sediments

Alternative 4, Excavation and Biological Treatment (Roundhouse area)	
Capital cost	$107,562
Present worth, Pre-closure (1 year at 10%)	13,550
Present worth, Closure (1 years at 10%)	3,685
Present worth, Operation & Maintenance (30 years at 10%)	68,439
TOTAL PRESENT WORTH COST	193,236
Alternative 4, Excavation and Biological Treatment (Treatment plant and pasture)	
Capital cost	$798,036
Present worth, Pre-closure (2 years at 10%)	20,210
Present worth, Closure (2 years at 10%)	24,454
Present worth, Operation & Maintenance (30 years at 10%)	58,070
TOTAL PRESENT WORTH COST	900,770
Alternative 6, Soil Flushing and *In Situ* Biological Treatment	
Capital cost	5,483,950
Present worth, Pre-closure Operation & Maintenance (10 years at 10%)	435,364
Present worth, Closure (single payment in 10 years at 10%)	6,636
Present worth, Operation & Maintenance (30 years at 10%)	58,070
TOTAL PRESENT WORTH COST	5,984,020

Ground water

Alternative 3, Pump & Biological Treatment	
Capital Cost	1,169,025
Present Worth, Operation & Maintenance (2 years at 10%)	398,304
TOTAL PRESENT WORTH COST	1,567,329
Alternative 4, *In Situ* Biological Treatment	
Capital Cost	83,700
Operation & Maintenance (10 years at 10%)	345,907
TOTAL PRESENT WORTH COST	429,607
TOTAL ESTIMATED COSTS	$ 9,074,962

Figure 16 Selected Remedy



AREA #1, SCENARIO #2
INTEGRATED REMEDIATION CONCEPTUAL PLAN VIEW

- Attainment of all other ARARs identified in Appendix A for ground water remediation;

- Monitoring of residential wells within or proximate to the contaminated ground water plume for contaminants of concern for ground water; residential wells will be monitored not less than every three months until attainment of ground water cleanup levels in the aquifer and in the wells has been achieved;

- Implementation of institutional controls to prevent access to contaminated ground water and to prevent spreading of the plume; and

- Installation, operation and maintenance of carbon/reverse osmosis treatment system for all residential wells that have ground water contaminant concentrations exceeding cleanup levels in Table 13.

Ground water sampling will be performed during the response action to verify that contaminated ground water above the cleanup levels is treated. Ground water will be extracted, treated and reinjected until cleanup levels are attained. If, during operation of the ground water remediation system, contaminant levels cease to decline and remain constant at concentrations higher that the cleanup levels, the remedy will be reevaluated.

Compliance Sampling Program

A sampling program for monitoring the remedial action and determining compliance with the performance standards shall be implemented during the remedial action. In addition, to ensure that ground water performance standards are maintained, it is expected that ground water will be monitored at least twice annually during the ground water seasonal high and low for a period of at least three years following discontinuation of ground water 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 proposed MCLs), 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.

Because the soils cleanup levels established in this Record of Decision are health based standards for industrial 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 10-15 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.

Continued monitoring of the treated materials remaining in the land treatment units will be necessary until cleanup levels are attained.

Points of Compliance

Compliance with remediation levels for excavated soils and sediments must be achieved at any point on the Site with the exception of under the plant and under I-90. Soils under the plant facility and under I-90 must meet the performance standards. For ground water, compliance with remediation levels must be achieved throughout the contaminated ground water plume, located downgradient of I-90, extending to Rocky Creek. Additionally, runoff that may be the result of ground water recharge, precipitation or snow melt, or release of noncontact cooling water from the pole plant will meet the surface water standards as identified in Appendix A, ARARs, where the release enters the surface waters. Surface water not meeting those standards will be treated with ground water under Ground Water Alternative 3.

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 ensure that risks do not reach unacceptable levels. 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. Institutional controls will include the prevention of domestic or commercial water well drilling in the contaminated ground water plume area to prevent additional receptors of contaminated ground water or an expansion of the plume. Land use and deed restrictions for the closed land treatment units will also be implemented to preserve the integrity of the closed land treatment units.

Ground Water Uncertainty and Restoring Ground Water to Beneficial Uses

The goal of this remedial action is to restore the ground water to its beneficial use, which is as an actual drinking water source. Based on information obtained during the RI and upon careful analysis of all remedial alternatives, MDHES and EPA believe the remedy will achieve this goal. It may become apparent, during implementation or operation of the ground water extraction and *in situ* bioremediation system, that contamination levels have ceased to decline and are remaining constant at levels higher than the remediation goals over some portion of the contaminated plume. In such a case, the remedy may need to be reevaluated.

The selected remedy will include ground water extraction and *in situ* bioremediation for an estimated period of 10-15 years, during which the system's performance will be carefully monitored on a regular basis and adjusted as warranted by the performance data collected during operation. Modifications may include any or all of the following:

- At individual wells where cleanup goals have been attained, pumping may be discontinued;
- Alternating pumping at wells to eliminate stagnation points;
- Pulse pumping to allow aquifer equilibration and to allow adsorbed contaminants to partition into ground water; and
- Installation of additional extraction wells to facilitate or accelerate cleanup of the contaminant plume.

Finally, if active IPC pole treating operations cease at the Site, MDHES and EPA may reevaluate the remedy concerning soils located under treatment facility structures.

X. STATUTORY DETERMINATIONS

Under CERCLA section 121, MDHES and EPA must select a remedy that is protective of human health and the environment, complies with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), is cost-effective, and utilizes permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment

The selected remedy protects human health and the environment through a combination of soil and ground water alternatives. Soil alternatives include excavation and biological treatment of contaminated soil and soil flushing with *in situ* biological treatment under pole plant structures and I-90. Excavated areas will include portions of the pole plant, the pasture and two ditches. Contaminated soils and sediments will be replaced by clean fill prior to completion of the cleanup. Soil flushing with *in situ* biological treatment will be used in those areas where excavation is not practicable or not cost effective in order to capture as much of the mobile contamination as possible and to reduce concentrations of contaminants in those areas to levels that will be more susceptible to biological treatment.

Implementation of the soil flushing alternative in the active plant area around existing structures and under I-90 will eliminate the need for demolition of structures and relocation/excavation of the interstate highway and will reduce the exposure risk in those areas to within the acceptable range. The other soils alternatives evaluated were not implementable in the plant area and under I-90 without removing structures and the roadbed.

Biological treatment of the contaminated soil will eliminate the threat of exposure through

direct contact with or ingestion of contaminated soil. The current cancer risks associated with these exposure pathways are as high as 1.8×10^{-4}. By excavating the contaminated soils and treating them, the cancer risks from exposure will be reduced to less than 1×10^{-6} industrial use (1×10^{-5} residential use) which is within the EPA's acceptable risk range of 1×10^{-4} to 1×10^{-6} as specified by the NCP. By closing the land treatment unit according to RCRA standards, the risks of exposure through direct contact will be further reduced. There are no short term threats associated with the selected remedy that cannot be readily controlled. In addition, no adverse cross-media impacts are expected from the remedy.

Pumping the ground water and treating it biologically will reduce the threat of exposure to contaminated ground water. Further reduction in risk will occur through *in situ* biological treatment of ground water. The current risks associated with ground water are as high as 9.0×10^{-3} depending upon the exposure pathway and contaminant. By treating the ground water and using it for *in situ* reinjection or discharging it to a publicly owned treatment works or to surface water, the cancer risks from exposure will be reduced to less than 5.5×10^{-5} for residential use, which is within the EPA acceptable risk range. There are no short term threats associated with the selected remedy that cannot be readily controlled. In addition, no adverse cross media impacts are expected from the remedy.

A variety of engineering and institutional controls will be implemented with the remedy to ensure protectiveness while the remedy is being implemented. Residential wells in the area will be sampled on a routine basis for contaminants. Any residences with levels exceeding MCLs in drinking water will have individual treatment at the tap. Institutional controls will be implemented to prohibit additional placement of wells in the affected area in order to prevent additional receptors of contaminated ground water and to prevent an expansion of the plume. Fencing and posting during remediation will be used to prevent unauthorized access to contaminated media, and land use and deed restrictions will be used to preserve the long term integrity of the closed land treatment units.

Compliance with Applicable or Relevant and Appropriate Requirements

The final determination of ARARs by MDHES and EPA is set forth in Appendix A attached to this Record of Decision. The selected remedy will comply with all applicable or relevant and appropriate requirements (ARARs). No waiver of ARARs is expected to be necessary.

Contaminant-specific ARARs

Contaminant-specific ARARs typically set levels or concentrations of chemicals that may be found in or discharged to the environment. The primary contaminant-specific ARARs for this remedy are the maximum contaminant levels (MCLs) for ground water under the Safe Drinking Water Act. While there are no currently effective MCLs for the contaminants of concern at the Site, an MCL has been promulgated for pentachlorophenol and will become effective January 1, 1993. Similarly, MCLs for benzo(a)pyrene and 2, 3, 7, 8 - TCDD (dioxin) have been promulgated and will become effective January 17, 1994. The selected

remedy will remediate existing ground water contamination to achieve these relevant and appropriate MCLs. The selected remedy will also reduce levels of certain other contaminants of concern to MCLs which have been proposed but not yet adopted. The proposed MCLs have been identified as TBCs by EPA and MDHES.

Since no treatment standards have been set for the RCRA listed wastes on site (F032 and F034 wastes) as of the date of this Record of Decision, RCRA Land Disposal Restrictions will not apply to the remedy.

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. The area in which the treatment is to be implemented is not located within a 100-year floodplain, and no planned waste storage or treatment area is located within 200 feet of a fault. Thus the selected remedy will comply with all requirements based on physical or geographic setting.

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 a small wetland area. Consultation with the U.S. Fish and Wildlife Service during the design and implementation phase will be required to establish appropriate mitigative measures, such as reestablishing these wetlands as part of the reclamation of excavated areas. Also in connection with EPA's consultation with the U.S. Fish and Wildlife Service regarding the Endangered Species Act, the U.S. Fish and Wildlife Service has requested that additional biological assessments regarding certain endangered species (peregrine falcons, and bald eagles) be conducted in conjunction with remedial design.

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, closure and post-closure standards, requirements for management of waste piles and land treatment units, recycling requirements, and transportation requirements, if any hazardous waste is ultimately shipped offsite for treatment or disposal, as well as all requirements for reclamation of excavated areas

The remedy will also satisfy regulations under the Federal Insecticide Fungicide and Rodenticide Act which establish allowable limits of certain constituents in pentachlorophenol

products used in wood treating operations. Product which exceeds these limits must be appropriately disposed of by a method other than recycling.

For any discharge to a POTW the remedy will comply with requirements, including the pretreatment requirements under the Clean Water Act and the permit-by-rule requirements under RCRA. Compliance with the standards for discharges to POTWs would require fulfilling the administrative, as well as the substantive portions of those requirements, since any such discharge would occur offsite.

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 run-on and run-off controls that prevent any discharge of contaminants from remedial actions that would violate surface water standards, sufficient treatment before reinjection of ground water to ensure compliance with ground water 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.

The FS Report provides further support for the determination that the selected remedy complies with ARARs.

Cost-Effectiveness

MDHES and EPA have determined that the selected remedy is cost-effective in mitigating the principal risks posed by the soils, sediments and contaminated ground water. Section 300.430(f)(ii)(D) of the NCP requires evaluation of cost-effectiveness. Cost-effectiveness is determined by the following three balancing criteria to determine overall effectiveness: long-term effectiveness and permanence; reduction of toxicity, mobility or volume through treatment; and short-term effectiveness. Overall effectiveness is then compared to cost to ensure that the remedy is cost-effective. A remedy is cost-effective if its costs are proportional to its overall effectiveness. The selected remedy meets the criteria and provides for overall effectiveness in proportion to its cost. The estimated cost for the selected remedy is approximately $9,074,962

The selected remedy for the soils provides the best overall effectiveness of all alternatives considered proportional to its cost. The selected remedy will greatly reduce the toxicity, mobility, and volume of contaminated soils. Also the implementation of this remedy will result in long-term effectiveness by reducing residual carcinogenic risks to within the acceptable risk range through permanent treatment. Although *in situ* bioremediation, if implemented by itself, is less expensive than the combination of soil alternatives comprising the selected remedy, it does not provide as great a degree of long-term effectiveness or reduction in toxicity, mobility or volume through treatment and therefore is only appropriate for use in specific areas of the Site.

Alternative 6, soil flushing and *in situ* bioremediation is the only soil remedy identified that will not require demolition of existing structures at the IPC plant and will not require excavation of I-90. Thus, the costs of Alternative 6 for these parts of the Site are much less than other alternatives, while still maintaining effectiveness.

The selected remedy for ground water provides the best overall effectiveness of all alternatives considered proportional to its cost. The combination of Alternatives 3, Pump and Biological Treatment, and 4, *In Situ* Biological Treatment, will reduce the toxicity, mobility or volume of affected ground water and will be permanent solutions. The combination of Alternative 2 and Alternative 4 might achieve cleanup levels more quickly, but the additional cost of Alternative 2 compared to Alternative 3 is not warranted. The combination of Alternatives 3 and 4 is believed necessary in order to reach MCLs because pump and treat methods without an *in situ* component require longer remediation times.

The selected remedy assures a high degree of certainty that the remedy will be effective in the long-term because of the significant reduction of the toxicity and mobility of the wastes achieved through biological treatment of the soil. The ground water component of the remedy ensures a high degree of certainty of effectiveness because the technology employed is known to be effective for organic contaminated wastewaters and will enhance the degradation of contaminants remaining *in situ*.

Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable

MDHES and EPA have determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner at the Site. Of those alternatives that are protective of human health and the environment and comply with ARARs, MDHES and EPA have determined that this selected remedy provides the best balance of trade-offs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, or volume achieved through treatment, short-term effectiveness, implementability and cost, while also considering the statutory preference for treatment as a principal element and considering state and community acceptance. The detailed evaluation of the balance of these criteria among the alternatives considered is set forth in the FS Report and is summarized in section VII, Description of Alternatives, of this record of decision.

The selected remedy includes treatment of contaminated media which will permanently and significantly reduce the principal threats posed by the soils and ground water. The other alternatives considered which could achieve similar or more substantial reductions, including incineration, solvent extraction or offsite disposal, were significantly more expensive. Other alternatives considered, including *in situ* biological treatment over the entire Site, did not offer similar prospects for effectiveness in treatment.

Preference for Treatment as a Principal Element

By biologically treating the contaminated ground water and the contaminated soils, the selected remedy addresses the principal threats posed by the Site through the use of treatment technologies. By utilizing treatment as a significant portion of the remedy, the statutory preference for remedies that employ treatment as a principal element is satisfied.

XI. DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for the Site was released for public comment April 16, 1992. The plan identified a combination of Soil Alternatives (4, Excavation and Biological Treatment and 6, Soil Flushing/*In Situ* Biological Treatment) and Ground Water Alternatives (3, Extraction and Biological Treatment and 4, *In situ* Biological Treatment) as the preferred remedy for the Site.

MDHES and EPA have reviewed all written and oral comments submitted during the public comment period. Upon review of the public comments, MDHES and EPA have determined that two changes to the Proposed Plan are warranted.

First, MDHES and EPA are considering the possibility of discharging treated wastewater from the Site into surface water if reinjection into the aquifer or discharge to a POTW are not feasible. This change is the result of strong objections by the City of Bozeman to any discharge of treated wastewater to the POTW.

Second, the roundhouse area soils have been identified as a significantly contaminated and have been included for remedial action. However, due to recent regulatory changes this conclusion may be subject to change. The rationale for this is that since preparation of the Proposed Plan, the cancer slope factor for benzo(a)pyrene, upon which the B2 PAH cleanup level of 7.5 mg/kg is based, has been reduced from 11.5 to 5.79 $(mg/kg/day)^{-1}$. Therefore, an adjusted cleanup level of 15 mg/kg B2 PAHs has been identified by MDHES as representative of the 1×10^{-6} risk level for industrial use. The currently determined highest concentrations of B2 PAHs at test pit 3B (25 mg/kg) and at test pit 7A (32 mg/kg) are much closer to the adjusted cleanup level than they were to the initial cleanup level. Also, the revised cleanup level reduced the number of data points above the cleanup level.

Consequently, the amount of contaminated soil in the roundhouse area that is subject to excavation and treatment may be significantly less than the earlier estimate of 4600 yd^3.

XII. REFERENCES

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APPENDIX A

FINAL DETERMINATION AND DESCRIPTION OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

IDAHO POLE NPL SITE
BOZEMAN, MONTANA

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LIST OF ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirements
ATSDR	Agency of Toxic Substances and Disease Registry
BAT	Best Available Technology Economically Achievable
BCT	Best Conventional Pollutant Control Technology
BPCTCA	Best Practicable Control Technology Currently Available
BPJ	Best Professional Judgment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
DNRC	Department of Natural Resources and Conservation (Montana)
DSL	Department of State Lands (Montana)
EPA	U.S. Environmental Protection Agency
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
HWM	Hazardous Waste Management
IPC	Idaho Pole Company
LNAPL	Light Non-aqueous Phase Liquid
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MDHES	Montana Department of Health and Environmental Sciences
MGWPCS	Montana Groundwater Pollution Control System
MPDES	Montana Pollutant Discharge Elimination System
NCP	National Contingency Plan
NESHAPS	National Emissions Standards for Hazardous Air Pollutants
NPL	National Priorities List
NPDES	National Pollutant Discharge Elimination System
PAH	Polynuclear Aromatic Hydrocarbon
PCP	Pentachlorophenol
POHC	Principal Organic Hazardous Constituents
POTW	Public Owned Treatment Works
PSD	Prevention of Significant Deterioration
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SHPO	State Historic Preservation Officer (Montana)
SIP	State Implementation Plan
TBC	To Be Considered
TU	Turbidity Unit
UIC	Underground Injection Control

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

ARARS FOR REMEDIAL ACTIONS

Section 121(d)(2) of CERCLA, 42 U.S.C. § 9621(d)(2), requires that cleanup actions conducted under CERCLA achieve a level or standard of control which at least attains "any standard, requirement, criteria or limitation under any Federal environmental law ... or any [more stringent] promulgated standard, requirement, criteria or limitation under a State environmental or facility siting law ... [which] is legally applicable to the hazardous substance concerned or is relevant and appropriate under the circumstances of the release of such hazardous substance or pollutant, or contaminant ..." The standards, requirements, criteria or limitations identified pursuant to this section are commonly referred to as "applicable or relevant and appropriate requirements," or ARARs.

The cleanup of the Idaho Pole NPL site must comply with or attain all ARARs unless specific ARAR waivers are invoked. See CERCLA § 121(d)(4), 42 U.S.C. § 9621(d)(4), and the NCP, 40 CFR 300.430(f)(1)(ii)(C). ARARs must be met both during the conduct of on site cleanup activities and at the conclusion of the cleanup activity, unless specifically exempted.[1]

DETERMINATION OF ARARS

ARARs may be either "applicable" requirements or "relevant and appropriate" requirements. Compliance with both is equally mandatory under CERCLA.[2]

Applicable requirements are those standards, requirements, criteria or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site.

Relevant and appropriate requirements are those standards, requirements, criteria or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not "applicable" to hazardous substances, pollutants, contaminants, remedial actions, locations, or other circumstances at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Factors which may be considered in making this determination, when the factors are pertinent, are presented in 40 C.F.R. § 300.400(g)(2). They include, among other considerations, examination of: the purpose of the requirement and the purpose of the CERCLA action; the medium and substances regulated by the requirement and the medium

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1 40 CFR § 300.435(b)(2); Preamble to the Proposed NCP, 53 Fed. Reg. 51440 (December 21, 1988); Preamble to the Final NCP, 55 Fed. Reg. 8755-8757 (March 8, 1990).

2 See CERCLA § 121(d)(2)(A), 42 U.S.C. § 9621(d)(2)(A).

and substances at the CERCLA site; the actions or activities regulated by the requirement and the remedial action contemplated at the site; and the potential use of resources affected by the requirement and the use or potential use of the affected resource at the CERCLA site.

ARARs are divided into contaminant-specific, location-specific and action-specific requirements. Contaminant-specific requirements govern the release to the environment of materials possessing certain chemical or physical characteristics or containing specific chemical compounds. Contaminant-specific ARARs generally set human or environmental risk-based criteria and protocols which, when applied to site-specific conditions, result in the establishment of numerical action values. These values establish the acceptable amount or concentration of a chemical that may be found in, or discharged to, the ambient environment.

Location-specific ARARs relate to the geographic or physical position of the site, rather than to the nature of site contaminants. These ARARs place restrictions on the concentration of hazardous substances or the conduct of cleanup activities due to their location in the environment.

Action-specific ARARs are usually technology- or activity-based requirements, or are limitations on actions taken with respect to hazardous substances. A particular remedial activity will trigger an action-specific ARAR. Unlike chemical-specific and location-specific ARARs, action-specific ARARs do not, in themselves, determine the remedial alternative. Rather, action-specific ARARs indicate how the selected remedy must be achieved.

On-site actions are required to comply with ARARs, but need comply only with the substantive provisions of a requirement.[3] Off-site actions need comply only with legally applicable requirements, but must comply fully with both the substantive and administrative portions of such requirements. See EPA OSWER Dir. 9234.2-02FS. Administrative requirements are those which involve consultation, issuance of permits, documentation, reporting, recordkeeping, and enforcement. The CERCLA program has its own set of administrative procedures which assure proper implementation of CERCLA. The application of additional or conflicting administrative requirements could result in delay or confusion.[4] Provisions of statutes or regulations which contain general goals that merely express legislative intent about desired outcomes or conditions but are non-binding are not ARARs.[5]

Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be applicable or relevant and appropriate. To be an ARAR, a state

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3 40 CFR § 300.5 (Definitions of "Applicable requirements" and "Relevant and appropriate requirements.") See also Preamble to the Final NCP, 55 Fed. Reg. 8756-8757 (March 8, 1990).

4 Preamble to the Final NCP, 55 Fed. Reg. 8756-8757 (March 8, 1990); Compliance with Other Laws Manual, Vol. I, pp. 1-11 through 1-12.

5 Preamble to the Final NCP, 55 Fed. Reg. 8746 (March 8, 1990).

standard must be "promulgated," which means that the standards are of general applicability and are legally enforceable.[6]

Additional documents may be identified as To Be Considered (TBCs). The TBC category consists of advisories, criteria, or guidance that were developed by EPA, other federal agencies, or states that may be useful in developing CERCLA remedies. These may be considered as appropriate in selecting and developing cleanup actions.[7]

Laws which are not environmental laws or state facility siting laws are not ARARS, but, if applicable, must be observed and complied with in any action at the site. CERCLA § 121 exempts any action conducted entirely on-site from any local, state or federal permit requirement, including any permit requirements of these other laws. However, all other applicable requirements of these other laws, including the administrative as well as the substantive requirements, apply to actions conducted at the site.

ARARS FOR THE IDAHO POLE NPL SITE

This document constitutes MDHES' and EPA's final determination and detailed descriptions of federal and state ARARs for remedial action at the Idaho Pole NPL site. The descriptions are provided to allow the user a reasonable understanding of the requirements without having to refer constantly back to the statute or regulation itself. However, in the event of any inconsistency between the law itself and the summaries provided in this document, the applicable or relevant and appropriate requirement is ultimately the requirement as set out in the law, rather than any paraphrase of the law provided here.

The ARARs analysis is based on section 121(d) of CERCLA, 42 U.S.C. § 9621(d); "CERCLA Compliance with Other Laws Manual, Volume I," OSWER Dir. 9234.1-01 (August 8, 1988); "CERCLA Compliance with Other Laws Manual, Volume II," OSWER Dir. 9234.1-02 (August, 1989); the Compendium of CERCLA ARARs Fact Sheets and Directives, OSWER Dir. 9347.3-15 (October 1991); the Preamble to the Proposed National Contingency Plan, 53 Fed. Reg. 51394, et. seq. (December 21, 1988); the Preamble to the Final National Contingency Plan, 55 Fed. Reg. 8666-8813 (March 8, 1990); and the Final National Contingency Plan, 40 C.F.R. Part 300 (55 Fed. Reg. 8813-8865, March 8, 1990) (hereinafter referred to as the NCP). All references to 40 C.F.R. Part 300 contained in this document refer to the final NCP, unless noted.

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6 40 C.F.R. § 300.400(g)(4).

7 40 C.F.R. § 300.400(g)(3); 40 C.F.R. § 300.415(i); Preamble to the Final NCP, 55 Fed. Reg. 8744-8746 (March 8, 1990).

FEDERAL ARARS

FEDERAL CONTAMINANT-SPECIFIC ARARS

Safe Drinking Water Act (Relevant and Appropriate)[8]

The National Primary and Secondary Drinking Water Standards (40 CFR Parts 141, 143), better known as "maximum contaminant levels" (MCLs), are not applicable to remedial activities at the site because the aquifer underlying the site does not serve a public water supply system. These drinking water standards are, however, relevant and appropriate to all groundwater alternatives because groundwater in the area is a domestic water source for off-site residences not connected to city water.

Ten residences located downgradient and within 1/2 mile of the site use groundwater for domestic, irrigation, and stock watering purposes. These wells are typically between 30 and 60 feet deep and are completed within transmissive sand and gravel seams. Pentachlorophenol, a contaminant of concern at the site, has been repeatedly identified in one of these wells. There are approximately 400 other wells within a 2-mile radius of the site.

The determination that the drinking water standards are relevant and appropriate at the site is fully supported by EPA regulations. The Preamble to the National Contingency Plan (NCP) clearly states MCLs are relevant and appropriate for groundwater that is a current or potential source of drinking water, 55 Fed. Reg. 8750 (March 8, 1990), and this determination is further supported by requirements in the RI/FS section of the NCP, 40 CFR § 300.430(e)(2)(i)(B). In addition to the MCLs, non-zero maximum contaminant level goals (MCLGs)[9] for any contaminants at the site would be relevant and appropriate for remedial actions that will be considered for this site. See 55 Fed. Reg. 8750-8752 (March 8, 1990). None of the contaminants for which MCLs and MCLGs are currently in effect have been identified as contaminants of concern at the Idaho Pole site. Relevant proposed MCLs are discussed in the federal standards "To Be Considered" (TBCs), Section 3.4, below.

An EPA rulemaking establishing an MCL for pentachlorophenol at 0.001 mg/l has been promulgated. The new MCL will be effective January 1, 1993. See 56 Fed. Reg. 30280 (July 1, 1991), to be codified at 40 CFR § 141.61. This MCL should be considered a

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[8] EPA has granted to the State of Montana primacy in enforcement of the Safe Drinking Water Act. Thus the law commonly enforced in Montana is the state law, rather than the federal law. The state regulations under the state Public Water Supply Act, §§ 75-6-101 et seq., MCA, substantially parallel the federal law. The MCLs are currently identical, see ARM 16.20.203, and will remain so until certain federal rule changes become effective on July 1, 1992, and January 1, 1993. The state requirements are not separately identified, since they are not more stringent. This note is provided only to clarify the primacy issue, i.e., which law is commonly enforced in Montana.

[9] Effective January 1, 1993, pentachlorophenol will be included in the group of highly toxic chemicals for which the MCLG is zero. See 56 Fed. Reg. 30280 (July 1 1991), to be codified at 40 CFR § 141.50(a). The zero MCLGs are not generally considered "appropriate" requirements for CERCLA cleanups, primarily for reasons of practicability. See 40 CFR § 300.430(e)(2)(i)(C); See also Preamble to the Final NCP, 55 Fed Reg. 8750-8753 (March 8, 1990).

relevant and appropriate requirement for this action. When a regulation with a delayed effective date is known at the time of issuance of a record of decision, and the remedy will not be performed until after the effective date of the regulation, EPA will consider the standard to be an ARAR.[10]

Similarly, the newly promulgated MCL's of 3 X 10^{-8} mg/l for 2,3,7,8-TCDD (Dioxin) and 0.0002 mg/l for Benzo(a)pyrene, 57 Fed. Reg. 31778 (July 17, 1992), are relevant and appropriate requirements for this action.

FEDERAL LOCATION-SPECIFIC ARARS

Fish and Wildlife Coordination Act (Applicable)

This standard (16 U.S.C. §§ 1531-1566, 40 CFR § 6.302(g)) requires that federal agencies or federally-funded projects ensure that any modification of any stream or other water body affected by any action authorized or funded by the federal agency provides for adequate protection of fish and wildlife resources. Compliance with this ARAR requires consultation with the U.S. Fish and Wildlife Service and the Wildlife Resources Agency of the affected State to ascertain the means and measures necessary to mitigate, prevent and compensate for project-related losses of wildlife resources and to enhance the resources. Consultation will occur during the remedial design and implementation phase and specific mitigative measures may be identified in consultation with the appropriate agencies, if remedial action, as designed, will affect a stream or creek.

Floodplain Management Order (Applicable)

This requirement (40 CFR Part 6, Appendix A, Executive Order No. 11,988) mandates that federally-funded or authorized actions within the 100 year floodplain avoid, to the maximum extent possible, adverse impacts associated with development of a floodplain. Compliance with this requirement is detailed in EPA's August 6, 1985 "Policy of Floodplains and Wetlands Assessments for CERCLA Actions." Specific measures to minimize adverse impacts will be identified and incorporated into the remedial design following consultation with the appropriate agencies.

Protection of Wetlands Order (Applicable)

This requirement (40 CFR Part 6, Appendix A, Executive Order No. 11,990) mandates that federal agencies and PRPs avoid, to the extent possible, the adverse impacts associated with

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[10] The new MCL does not have to be currently in effect to be considered relevant and appropriate. But for the delayed effective date, the new MCL would clearly constitute a relevant and appropriate requirement. The considerations specified in 40 CFR § 300.400(g)(2) for evaluating whether a requirement is relevant and appropriate all weigh in favor of observing this requirement as an ARAR.

the destruction or loss of wetlands and to avoid support of new construction in wetlands if a practicable alternative exists. The wetlands inventory for the site identified the following wetlands: drainage ditches along Cedar Street and I-90; lowland areas along Mill Ditch; a 6-acre willow/sedge grove situated immediately west of the MPC Substation and located on pasture land owned by the IPC; and the Rocky Creek floodplain. Alternatives for soil and sediments and ground water cleanup could impact these areas, so this requirement would be applicable.

Compliance with this ARAR requires consultation with the U.S. Fish and Wildlife Service (USFWS) to determine the extent of impact on wetlands and to ascertain the means and measures necessary to mitigate, prevent and compensate for project-related losses of wetlands. EPA consulted the USFWS during the RI/FS. The USFWS has submitted suggestions for developing a wetlands mitigation plan. This plan will be prepared in conjunction with the design phase of the remedy.

Resource Conservation and Recovery Act (Applicable)

The requirements set forth at 40 CFR § 264.18(a) and (b)[11] provide that (a) any hazardous waste facility must not be located within 61 meters (200 feet) of a fault (see Appendix VI of Part 264), and (b) any hazardous waste facility within the 100 year floodplain must be designed, constructed, operated and maintained to avoid washout. Although the site is not located within 61 meters of a fault, a portion of the site lies within the 100 year floodplain. Any discrete disposal or storage facilities which remain on-site as part of remedial activities will be located outside the 100 year floodplain.

Endangered Species Act (Pending)

This statute and implementing regulations (16 USC §§ 1531-1543, 50 CFR § 402, 40 CFR § 6.302(h)) require that any federal activity or federally-authorized activity may not jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify critical habitat.

Compliance with this requirement involves consultation with the U.S. Fish and Wildlife Service to determine whether there are listed or proposed species or critical habitats present on the site, and, if so, whether any proposed activities will impact such wildlife or habitat. To date the U.S. Fish and Wildlife Service has not identified any threatened or endangered species or critical habitats on the site. However, a final determination will be made during the design phase of the remedial action. The U.S. Fish and Wildlife Service has recommended that certain biological assessments be conducted in conjunction with remedial design to determine the exact extent of any impact on endangered species.

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[11] These requirements are applicable through their incorporation by reference in Montana's regulations for its authorized RCRA program. ARM 16.44.702.

Archaeological and Historical Preservation Act (Applicable)

This statute and implementing regulations, 16 U.S.C. § 469, 40 CFR § 6.301(c), establish requirements for the evaluation and preservation of historical and archaeological data, which may be destroyed through alteration of terrain as a result of a federal construction project or a federally licensed activity or program. This requires a survey of the site for covered scientific, prehistorical or archaeological artifacts. Such a survey was conducted by GCM Services, Inc., of Butte, Montana, on April 25 and 26, 1990, and revealed no prehistoric sites at the facility. See Final Cultural Resource Inventory of the Idaho Pole Site, MSE, Inc., September 1990. Preservation of appropriate data concerning any artifacts actually discovered would be required, however, during the implementation of this remedial action.

FEDERAL ACTION-SPECIFIC ARARS

Clean Water Act (Applicable)

Under the Clean Water Act, all discharges by nondomestic users into POTWs must meet pretreatment standards. Under 40 CFR Part 403, standards are set to control pollutants which contact publicly-owned treatment works (POTWs) or which may contaminate sewage sludge. 40 CFR Part 421 limits discharges to POTWs. If groundwater that is pumped and treated is discharged to a POTW, these requirements will be applicable. Because the POTW is off-site, both administrative and substantive permit requirements specified in these regulations must be met.

There are three categories of limitations for discharges into a POTW. The first is the general standard that applies to all discharges into a POTW. Second, POTWs may issue discharge permits to industrial users to enforce specific limits for a particular facility. Third, EPA has established pretreatment standards for specific industrial subcategories. All three of these standards may be applicable to a particular wastewater stream. Generally, discharges into a POTW cannot cause pass through or interference with a POTW. "Pass through" means a discharge which exits the POTW causing a violation of the POTW's National Pollutant Discharge Elimination System ("NPDES") permit. "Interference" is a discharge which inhibits or disrupts a POTW's treatment process or operation, causing a violation of the POTW's NPDES permit.

Safe Drinking Water Act (Applicable)

The underground injection control (UIC) program requirements found at 40 CFR Part 144 would be applicable for alternatives that involve reinjection of pumped and treated groundwater. The program divides wells into classes for permitting purposes. Class IV wells are used to dispose of hazardous waste into or above a formation which contains, within one-quarter mile of the well, an underground source of drinking water. These wells are generally prohibited, except for reinjection of treated groundwater into the same

formation from which it was withdrawn, as part of a CERCLA cleanup or RCRA corrective action.

The aquifer underlying the site would be considered an underground source of drinking water, so any well injecting above the aquifer would be a Class IV well. Generally, the construction, operation, and maintenance of a Class IV well is prohibited by 40 CFR § 144.13. However, wells used to inject contaminated ground water that has been treated and is being reinjected into the same formation from which it was withdrawn are not prohibited if such injection is approved by EPA pursuant to provisions for cleanup of releases under CERCLA, or pursuant to requirements and provisions under RCRA. 40 CFR § 144.23 requires that Class IV wells be plugged or otherwise closed in a manner acceptable to the EPA Regional Administrator.

Clean Air Act (Applicable)

Section 109 of the Clean Air Act, 42 USC § 7409, and implementing regulations found at 40 CFR Part 50 set national primary and secondary ambient air quality standards. National primary ambient air quality standards define levels of air quality which are necessary, with an adequate margin of safety, to protect the public health. National secondary ambient air quality standards define levels of air quality which are necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant. The standards for particulate matter at 40 CFR § 50.6 are applicable for all alternatives involving the excavation, land treatment, incineration and transportation of soils. These standards must be met during both the design and implementation phases of the remedial action.

Particulate Matter

The ambient air quality standard for particulate matter of less than or equal to 10 micrometers in diameter (PM-10) is 150 micrograms per cubic meter, 24 hour average concentration; 50 micrograms per cubic meter, annual arithmetic mean for particulate matter of less than or equal to 10 micrometers in diameter.[12]

In addition, state law provides an ambient air quality standard for settled particulate matter. Particulate matter concentrations in the ambient air shall not exceed the following 30-day average: 10 grams per square meter. ARM § 16.8.818 (Applicable).

Resource Conservation and Recovery Act (Applicable)

As noted above, EPA has listed new RCRA hazardous wastes consisting of waste waters, process residuals, preservative drippage, and spent formulations of wood preserving processes generated at plants using chlorophenolic and creosote formulations for wood

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[12] The state air quality regulations provide an equivalent standard, see ARM 16.8.821, which is enforceable in Montana as part of the State Implementation Plan.

preserving waste nos. F032 and F034. 55 Fed. Reg. 50,450, 50,482, to be codified at 40 CFR § 261.31(a). Because the site is a wood treating site that uses pentachlorophenol (PCP) and has used creosote, these newly-listed wastes are found in various locations throughout the site, and RCRA regulations concerning the treatment, storage and disposal of hazardous wastes apply to activities involving these materials.

Standards Applicable to Transporters of Hazardous Waste (Applicable)

The regulations at 40 CFR Part 263 establish standards that apply to persons that transport hazardous waste within the United States. If hazardous waste is transported on a rail-line or public highway on-site, or if transportation occurs off-site, these regulations will be applicable.

Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (Applicable)

A. Releases from Solid Waste Management Units

The regulations at 40 CFR 264, Subpart F,[13] establish requirements for groundwater protection for RCRA-regulated solid waste management units (i.e., waste piles, surface impoundments, land treatment units, and landfills). These requirements will apply to the land treatment units containing the PCP contaminated wastes and media at the site. Subpart F provides for three general types of groundwater monitoring: detection monitoring (40 CFR § 264.98); compliance monitoring (40 CFR § 264.99); and corrective action monitoring (40 CFR § 264.100). Monitoring wells must be cased according to § 264.97(c).

Monitoring is required during the active life of a hazardous waste management unit. At closure, if all hazardous waste, waste residue, and contaminated subsoil is removed, no monitoring is required. If hazardous waste remains, the monitoring requirements continue during the 40 CFR § 264.117 closure period.

B. Closure and Post-Closure

40 CFR Part 264, Subpart G,[14] establishes that hazardous waste management facilities, including land treatment units treating hazardous wastes, must be closed in such a manner as to (a) minimize the need for further maintenance and (b) control, minimize or eliminate, to the extent necessary to protect public health and the environment, post-closure escape of hazardous wastes, hazardous constituents, leachate, contaminated runoff or hazardous waste decomposition products to the ground or surface waters or to the atmosphere.

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[13] These regulations are incorporated by reference and are implemented by DHES as part of Montana's authorized RCRA program. See ARM 16.44.702.

[14] These regulations are incorporated by reference and are implemented by DHES as part of Montana's authorized RCRA program. See ARM 16.44.702.

Facilities requiring post-closure care must undertake appropriate monitoring and maintenance actions, control public access, and control post-closure use of the property to ensure that the integrity of the final cover, liner, or containment system is not disturbed. 40 CFR § 264.117. In addition, all contaminated equipment, structures and soil must be properly disposed of or decontaminated unless exempt. 40 CFR § 264.114. A survey plat should be submitted to the local zoning authority and to the EPA Regional Administrator indicating the location and dimensions of landfill cells or other hazardous waste disposal units with respect to permanently surveyed benchmarks. 40 CFR § 264.116. 40 CFR § 264.228(a) requires that at closure, free liquids must be removed or solidified, the wastes stabilized, and the waste management unit covered.

C. Waste Piles (Applicable)

40 CFR Part 264, Subpart L, applies to owners and operators of facilities that store or treat hazardous waste in piles.[15] Implementation of the remedy may include placement of hazardous waste contaminated soils and sediments in piles as part of pretreatment (separation of rocks, etc.) prior to the placement of the soils in the land treatment unit. The regulations require the use of run-on and run-off control systems and collection and holding systems to prevent the release of contaminants from waste piles.

D. Land Treatment (Applicable)

The requirements of 40 CFR Part 264, Subpart M,[16] regulate the management of "land treatment units"[17] that treat or dispose of hazardous waste; these requirements are applicable for any land treatment units established at the site.

The owner or operator of a land treatment unit must design treatment so that hazardous constituents placed in the treatment zone are degraded, transformed, or immobilized within the treatment zone. "Hazardous constituents" are those identified in Appendix VIII of 40 CFR Part 261 that are reasonably expected to be in, or derived from, waste placed in or on the treatment zone. Design measures and operating practices must be set up to maximize the success of degradation, transformation, and immobilization processes. The treatment zone is the portion of the unsaturated zone below and including the land surface in which the owner or operator intends to maintain the conditions necessary for effective degradation, transformation, or immobilization of hazardous constituents. The maximum depth of the treatment zone must be no more than 1.5 meters (five feet) from the initial soil surface; and more than one meter (three feet) above the seasonal high water table.

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15 "Pile" means any non-containerized accumulation of solid, nonflowing hazardous waste that is used for treatment or storage. 40 CFR § 260.10.

16 These regulations are incorporated by reference and are implemented by DHES as part of Montana's authorized RCRA program. See ARM 16.44.702.

17 Land treatment occurs when hazardous waste is applied onto or incorporated into the soil surface.

Subpart M also requires the construction and maintenance of control features that prevent the run-off of hazardous constituents and the run-on of water to the treatment unit. The unit must also be inspected weekly and after storms for deterioration, malfunctions, improper operation of run-on and run-off control systems, and improper functioning of wind dispersal control measures.

An unsaturated zone monitoring program must be established to monitor soil and soil-pore liquid to determine whether hazardous constituents migrate out of the treatment zone. Specifications related to the monitoring program are contained in section 264.278.

E. Incineration (Applicable)

The regulations at 40 CFR §§ 264.340 - 351 and 40 CFR Part 265, Subpart O,[18] will be ARARs for any remedial action involving incineration of hazardous waste. The standards require an owner or operator of a hazardous waste incinerator to conduct a waste analysis in conjunction with obtaining a treatment, disposal, and storage permit for the incinerator. A permit designates one or more Principal Organic Hazardous Constituents (POHCs) from those constituents listed in 40 CFR Part 261, Appendix VIII. A POHC designation is based on the degree of difficulty of incineration of the organic constituents in the waste feed from trial burns. Organic constituents that represent the greatest degree of difficulty are most likely to be designated a POHC. Incineration of POHCs designated in the permit must achieve a 99.99% destruction and removal efficiency. Incineration of dioxins must achieve a destruction and removal efficiency of 99.9999% (40 CFR § 264.343(a)).

An incinerator burning hazardous waste and producing stack emissions of more than 1.8 kilograms per hour (4 pounds per hour) of hydrogen chloride (Hcl) must control Hcl emissions such that the rate of emission is no greater than the larger of either 1.8 kilograms per hour or 1% of the HCl in the stack gas prior to entering any pollution control equipment (40 CFR § 264.343(b)). A permitted incinerator must not emit particulate matter in excess of 180 milligrams per dry standard cubic meter (40 CFR § 264.343(c)). The owner or operator must monitor combustion temperature, waste feed rate, CO emissions, and combustion gas velocity. The incinerator must be visually inspected daily, and the emergency waste feed cutoff system and associated alarms must be tested weekly. At closure, all hazardous waste residues must be removed from the incinerator site.

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[18] These regulations are incorporated by reference and are implemented by DHES as part of Montana's authorized RCRA program. See ARM 16.44.702 and 16.44.609 (Interim status).

Discharge to POTWs (Applicable)

All discharges of RCRA hazardous wastes to POTWs must comply with the RCRA permit-by-rule requirements at 40 CFR § 270.60. The regulations require that the waste meet all federal, state, and local pretreatment requirements which would be applicable to the waste if it were being discharged into the POTW through a sewer, pipe, or similar conveyance.

Requirements for Recyclable Materials (Applicable)

Hazardous wastes that are recycled are subject to the requirements for generators, transporters, and storage facilities set forth in 40 CFR § 261.6(b) and (c), unless the wastes are excluded from regulation in 40 CFR § 261.6(a).

40 CFR § 261.6(b) subjects generators and transporters of recyclable materials to the applicable requirements of 40 CFR Part 262,under which generators must comply with specified accumulation times and methods for storing hazardous waste on-site. Both time and storage method vary depending upon the quantity of hazardous waste generated.

Owners or operators of facilities that store recyclable materials before they are recycled must comply with 40 CFR Part 270. Part 270 establishes EPA's Hazardous Waste Permit Program, and sets forth basic permitting requirements, standard permit conditions, and monitoring and reporting requirements. While a permit is not required for on-site remediation, the substantive portions of the permitting requirements must be followed.

Hazardous Materials Transportation Act (Applicable)

The Hazardous Materials Transportation Act (49 USC §§ 1801-1813), as implemented by the Hazardous Materials Transportation Regulations (49 CFR Parts 10, 171-177), regulates the transportation of hazardous materials. The regulations apply to any alternatives involving the transport of hazardous waste off-site, on public highways on-site, or by rail line.

Federal Insecticide, Fungicide, and Rodenticide Act (Applicable)

This statute (7 U.S.C. § 136 et seq.) regulates the sale, distribution and use of all pesticide products in the United States, and is applicable to any alternative involving the recycling and reuse of recovered wood treating fluid, since the fluid contains the pesticide pentachlorophenol. Under FIFRA, use of a registered pesticide product in a manner inconsistent with its labeling is a violation of the Act (7 U.S.C. § 136j). Recovered pesticides may be reused provided they meet new product labelling specifications, which include concentration limits for pesticides in solution.

FEDERAL STANDARDS TO BE CONSIDERED (TBC's)

Safe Drinking Water Act

Proposed MCLs

Proposed Maximum Contaminant Levels are unpromulgated versions of the MCLs discussed in the ARARs section. MCLs apply to public water systems. However, they may be relevant and appropriate to surface or groundwater if those waters are used as drinking water. Because the aquifer underlying the site is a drinking water source, and current or adopted MCL's are ARARs, the proposed MCLs are TBCs. The contaminant levels identified below have been proposed as MCLs. See 54 Fed. Reg. 22062, 22155-57 (May 22, 1989) and 55 Fed Reg. 30370, 30445 (July 25, 1990), (to be codified at 40 CFR § 141.61).

	Compound	Proposed MCL (mg/l)
PAHs:	Benz(a)anthracene	0.0001
	Benzo(b)fluoranthene	0.0002
	Benzo(k)fluoranthene	0.0002
	Chrysene	0.0002
	Dibenz(a,h)anthracene	0.0003
	Indeno(1,2,3-CD)pyrene	0.0004

STATE OF MONTANA ARARS

MONTANA CONTAMINANT-SPECIFIC ARARS

Water Quality

Surface water quality standards, including the requirement that any discharge to surface waters such as Rocky or Mill Creek must meet Gold Book levels, are specified in the action-specific ARARs below.

MONTANA LOCATION-SPECIFIC ARARS

Floodplain and Floodway Management

The 100 year floodways and floodplains of Rocky and Mill Creeks are near the site. The areas proposed for excavation and for placement of the land treatment units are located outside these floodplains. Compliance with these floodway and floodplain ARARs can be attained by avoiding conducting any of the remedial activities within the floodplain boundaries.

Floodplain and Floodway Management Act (Applicable)

Section 76-5-401, MCA, (Applicable) specifies the uses permissible in a floodway and generally prohibits permanent structures, fill, or permanent storage of materials or equipment.

Section 76-5-402, MCA, (Applicable) specifies uses allowed in the floodplain, excluding the floodway, and allows structures meeting certain minimum standards.

Section 76-5-403, MCA, (Applicable) lists certain uses which are prohibited in a designated floodway, including:

1. any building for living purposes or place of assembly or permanent use by human beings,

2. any structure or excavation that will cause water to be diverted from the established floodway, cause erosion, obstruct the natural flow of water, or reduce the carrying capacity of the floodway, or

3. the construction or permanent storage of an object subject to flotation or movement during flood level periods.

Floodplain Management Regulations (Applicable)

ARM 36.15.216 (Applicable) specifies factors to consider in determining whether a permit should be issued to establish or alter an artificial obstruction or nonconforming use in the floodplain or floodway. While permit requirements are not directly applicable to activities conducted entirely on site, the criteria used to determine whether to approve establishment or alteration of an artificial obstruction or nonconforming use should be applied by the decision-makers in evaluating proposed remedial alternatives which involve artificial obstructions or nonconforming uses in the floodway or floodplain. Thus the following criteria are relevant and appropriate considerations in evaluating any such obstructions or uses:

1. the danger to life and property from backwater or diverted flow caused by the obstruction;

2. the danger that the obstruction will be swept downstream to the injury of others;

3. the availability of alternative locations;

4. the construction or alteration of the obstruction in such a manner as to lessen the danger;

5. the permanence of the obstruction;

6. the anticipated development in the foreseeable future of the area which may be affected by the obstruction.

ARM 36.15.604 (Applicable) precludes new construction or alteration of an artificial obstruction that will significantly increase the upstream elevation of the flood of 100-year frequency (½ foot or as otherwise determined by the permit issuing authority) or significantly increase flood velocities.

ARM 36.15.605 (Applicable) enumerate artificial obstructions and nonconforming uses that are prohibited within the designated floodway except as allowed by permit and includes "a structure or excavation that will cause water to be diverted from the established floodway, cause erosion, obstruct the natural flow of water, or reduce the carrying capacity of the floodway ... ." Solid and hazardous waste disposal and storage of toxic, flammable, hazardous, or explosive materials are also prohibited.

ARM 36.15.703 (Applicable) is applicable in flood fringe areas (i.e., areas in the floodplain but outside of the designated floodway) of the site and prohibits, with limited exceptions, solid and hazardous waste disposal and storage of toxic, flammable, hazardous, or explosive materials.

MONTANA ACTION-SPECIFIC ARARS

In the following action-specific ARARs, the nature of the action triggering applicability of the requirement is stated in parenthesis as part of the heading for each requirement.

Water Quality

Surface Water Quality Standards (Applicable) (Discharge to surface water)

Under the state Water Quality Act, §§ 75-5-101 et seq., MCA, the state has promulgated regulations to preserve and protect the quality of surface waters in the state. These regulations classify state waters according to quality, place restrictions on the discharge of pollutants to state waters, and prohibit the degradation of state waters. The requirements listed below would be applicable to any discharge[19] to surface waters in connection with the remedial action. Compliance with these requirements may be achieved by avoiding any such discharge.

ARM 16.20.607(1) provides that specified waters in the Missouri River drainage, including Rocky Creek and Mill Creek, are classified "B-1" for water use. The standards for "B-1" classification waters are contained in ARM 16.20.618 (Applicable) of the Montana water quality regulations. These standards place limits on fecal coliform content, dissolved oxygen concentration, Ph balance, turbidity, water temperature, sediments, solids, oils, and color.[20] Concentrations of toxic or deleterious substances which would remain in the water after

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19 "Discharge" is defined in the state Surface Water Quality Standards as "the injection, deposit, dumping, spilling, leaking, placing, or failing to remove any pollutant so that it or any constituent thereof may enter into state waters, including ground water." ARM 16.20.603(6).

20 The B-1 classification standards in ARM 16.20.618 include the following limitations:

1. During periods when the daily maximum water temperature is greater than 60°F, the geometric mean number of organisms in the fecal coliform group must not exceed 200 per 100 milliliters (ml), nor are 10% of the total samples during any 30-day period to exceed 400 fecal coliforms per 100 ml.

2. Dissolved oxygen concentration must not be reduced below 7.0 milligrams (mg) per liter (l).

3. Induced variation of hydrogen ion concentration (Ph) within the range of 6.5 to 8.5 must be less than 0.5 Ph unit. Natural pH outside this range may not be altered and natural pH above 7.0 must be maintained above 7.0.

4. Temperature variations are specifically limited, depending upon the temperature range of the receiving water. See ARM 16.20.618(2)(e).

5. No increase in naturally occurring concentrations of sediment, settleable solids, oils, or floating solids is allowed which will or is likely to create a nuisance or render the waters harmful, detrimental, or injurious to public health, recreation, safety, welfare, livestock, wild animals, birds, fish or other wildlife.

6. True color must not be increased more than five units above naturally occurring color.

conventional treatment cannot exceed MCLs, and concentrations of toxic or deleterious substances cannot exceed Gold Book levels.[21]

Additional restrictions on any discharge to surface waters are included in:

ARM 16.20.631 (Applicable), which requires that industrial waste[22] must receive, as a minimum, treatment equivalent to the best practicable control technology currently available (BPCTCA) as defined in 40 CFR Subchapter N and subsequent amendments. This section also requires that in designing a disposal system, stream flow dilution requirements must be based on the minimum consecutive 7-day average flow which may be expected to occur on the average of once in 10 years.

ARM 16.20.633 (Applicable), which prohibits discharges containing substances that will:

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

ARM 16.20.925 (Applicable), which adopts and incorporates the provisions of 40 C.F.R. Part 125 for criteria and standards for the imposition of technology-based treatment requirements in MPDES permits. Although the permit requirement would not apply to on-site discharges, the substantive requirements of Part 125 are applicable, i.e., for toxic and nonconventional pollutants treatment must apply the best available technology economically achievable (BAT); for conventional pollutants, application of the best conventional pollutant control technology (BCT) is required. Where effluent limitations are not specified for the particular industry or industrial category at issue, BCT/BAT technology-based treatment requirements are determined on a case by case basis using best professional judgment (BPJ). See CERCLA Compliance with Other Laws Manual, Vol. I, August 1988, pp. 3-4 and 3-7.

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21 ARM 16.20.603(10) defines Gold Book levels as "the freshwater acute or chronic levels or the levels for water and fish ingestion that are listed in Update Number Two (5/1/87) of Quality Criteria for Water 1986 (EPA 440/5-86-001)."

22 Section 75-5-103, MCA, defines "Industrial waste" as "any waste substance from the process of business or industry or from the development of any natural resource, together with any sewage that may be present."

The Water Quality Act and regulations also include nondegradation provisions which require that waters which are of higher quality than the applicable classification be maintained at that high quality, and discharges which would degrade that water are prohibited. Montana's standard for nondegradation of water quality is applicable for all constituents for which pertinent portions of Rocky Creek and Mill Creek are of higher quality than the B-1 classification. This standard will also be applicable if any remedial action constitutes a new source of pollution or an increased source of pollution to high-quality waters to require the degree of waste treatment necessary to maintain that existing water quality.

ARM 16.20.701 (Applicable) defines "degradation" and provides that "nonpoint source pollutants [e.g., runoff] from lands where all reasonable land, soil and water managements or conservation practices have been applied are not considered degradation."

ARM 16.20.702 (Applicable) applies nondegradation requirements to any activity which would cause a new or increased source of pollution to state waters. This section states when exceptions to nondegradation requirements apply, except that in no event may such degradation affect public health, recreation, safety, welfare, livestock, wild birds, fish and other wildlife or other beneficial uses.

ARM 16.20.703 (Applicable) establishes the substantive nondegradation standard (quality of receiving waters whose quality is higher than established water quality standards is not to be degraded by the discharge of pollutants), and requires that water quality permits incorporate nondegradation standards. In accordance with CERCLA § 121(e), if the discharge occurs entirely on-site, only the substantive nondegradation standard, and not the permit requirement, would apply. However, if the discharge occurs off-site, the permit and administrative requirements would also be applicable. This rule also provides that determination of degradation is to ensure that baseline quality of the receiving waters will not be degraded at any flow greater than the 7-day, 10-year low flow of the receiving waters.

<u>Montana Groundwater Pollution Control System (Applicable)</u> (Discharge to groundwater)

ARM 16.20.1002 (Applicable) classifies groundwater into Classes I through IV based on the present and future most beneficial uses of the groundwater, and states that groundwater is to be classified according to actual quality or actual use, whichever places the groundwater in a

higher class. Class I is the highest class; class IV is the lowest. Based upon its specific conductance, the bulk of the groundwater at the site should be considered Class I groundwater.[23]

ARM 16.20.1003 (Applicable) establishes the groundwater quality standards applicable with respect to each groundwater classification. Concentrations of dissolved substances in Class I or II groundwater or any groundwater which is used for drinking water supplies may not exceed Montana MCL values for drinking water. However, no Montana MCL's have been established for the contaminants of concern at the Idaho Pole site. Thus for the Idaho Pole site, concentrations of dissolved or suspended substances must not exceed levels that render the waters harmful, detrimental or injurious to public health. Maximum allowable concentration of these substances also must not exceed acute or chronic problem levels that would adversely affect existing or designated beneficial uses of groundwater of that classification.

ARM 16.20.1011 (Applicable), the nondegradation requirement, provides that any groundwater whose existing quality is higher than the standard for its classification must be maintained at that high quality unless the Board of Health is satisfied that a change is justifiable for economic or social development and will not preclude present or anticipated use of such waters. Thus any groundwater which is to be reinjected as part of the remedy must be treated sufficiently to prevent additional degradation of the aquifer, i.e., the reinjected groundwater cannot be of lower quality than the receiving groundwater for any constituent.

Groundwater Act (Applicable) (Construction and maintenance of groundwater wells)

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

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[23] ARM 16.20.1002 provides that Class I groundwaters have a specific conductance of less than 1000 micromhos/cm at 25° C; Class II groundwaters: 1000 to 2500; Class III groundwaters: 2500 to 15,000; and Class IV groundwaters: over 15,000. The groundwater at the Idaho Pole site ranges from 586 to 1370 micromhos/cm, with the majority of the wells testing at below 1000. See Final Draft Remedial Investigation Report, Vol. II, Appendix E, MSE, Inc., March 1992.

Air Quality[24]

Air Quality Regulations (Applicable) (Excavation/earth-moving; transportation; incineration; storage of petroleum distillates)

Dust suppression and control of certain substances likely to be released into the air as a result of earth moving, transportation and similar actions may be necessary to meet air quality requirements. The ambient air standards for specific contaminants and for particulates are set forth in the federal contaminant-specific section above. Additional air quality regulations under the state Clean Air Act, §§ 75-2-101 et seq., MCA, are discussed below.

ARM 16.8.1404 (Applicable) states that "no person may cause or authorize emissions to be discharged in the outdoor atmosphere ... that exhibit an opacity of twenty percent (20%) or greater averaged over six consecutive minutes."

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24 The air quality ARARs included in this analysis are identified on the assumption that no remedial action at the site will constitute a "major stationary source," or "major modification," as defined in ARM 16.8.921. Should any part of a remedy constitute such a source, some additional requirements would be applicable, including the ambient air increments of ARM 16.8.925 et seq.

Similarly, if any part of a remedy should constitute a new or altered source of air pollution which has the potential to emit more than 25 tons per year of any pollutant addressed by the Clean Air Act regulations, the owner or operator must install the maximum air pollution control capability which is technically practicable and economically feasible, as provided by ARM 16.8.1103 (best available control technology shall be utilized).

APPENDIX B

ADMINISTRATIVE RECORD INDEX

IDAHO POLE NPL SITE
BOZEMAN, MONTANA

Montana Department of Health & Environmental Sciences
Solid & Hazardous Waste Bureau

IDAHO POLE REMEDIAL INVESTIGATION/FEASIBILITY STUDY
Administrative Record Index
September 27, 1992

Document categories noted with an asterisk '*' include confidential material.

1.0 SITE IDENTIFICATION

1.01 Site Overview
- 1.01.01 Site History Report, MDHES, Feb. 23, 1984.

1.02 Notification/ Site Inspection Reports
- 1.02.01 Site Inspection Report, MDHES, April 24, 1984.
- 1.02.02 Site Inspection Memorandum, R.F. Weston, Jan. 6, 1986.

1.03 Preliminary Assessment (PA) Reports
- 1.03.01 Preliminary Assessment, MDHES, Feb. 23, 1984.

2.0 REMOVAL RESPONSE

2.01 EPA/Emergency Response Branch (ERB) Soil Gas Survey
- 2.01.01 ERB Soil Gas Survey Final Report, Roy F. Weston, Jan. 29, 1987.

2.02 ERB Monitor Well Sampling 1986
- 2.02.01 Summary Report, Roy F. Weston, Sept. 25, 1986.

2.03 ERB Monitor Well Sampling 1987
- 2.03.01 Sampling Activities Report, Idaho Pole Phase One Sampling, Ecology & Environment (E&E), June 18, 1987.
- 2.03.02 Validated Organics Data Report, Case #M8603, E&E, July 9, 1987.
- 2.03.03 Data Transmittal Dioxins/furans, EPA, Sept. 9, 1987.

2.04 ERB Residential Well Sampling 1989
- 2.04.01 Sampling Plan for Idaho Pole, E&E, April 25, 1989.
- 2.04.02 Idaho Pole Sampling Activities Report, E&E, May 4, 1989.
- 2.04.03 Idaho Pole Semivolatiles/volatiles Results, E&E, June 9, 1989.
- 2.04.04 Idaho Pole Data Results for Dioxins/furans, E&E, June 19, 1989.
- 2.04.05 Data Validation Report for Dioxins/furans, EPA, Jan. 2, 1990.

3.0 RI/FS PLANNING

3.01 Work Plan
- 3.01.01 Final RI/FS Work Plan, MSE, Inc., Jan., 1990.

3.01.02 Jim Harris, EPA, letter of approval of Work Plan documents to Kevin Kirley, MDHES, March. 6, 1990.

3.01.03 Final Technical Memorandum #4: Additional Sampling, MSE, Inc., March 1991.

3.01.04 Final Stage V Groundwater Sampling Plan, MSE, Inc., August 1991.

3.01.05 Residential Sampling Plan, MDHES, Sept. 1991.

3.01.06 Treatability Testing Work Plan, MSE, Inc., Jan. 1992.

3.02 Quality Assurance Project Plan (QAPjP)

3.02.01 Final Sampling and Analysis Plan Vol I: Quality Assurance Project Plan (QAPjP), MSE, Inc., Jan. 1990.

3.03 Field Sampling Plan (FSP)

3.03.01 Final Sampling and Analysis Plan Vol II: Field Sampling Plan (FSP), MSE, Inc., Jan. 1990

3.03.02 Treatability Testing Sampling and Analysis Plan, MSE, Inc., Jan. 1992.

3.04 Laboratory Analytical Plan (LAP)

3.04.01 Final Sampling and Analysis Plan Vol III: Laboratory Analytical Plan (LAP), MSE, Inc., Jan. 1990.

3.05 Health and Safety Plan

3.05.01 Final Health and Safety Plan, MSE, Inc., Jan. 1990.

3.06 Data Management Plan

3.06.01 Final Data Management Plan, MSE, Inc., Jan. 1990.

3.07 Review Letters

3.07.01 Mel Burda, Burlington Northern, letter on Work Plans to Kevin Kirley, MDHES, Apr. 18, 1990.

3.08 Agency Response to Comments

3.08.01 Kevin Kirley, MDHES, letter in response to Mel Burda's April 18 letter to Mel Burda, Burlington Northern, May 29, 1990.

3.09 Pre-RI/FS Reports

3.09.01 Idaho Pole 1984 Remedial Investigation, AGI, July 1985.

3.09.02 Idaho Pole Sampling Report to Kevin Keenan, MDHES, Nov. 19, 1985.

3.09.03 Idaho Pole Sampling Report to Kevin Keenan, MDHES, Jan. 10, 1986.

3.09.04 Idaho Pole Sampling Report to Kevin Keenan, MDHES, Jan. 13, 1986.

3.09.05 Idaho Pole Sampling Report to Kevin Keenan, MDHES, March. 31, 1986.

3.09.06 Idaho Pole Sampling Report to Sarah Weinstock, MDHES, May 28, 1986.

3.09.07 Idaho Pole Sampling Report to Jim Knoy, EPA, Nov. 21, 1986.

4.0 REMEDIAL INVESTIGATION (RI) REPORTS

4.01 Technical Memorandum #1
- 4.01.01 Final Cultural Resources Inventory, MSE, Inc., Sept. 1990.
- 4.01.02 Final Biota Investigation, MSE, Inc., March 1991.

4.02 Technical Memorandum #2
- 4.02.01 Final Additional Sampling Report, MSE, Inc., Sept. 1991.

4.03 Quarterly Contamination Reports
- 4.03.01 First Quarterly Contamination Report, MSE, Inc., May, 1991.
- 4.03.02 Second Quarterly Contamination Report, MSE, Inc., June, 1991.
- 4.03.03 Third Quarterly Contamination Report, MSE, Inc., Sept., 1991.
- 4.03.04 Fourth Quarterly Contamination Report, MSE, Inc., Sept., 1991.
- 4.03.05 Fifth Quarterly Contamination Report, MSE, Inc., Jan., 1992.

4.04 Treatability Testing Reports
- 4.04.01 Phase I Treatability Testing Report, MSE, Inc., April 1992.

4.05 Remedial Investigation
- 4.05.01 Remedial Investigation Report, MSE, Inc., March 1992.
- 4.05.02 October 1991 Residential Sampling Report, MDHES, April 1992.
- 4.05.03 January 1992 Residential Sampling Report, MDHES, July 1992.
- 4.05.04 April 1992 Residential Sampling Report, MDHES, Sept. 1992.

4.06 Reserved

4.07 Review Comments
- 4.07.01 C.A. Laughner (Leo Berry), Browning, Kaleczyc, Berry, & Hoven, P.C., Administrative Record review letter to Kevin Kirley, MDHES, Sep. 6, 1990.
- 4.07.02 Kathy Huppe, State Historic Preservation Office, review letter to Kevin Kirley, MDHES, on Cultural Resources Inventory, Sept. 25, 1990.

4.08 MDHES Response to Comments
- 4.08.01 Kevin Kirley, MDHES, response letter to Leo Berry on Administrative Record, Sep. 30, 1990.
- 4.08.02 Kevin Kirley, MDHES, response letter to Kathy Huppe, State Historic Preservation Office, documenting determination of eligibility for site, Oct. 4, 1990.

5.0 FEASIBILITY STUDY (FS) REPORTS

5.01 Development, Screening and Evaluation of Alternatives
- 5.01.01 Final Technical Memorandum #5, MSE, Inc., Sept. 1991.
- 5.01.02 Draft Final Technical Memorandum #6, MSE, Inc., Sept. 1991.
- 5.01.03 Feasibility Study, MSE, Inc., April 1992.

6.0 PROPOSED PLAN AND RECORD OF DECISION (ROD)

6.01 Proposed Plan and Supplements and Revisions to the Proposed Plan

- 6.01.01 Proposed Plan, MDHES, April 1992.
- 6.01.02 Kathy Huppe, State Historical Preservation Office, to Kevin Kirley, MDHES, April 28, 1992.
- 6.01.03 Dale Harris, US Fish and Wildlife Service, wetlands mitigation letter to Jim Harris, USEPA, May 22, 1992.

6.02 Public Written Comments

- 6.02.01 Deb Berglund, Gallatin County Commission, to Jane Stiles, April 7, 1992.
- 6.02.02 Joe Gutterski, Montana Wildlife Federation, to Kevin Kirley, MDHES, April 8, 1992.
- 6.02.03 Rosalea Abelin, Figgins Sand and Gravel, to Kevin Kirley, MDHES, April 15, 1992.
- 6.02.04 Les Lonning, Idaho Pole Company to Kevin Kirley, MDHES, April 17, 1992.
- 6.02.05 Catherine Laughner, Browning, Kaleczyc, Berry and Hoven, P.C., to Kevin Kirley, MDHES, April 22, 1992.
- 6.02.06 Martin Studer, attorney at law, to Kevin Kirley, MDHES, April 23, 1992.
- 6.02.07 Robin Schafer, area resident, letter to MDHES, April 30, 1992.
- 6.02.08 Jake and Georgia Kroon, area residents, to Kevin Kirley, MDHES, April 28, 1992.
- 6.02.09 S. H. Davis, area resident, to Kevin Kirley, MDHES, May 12, 1992.
- 6.02.10 Christopher Hermann, Stoel, Rives, Boley, Jones and Grey, to Kevin Kirley, May 29, 1992.
- 6.02.11 Catherine Laughner, Browning, Kaleczyc, Berry and Hoven, to Kevin Kirley, June 1, 1992.
- 6.02.12 Don Bachman, Citizens Group Chairman, to Kevin Kirley, June 15, 1992.
- 6.02.13 Christopher Hermann, Stoel, Rives, Boley, Jones and Grey, to Kevin Kirley, June 15, 1992.
- 6.02.14 Catherine Laughner, Browning, Kaleczyc, Berry and Hoven, to Kevin Kirley, June 16, 1992.
- 6.02.15 Phillip Forbes, City of Bozeman, to Kevin Kirley, June 16, 1992.

6.03 Response to Comments

- 6.03.01 MDHES response to Deb Berglund, Gallatin County Commission, May 5, 1992.
- 6.03.02 MDHES response to Joe Gutterski, Montana Wildlife Federation, May 8, 1992.
- 6.03.03 MDHES response to Rosalea Abelin, May 8, 1992.
- 6.03.04 MDHES response to Les Lonning, Idaho Pole Company, April 28,

1992.

6.03.05 MDHES response to Catherine Laughner, Browning, Kaleczyc, Berry and Hoven, P.C., April 28, 1992.

6.03.06 MDHES response to Martin Studer, July 6, 1992.

6.03.07 MDHES response to Robin Schafer, May 8, 1992.

6.03.08 MDHES response to Jake and Georgia Kroon, May 8, 1992.

6.03.09 MDHES response to S. H. Davis, May 19, 1992.

6.03.10 MDHES response to Don Bachman, Citizens Group chairman, Sept. 27, 1992.

6.03.11 MDHES response to Phillip Forbes, City of Bozeman, Sept. 27, 1992.

(MDHES responses to comments submitted by Christopher Hermann, representing the Idaho Pole Company, and by Catherine Laughner, representing the Burlington Northern Railroad, are included in the Responsiveness Summary of the Record of Decision.)

6.04 Record of Decision

6.04.01 Idaho Pole Company NPL Site Record of Decision, MDHES, September 1992.

6.05 Late Comments

6.05.01 Douglas Crandall, Brand S Lumber, to Kevin Kirley, Sept. 3, 1992.

7.0 EPA/STATE COORDINATION

7.01 State/EPA Cooperative Agreement

7.01.01 Jim Scherer, EPA, letter to Dr. Sidney Pratt, M.D., MDHES, designating the State as lead agency for RI/FS, March 17, 1989.

7.01.02 MDHES 1989 Cooperative Agreement Application, April 1989.

7.01.03 EPA 1989 Grant award, June 6, 1989.

7.01.04 EPA 1990 Amended grant award, Feb. 5, 1990.

7.01.05 MDHES 1990 Cooperative Agreement Amendment Application #2, Aug. 23, 1990.

7.01.06 EPA 1990 Amended grant award, Sept. 14, 1990.

7.01.07 MDHES 1991 Cooperative Agreement Amendment Application #3, July 31, 1991.

7.01.08 EPA 1990 Amended grant award, Sept. 20, 1991.

7.01.09 EPA 1990 Amended grant award, Sept. 26, 1991.

7.01.10 EPA 1990 Amended grant award, Dec. 30, 1991.

7.01.11 MDHES 1992 Cooperative Agreement Amendment Application #6, July 11, 1992.

8.0 ENFORCEMENT

8.01 PRP Notice Letters and Responses (Idaho Pole Company)

8.01.01 John Wardell, EPA, General Notice and Information Request to Les Lonning, McFarland Cascade, Feb. 17, 1988.

* 8.01.02 Les Lonning, McFarland Cascade, response to General Notice letter to Kevin Kirley, MDHES, March. 17, 1988.

8.01.03 Jim Scherer, EPA, Special Notice Letter for RI/FS to Les Lonning, McFarland Cascade, June 29, 1988.

8.01.04 Les Lonning, McFarland Cascade, Response and Good faith offer to Stephanie Wallace, EPA, Sept. 2, 1988.

8.02 PRP Notice Letters and Responses (Burlington Northern)

8.02.01 John Wardell, EPA, General Notice and Information Request to Mike Cook, Burlington Northern (BN), Feb. 19, 1988.

8.02.02 Thomas J. Patnode, Glacier Park Co. (BN), response to General Notice letter to Kevin Kirley, MDHES, March. 11, 1988.

8.02.03 Jim Scherer, EPA, Special Notice Letter for RI/FS to Thomas J. Patnode, Glacier Park Co., June 27, 1988.

8.02.04 Leo Berry, Browning, Kaleczyc, Berry, & Hoven, P.C., Response and Good faith offer to Stephanie Wallace, EPA, Sept. 6, 1988.

* 8.02.05 Report of Historical Findings-Northern Pacific Roundhouse Site, Bozeman, Mt., Historical Research Associates, Dec. 8, 1988.

8.03 Enforcement History

8.03.01 John Wardell, EPA, letter to Les Lonning, McFarland Cascade, withdrawing offer of RI/FS conduct, April 26, 1989.

9.0 PUBLIC HEALTH AND ENVIRONMENTAL ASSESSMENTS (PHEA)

9.01 ATSDR Health Assessment

9.01.01 Preliminary Health Assessment Report, March 15, 1989, Agency for Toxic Substances and Diseases Registry.

9.02 MDHES Risk Assessment

9.02.01 Baseline Risk Assessment (Technical Memorandum #3), MSE, Inc., March 1992.

9.02.02 Ecological Risk Assessment (Technical Memorandum #3), MSE, Inc., March 1992.

9.03 Toxicological Profiles

9.03.01 Toxicological Profile for Pentachlorophenol, TP-89/19, ATSDR, Dec. 1989.

9.03.02 Toxicological Profile for Polycyclic Aromatic Hydrocarbons, TP-90/20, ATSDR, Dec. 1990.

10.0 BACKGROUND DOCUMENTS

10.01 BACKGROUND DOCUMENTATION

10.01.01 Additional background documents, such as chain of custody documents, raw data, QA/QC data and records on validation, verification and evaluation of data are incorporated by reference in the administrative record.

10.01.02 Stream Flow and Ground Water Level Data, Technical Memorandum #2, Addendum A, Volume II, Appendix D, MSE, Inc., April 1991.

10.01.03 Summary table of LNAPL boring measurements and observations, Sept. 25, 1992.

11.0 PUBLIC PARTICIPATION

11.01 Community Relations Plan

11.01.01 Community Relations Plan, MDHES, May 1989.

11.02 Progress Reports

11.02.01 Idaho RI/FS UPDATE, March. 1990.

11.02.02 Idaho Pole RI/FS PROGRESS Report, Aug. 1990.

11.02.03 Idaho Pole RI/FS PROGRESS Report, June 1991.

11.02.04 Idaho Pole RI/FS PROGRESS Report, March 1992.

11.03 Public Notice(s)

11.03.01 Public Meeting Advertisement in Bozeman Chronicle, Apr 17, 1990.

11.03.02 Press release for April 17, 1990 Superfund Public Meeting, Apr. 5, 1990.

11.03.03 Public Informational Meeting Postcard for July 12, 1990.

11.03.04 Press release for July 12, 1990 Superfund Public Informational Meeting, July 5, 1990.

11.03.05 Form letter from MDHES to Idaho Pole neighborhood residents announcing July 12, 1990. Public Informational Meeting, July 5, 1990.

11.03.06 Newspaper ad for the Bozeman Chronicle announcing the placement of the Administrative Record, Aug. 1, 1990.

11.03.07 Advertisement request for Citizens Group meeting, Nov. 5, 1990.

11.03.08 Press release for June 19, 1991 public informational meeting, June 13, 1991.

11.03.09 Press release for March 19, 1992 public information meeting, March 10, 1992.

11.03.10 Press release announcing public comment period on Remedial Investigation, Baseline and Ecological Risk Assessments, March 30, 1992.

11.03.11 Legal advertisement for public comment period on Remedial Investigation Report and Risk Assessment, March 27, 1992.

11.03.12 Legal advertisement for public comment period on Proposed Plan and Feasibility Study, April 13, 1992.

11.03.13 Press release April 23, 1992, public meeting/hearing on April 30, 1992.

11.03.14 Press release announcing extension of both public comment periods an additional 30 days each, May 4, 1992.

11.03.15 Affidavit of publication for public comment period extension, June 3, 1992.

11.03.16 Public notice materials announcing informational meeting on Oct. 7, 1992, to discuss the Idaho Pole NPL Site Record of Decision.

11.04 Public Meeting Transcripts

11.04.01 Public Meeting Notes, Apr 17, 1990.

11.04.02 Public Informational Meeting Notes, July 12, 1990.

11.04.03 Idaho Pole Citizens Group meeting at Union Hall, Nov. 15, 1990.

11.04.04 Public meeting and hearing transcript, Ione Daniels and Associates, April 30, 1992.

11.05 Documentation of Other Public Meetings

11.05.01 Newspaper clipping for July 12, 1990 Citizens Group meeting, July 1990.

11.05.02 Newspaper article on Jul. 12, 1990 meeting and announcing the Aug 16, 1990 meeting, July 1990.

11.05.03 MDHES letter announcing Sep. 13, 1990 site tour to Citizens Group, Sep. 4, 1990.

11.05.04 Press release for Sep. 20, 1990 Citizens Group meeting at the Gallatin County courthouse, Sep. 14, 1990.

11.05.05 Format of MDHES letter to selected addressees inviting them to the Sep 20. meeting, Sep. 14, 1990.

11.05.06 MDHES letter to affected neighbors, announcing time and location of Nov. 15, 1990 meetings for residents only and the Citizens Group meeting, Nov. 6, 1990.

11.05.07 MDHES letter to mailing list addressees, announcing Nov. 15, 1990 Citizens Group meeting, Nov. 6, 1990.

12.0 TECHNICAL SOURCES AND GUIDANCE DOCUMENTS

12.01 Guidance

12.01.01 Compendium of Guidance Documents

12.02 Technical Sources

12.02.01 *Pentachlorophenol and Sodium Pentachlorophenate*, Wm. B. Deichmann, M. L. Keplinger

* Certain materials in this section are maintained in a confidential portion of the

administrative record. These materials are described on a Notice of Confidential Information contained in this section of the administrative record file.

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I. INTRODUCTION

The Montana Department of Health and Environmental Sciences (MDHES) has conducted community involvement activities at the as Site in accordance with state and federal laws as well with Superfund guidance. It is the MDHES Superfund program's philosophy that the citizens of Montana and especially residents living near Superfund sites will be most affected by the decisions of the agency and therefore should have the opportunity to be actively involved in the decision making process.

COMMUNITY INVOLVEMENT BACKGROUND

Public meeting publicity

Press releases were sent out to the media mailing list before each public and citizens group meeting and to announce public comment periods. The press mailing list includes all media (print and electronic) in Bozeman as well as news services and several magazines. In addition, these meetings were advertised in local papers and/or on a local radio station. Print advertisements are display style, conspicuously large (at least two columns by five inches) in a widely read section of the local papers. Radio advertisements are usually run on an AM and FM station in a variety of time slots, for several days before the meeting.

Property access permission work

Whenever MDHES takes samples on private property, permission is sought from the landowner. During remedial investigation activities, MDHES took samples of residential and monitoring wells and surface water on private property. Each time a sample is taken, MDHES contacts the property owner and arranges a sampling time convenient to the owner and asks the owner to sign a permission access agreement. MDHES also discusses with the owner any special concerns or issues the owner may have. This type of personal contact has helped MDHES establish a positive working relationship with site neighborhood residents. Access activities are not listed in the following chronology, but have been conducted since the beginning of remedial investigation activities and continue throughout domestic well monitoring.

Administrative Record

The Administrative Record is the set of documents identified for the Site that the selection of the remedy is based upon. The Administrative Record is required by CERCLA §113(k). The index of Administrative Record documents is provided in Appendix B.

The Administrative Record is made available to the public at the Bozeman Public Library and the MDHES Helena office. Requests by the public or potentially responsible parties to

view the Administrative Record in the MDHES Helena office are coordinated through the site attorney, the Superfund documents clerk or the State Project Officer.

Document repositories

Site documents and other information have been, and will continue to be, made available to the public near the Site. MDHES has established repositories of site documents for check-out at the Bozeman Public Library, the Montana State University Renne Library on the MSU campus, the Gallatin County Environmental Health office in the courthouse basement, the State Library, and MDHES offices in Helena. MDHES adds documents to the repository as quickly as possible after publication.

Citizens group

In 1990, Bozeman residents formed a citizens group for the Site. After about eight months of meetings, the group voted to meet only on an as needed basis or to attend MDHES sponsored public meetings. MDHES was asked to stay in contact with the group chairman and has done so by phone and in person.

Progress reports

MDHES publishes progress reports which contain information on recently released documents, upcoming meetings, site activities, completion of projects, sampling results, etc. Progress reports are sent to those people on the site mailing list. Extra copies are distributed to pamphlet racks at a number of public agencies and other locations deemed appropriate. MDHES keeps extra copies of progress reports on file for distribution.

Toll-free hotline

The MDHES Superfund program in-state toll-free number, 1-800-648-8465, was established in June 1987 and has proven to be an effective tool for the public as well as MDHES at the Idaho Pole Site. The public may be more willing to call MDHES offices when they know they have a hotline number. The MDHES Superfund public information officer answers hotline calls and responds to questions. Technical questions are directed to the State Project Officer. The hotline is in operation during business hours at MDHES. The number is also served by an answering machine during evenings and weekends.

Mailing list

At MDHES, the site mailing list is maintained on a computer database and is updated periodically. MDHES actively solicits additions to the mailing list in the progress reports and at public meetings. The mailing list is retained as confidential information by MDHES and is not distributed.

Chronology of community relations activities

1988 October -- MDHES and EPA conduct community relations interviews in preparation of a community relations plan.

1989 May -- MDHES publishes the Site Community Relations Plan.

1990 March -- MDHES issues a progress report discussing upcoming remedial investigation activities and work plan.

April -- MDHES establishes the Administrative Record in Superfund offices and begins preparation of a duplicate Administrative Record for the Bozeman Public Library.

April 17 - 7 p.m. -- MDHES holds a public meeting at the Bozeman City Commission meeting room to discuss the Remedial Investigation Work Plan.

July 5 -- MDHES sends a letter of invitation to all residents living near the Site about the July 12 initial citizens group meeting. Postcards with the same message are sent to everyone on the Site mailing list.

July 12 -- MDHES holds a kick-off meeting for the citizens group.

August -- MDHES places a duplicate Administrative Record for the Site at the Bozeman Public Library and issues required legal notice and press release.

August -- MDHES publishes a progress report discussing the Administrative Record, citizens group and historic resources inventory. The progress report is sent to entire mailing list for the Site.

August 16 -- MDHES and citizens group hold an informational meeting.

September 4 -- MDHES sends out letters of invitation for a Site tour.

September 13 -- MDHES and the citizens group sponsor a Site presentation and tour for interested citizens, the press and local officials. MDHES gives a presentation about the Site at the Bozeman Public Library, then conducts the Site tour for twenty three people.

September 14 -- MDHES sends out letters of invitation for the citizens group meeting on September 20.

September 20 -- MDHES and citizens group hold an informational meeting.

November 6 -- MDHES sends out letters to Site residents to invite them to the citizens group meeting.

November 15 -- MDHES cosponsors citizens group meeting.

1991

May 23 - 7 p.m. -- MDHES holds a public meeting at the Bozeman Public Library to present the plans for the risk assessment and findings of the remedial investigation, including potential sources, soil, ground water and surface water contamination.

June -- MDHES publishes a progress report summarizing findings of the remedial investigation. Progress report is sent to entire Site mailing list.

June 19 - 7 p.m. -- Because of poor turnout at the May 23 public meeting, MDHES presents another public meeting with the May 23 meeting agenda.

1992

March -- MDHES publishes a progress report discussing the results of the remedial investigation and risk assessment. Progress report is sent to entire Site mailing list.

March 19 - 10 a.m. -- MDHES holds a meeting at the Bozeman Public Library with members of the press to discuss issues to be discussed that evening.

March 19 - 2 p.m. -- MDHES holds a meeting at the Bozeman Public Library with local city and county officials and staff to discuss remediation issues as they may affect public works and utilities.

March 19 - 7 p.m. -- MDHES holds a public meeting to discuss results of the risk assessments and remedial investigation at the Bozeman Public Library

February and March -- MDHES and EPA conduct community relations interviews in preparation of a revised Community Relations Plan.

April -- MDHES publishes a Proposed Plan and sends it to the Site mailing list.

April 1 -- MDHES begins 30 day public comment period on the risk assessments and remedial investigation. Comment period is subsequently extended 30 days at the request of potentially responsible parties.

April 14-15 -- MDHES and U.S. Agency for Toxic Substances and Disease Registry meet privately with members of the public about their health concerns.

April 16 -- MDHES begins 30 day public comment period on the Proposed Plan and Feasibility Study. Comment period is subsequently extended 30 days at the requests of potentially responsible parties.

April 30 - 7 p.m. -- MDHES holds public hearing on the Proposed Plan and Feasibility Study Bozeman Public Library.

II. EXPLANATION OF RESPONSIVENESS SUMMARY

A wide variety of oral and written comments were received by MDHES and EPA during the public comment period. Oral comments were received at a public hearing conducted April 30, 1992 in Bozeman, Montana. Written comments were received at MDHES offices in Helena. Comments were submitted by concerned citizens, Site neighborhood residents, local government officials and the potentially responsible parties: the Idaho Pole Company (IPC) and the Burlington Northern Railroad (BN).

The hearing was transcribed and MDHES identified substantive comments from the transcript. The comments and responses have been categorized by major topics. Many comments that expressed related or similar concerns were combined with one response prepared.

Editorial comments have been noted by MDHES and EPA, but are not included in the Responsiveness Summary. Substantive comments with MDHES and EPA response are presented in the following sections. These sections separate comments into general and originator categories.

The Responsiveness Summary concludes with specific potentially responsible party comments on the four documents released for public review. All of the substantive comments received by MDHES have been grouped together by originator or topic. Because there were instances where the same comment was made by more than one commentor, MDHES and EPA attempted to extract common themes and ideas when identifying and responding to comments.

III. GENERAL CONCERNS

INTRODUCTION

MDHES announced a 30 day public comment period on the Idaho Pole Company Site Remedial Investigation (RI) and the Baseline Risk Assessment (BRA) on April 1, 1992. The comment period was subsequently extended by an additional 30 days at the request of the Idaho Pole Company and Burlington Northern Railroad. The public comment period on the RI and the BRA ended on June 1, 1992.

The Proposed Plan announced a 30 day public comment period on the Proposed Plan and the Feasibility Study (FS). The comment period was subsequently extended by 30 days at the request of the Idaho Pole Company and Burlington Northern Railroad. The comment period on the FS and the Proposed Plan ended on June 16, 1992.

The Proposed Plan for the Idaho Pole Company Superfund Site was issued on April 16, 1992. The Proposed Plan:

1. Identified the preferred remedy selected by MDHES and EPA and explained the reasons for that preference;

2. Outlined the various alternatives that MDHES and EPA evaluated and compared for the Idaho Pole Company Site;

3. Highlighted key information in the RI/FS and Administrative Record;

4. Sought public review and comment on all of the alternatives described;

5. Provided information on how the public can be involved in the remedy selection process; and

6. Fulfilled the public notice requirements.

The Proposed Plan also announced a public meeting and hearing to take place at the Bozeman Public Library on April 30, 1992. The purpose of the public meeting was to allow MDHES and EPA representatives an opportunity to present a brief summary of the identified preferred remedy and to answer questions concerning the FS and the Proposed Plan. During the hearing portion of the meeting, formal comments were received and a court reporter was available to record and transcribe the oral testimony.

This Responsiveness Summary addresses comments received from the public (including the identified potentially responsible parties: the Idaho Pole Company and Burlington Northern Railroad) presented as oral testimony at the public hearing, and as written comments submitted during the public comment period for the RI and the BRA, and the public comment period for the FS and the Proposed Plan.

The preferred alternative for remediation of the Idaho Pole Company Site, identified by MDHES and EPA in the Proposed Plan, addressed soil and ground water contamination at the Site. The complexity of the Site with Interstate Highway 90 running through the center and an operating pole treating facility located on a portion, required that several alternatives be combined in the Proposed Plan to achieve remediation of the entire Site. The preferred alternative consists of a combination of two ground water alternatives from the FS and two soils alternatives from the FS.

Concerns of Area Residents

Oral testimony and written comment were received from persons residing in the vicinity of the Idaho Pole Company plant. The comments expressed concern about health effects related to drinking contaminated ground water, decreased property values, compensation for expenditures for water treatment and continuing residential well monitoring.

One resident has suggested that all remedies be evaluated for costs and time with the Idaho Pole Company plant removed and if remediation could be accomplished more quickly and at the same cost, the plant should be removed. Comments also suggest that the neighborhood residents to the West of "L" Street be connected to the City of Bozeman water supply system to eliminate the possibility of drinking contaminated well water.

Concerns of Local Government

Comments were also submitted by county and city governments. The county expressed concern about the delays in cleanup that the RI/FS has created. The City had concerns about potential impacts to the municipal water and sewer system during remedial action. Also, the City indicated that annexation of residential areas would be required before municipal water could be installed.

Potentially Responsible Party (PRP) Comments

The Idaho Pole Company (IPC) and Burlington Northern Railroad (BN) have been identified as PRPs for the Site. Both PRPs were offered the opportunity to conduct the RI/FS at the Site during negotiations in 1989. BN maintained that they were not responsible for contaminants at the Site and elected not to negotiate with EPA to implement the RI/FS. IPC and EPA were not able to reach agreement on the conditions under which the RI/FS would be conducted and negotiations were terminated.

MDHES requested that EPA enter into a cooperative agreement that would allow MDHES to conduct the RI/FS using funds from the federal "Superfund" tax on chemical products. MDHES contracted with MSE, Inc., Butte, Montana, to conduct the RI and the FS. A Final RI/FS Work Plan, dated January 1990, was developed and copies were provided to IPC and BN. Copies of subsequent RI/FS documents were provided to the PRPs. No comments were received from either IPC or BN on the RI/FS Work Plan or on the subsequent RI/FS reports until MDHES initiated public comment periods for the RI/FS, Baseline Risk Assessments and Proposed Plan.

The first comments from the Idaho Pole Company concerning the RI/FS documents were provided during oral testimony on the Remedial Investigation and Baseline Risk Assessment at the April 30, 1992 public hearing. IPC indicated that their evaluation of the RI had revealed a number of deficiencies in data collection and interpretation. IPC also indicated that their review of the Baseline Risk Assessment (BRA) portion of the RI revealed that the

risks associated with the Site were not as high as the BRA indicated. IPC did not present oral comments on the FS or Proposed Plan. BN did not present oral comments.

Written comments on the RI and BRA were received from both BN and IPC on June 1, 1992. The comments from BN included 73 pages of material and the comments from IPC contained 71 pages. Written comments on the FS and Proposed Plan were received from both BN and IPC. BN submitted 32 pages and IPC submitted 58 pages.

Remedial Investigation

Both PRPs indicated in their comments that the site characterization efforts of the RI were deficient and BN suggested that the RI be rewritten. IPC suggested that additional studies be undertaken. MDHES and EPA believe that the RI is complete and follows appropriate guidance and are not considering additional data collection efforts, except to verify soil contaminant concentrations in selected areas of the Site. The purpose of remedial investigation
was to:

1. conduct site characterization and data collection;

2. determine the nature and extent of contamination; and

3. prepare a human health and ecological risk assessment.

Baseline Risk Assessment

Comments from IPC on the BRA indicate that the current and future exposure risks to human health associated with the Site were not calculated properly. IPC claims that the BRA is overly conservative and does not follow EPA guidance.

BN comments on the BRA are focused on the railroad roundhouse area and indicate that the risks associated with that area are not great enough to warrant remedial action.

MDHES and EPA are confident that the procedures used to characterize Site risk are consistent with EPA guidance. It is currently EPA policy to not allow PRPs to conduct the Baseline Risk Assessment portion of the RI in an effort to assure the public that risks associated with a site are properly characterized.

Feasibility Study

Another comment submittal was received from each of the PRPs on the FS. BN's FS comments suggested that the RI/FS documents, including the BRA, be rewritten to incorporate changes that are alluded to in their comments. IPC presented revised risk

calculations, alternative preliminary remediation goals and an alternate preferred remedy in their comments.

MDHES and EPA believe that risks associated with the Site have been properly characterized in the BRA and that the remediation levels developed from the RI are appropriate. MDHES and EPA note that since preparation of the baseline risk assessment, the cancer slope factor for benzo(a)pyrene has been reduced by approximately 1/2. This effectively raises the cleanup level for B2 PAHs by a factor of two. Additionally, reevaluation of cancer risk for ground water ingestion of dioxin has resulted in a 50 fold decrease. These factors have been incorporated into the selection of the remedy and specific details are outlined in the Decision Summary.

Site Liability Issues

IPC and BN have been identified as potentially responsible parties for the Site because of their past association with the Site. IPC has operated a pole treating facility at the Site for a number of years and BN is a past landowner of the Site and is the successor to a previous operator on the Site.

Contaminated soil was identified during the RI in an area adjacent to the location of a roundhouse that was once owned and operated by BN's predecessors. A major portion of the comments submitted by BN on the RI/FS are directed at attempting to discount any relationship between the contamination in the roundhouse area, the Site in general and previous railroad operations. A number of comments submitted by IPC on the RI indicate that additional investigations should be conducted in the roundhouse area to more completely characterize the roundhouse's relationship to contamination in the treating plant area.

The purpose of the RI is to define the nature and extent of contamination at the Idaho Pole Company Site. The RI does not attempt to assign liability for Site contamination. Any mention of railroad activities in the roundhouse area and contamination associated with that area is to provide guidance for RI efforts. Historic use of the Site was one of many criteria considered when the RI/FS Work Plan was developed and does not serve to identify the party that is responsible for contaminants that are detected during the RI/FS.

MDHES and EPA have determined that additional remedial investigation will not be performed to attempt to determine the origin of contaminants in the roundhouse area. However, limited additional soil sampling will take place to further characterize contaminant levels.

GENERAL COMMENTS

The comments addressed in this section of the Responsiveness Summary have been identified as "general comments" because they raise issues more encompassing than many of the other comments. These general comments are in many cases, a consolidation of several similar

comments. These comments and their responses are not meant to substitute for the more detailed comments and responses contained in the following sections.

1. During oral testimony, several residents of the neighborhood located to the West of L Street expressed concern about health effects related to exposure to contaminants from the Site, decreased real estate values, and the need for future residential well monitoring. Several letters were also received during the public comment period that expressed the same concerns.

Response: Information provided to the Agency for Toxic Substances and Disease Registry, a branch of the U.S. Public Health Service, during interviews with local residents in April 1992, will be evaluated and a determination will be made concerning the need for additional health studies.

Neither EPA nor MDHES are able to compensate area residents for loss of real estate values due to contamination on or near their property or in the ground water used as their drinking water source.

As part of the selected remedy, residential well monitoring will continue. The current program provides for sample collection on a quarterly basis (every 3 months) and coincides with fluctuations in ground water levels. If the Potentially responsible parties agree to implement Site clean up, they will pay for the residential well monitoring. If EPA conducts the clean up, monitoring costs will be covered by the Superfund and EPA will seek to recover costs from the Potentially responsible parties. Monitoring will continue until ground water cleanup levels have been achieved.

2. Several comments concerning the effectiveness of reducing the toxicity of contaminated soil and ground water by bioremediation were received at the public hearing.

Response: Bioremediation is considered to be an innovative technology for treatment of contaminated soil and water. The use of bioremediation at petroleum refineries to decontaminate refinery process sludges has been documented for 30 years. Surface land treatment of refinery sludges and soil contaminated with hydrocarbons is currently taking place in Montana at three refineries permitted by EPA and MDHES's Hazardous Waste Programs. Data collected on the effectiveness of these facilities over several years of operation indicates that PAH concentrations are reduced significantly and that permit requirements are being met.

The Burlington Northern Railroad Paradise Tie Plant Site is the location of a former railroad tie treating facility where bioremediation is being used to decontaminate soil containing PAHs. Two years of operation data from this Site indicate reductions in PAH concentrations. The Libby Ground Water Superfund Site, located in Libby, Montana, employs bioremediation processes for both contaminated ground water and

soils. Ground water is treated in a fixed film bioreactor where microorganisms are used to degrade contaminants, primarily pentachlorophenol (PCP). Reductions of 90% and greater are being accomplished. Contaminated soil at the Libby Site is being treated in a surface land treatment unit where remediation levels are being reached.

EPA has established a program called "Bioremediation in the Field" to provide EPA and State Project Managers, consulting engineers and industry with information regarding the application of bioremediation at hazardous waste sites. The initiative provides evaluation of the performance of selected full scale field applications and has developed a data base on the field applications of bioremediation which is published in bulletin form.

The March 1992 "Bioremediation in the Field" bulletin lists approximately 140 sites where bioremediation has been proposed or is being used for site remediation. Of the 140 sites, more than 50 sites are currently in the operational phase and are collecting information on the effectiveness of the bioremediation remedy. The same bulletin lists eleven sites at which a bioremediation project has been completed.

There are differences between each site at which bioremediation has been or is being proposed as a remedy. A site specific evaluation or "treatment demonstration" is required prior to implementing bioremediation activities. The demonstration can include field-scale and laboratory testing to determine the most effective method for operating a biotreatment unit.

MDHES and EPA are confident that bioremediation will be effective at achieving remediation goals in soil and ground water at the Idaho Pole Company Site.

3. BN stated in written comments that they did not believe that the primary objectives of the RI were clear.

Response: The Final RI/FS Work Plan for the Idaho Pole Company Site dated January 1990 was provided to BN shortly after completion. Among other things, this document states in Chapter 4 entitled "Work Plan Objectives, Approach, and Data Quality" the purpose of the RI and the FS in general terms and cites the guidance and procedures to be followed.

Chapter 5 lists the specific tasks that were developed to be performed at the IPC Site including the following:

Community Relations
Potential Sources Investigation
Geologic Investigation
Ground Water Investigation
Surface Water Investigation
Biota Investigation
Cultural Resources Study
Airborne Contamination
Sample Analysis and Validation
Data Evaluation
Treatability Study/Pilot Testing
Expedited Response

Each of the above tasks are discussed in detail in the RI/FS Work Plan. Site investigations were performed in stages so that data collection efforts would be optimized. The results of one phase of an investigation were thoroughly evaluated prior to initiating a subsequent phase. This approach prevented a random sampling and data collection effort that could have proven to be costly and unnecessary. Although the RI/FS Work Plan was provided to BN and IPC, no comments on the Work Plan were received from either company.

4. BN and IPC commented that the Site history contained in the RI was inaccurate and incomplete. The area of the Site that BN and IPC were most concerned with was the roundhouse area. IPC submitted their version of the Site history and requested that it be included in the RI.

Response: Much of the Site history contained in the RI concerning railroad operations and the roundhouse was taken from a document prepared by BN entitled "Report of Historical Findings-Northern Pacific Roundhouse Site, Bozeman, Montana" (HRA, December 8, 1988). BN submitted the report to supplement their earlier submittals in response to EPA's Request for Information letter. The purpose of the Site History Section of the RI is to assist in site characterization by identifying past management practices that may have been the cause of releases of hazardous substances to the environment.

MDHES and EPA believe that the Site history that is contained in the RI is accurate and unbiased and does not attempt to assign liability for contamination found at the IPC Site.

5. Comments received from BN and IPC stated that comprehensive review of the RI and the BRA was difficult because information such as field notes, raw data and calculations were not available in the report.

Response: The appendices to the technical memoranda that were prepared during the RI process present the analytical data results from sampling events and are available in the administrative record. Field notes and raw data generated for an RI are not typically included in an RI report. This is because of the volume of such material and the fact that data results are summarized and presented in the report in a more usable fashion. Where the field notes provide additional information relied upon by the agencies, they are available in the site files. For example, the field notes taken during the sampling events that were used in estimating the volume of oily treating fluid are available through MDHES.

Calculations made by MDHES's consultant relating to the BRA and the ERA were also not included in the RI Report. It is not normal procedure to include the raw calculations made during the baseline risk assessment process in a remedial investigation report. However, the equations and assumptions used to derive the risk information were presented in the report. Thus such calculations can be verified without having the author's original work sheet presented in the report.

6. BN's written comments contain "Exhibit A" prepared by Envirocon, Inc., Livingston, Montana. Exhibit A consists of information that BN believes demonstrates that "...many of the same PAH constituents identified on the Site are present offsite ..." and that "...PAH concentrations offsite are generally of the same order of magnitude as PAH concentrations in the roundhouse area".

Response: Exhibit A contains eight laboratory report pages and a transmittal letter; portions of one USGS quadrangle map and part of a telephone book map; one Envirocon chain of custody record; and what appears to be three pages from the sampler's field notebook. MDHES and EPA agree that many of the PAH compounds found on the Site are found offsite not only in Bozeman, Montana but in the vicinity of any commercial/industrial development. however, they are not typically found at the concentrations that exist at IPC.

The data submitted by BN is not accompanied by a narrative description of the sampling event and no explanation is offered concerning the purpose of the exercise other than the above quotations. The Exhibit contains limited QA/QC information about the laboratory data quality but does not provide the Agencies with a Field Sampling Plan, Laboratory Analytical Protocol, Quality Assurance Project Plan or Sampling and Analysis Plan to review as was required at the Site prior to beginning the RI.

The values summarized on page 4-9 of the RI and listed in their entirety in Appendix E, indicate that the values in the BN Exhibit A are not comparable within an order of magnitude to the values of RI sampling data. A number of samples collected in the roundhouse area during the RI contained high molecular weight PAHs that are

suspected human carcinogens. These compounds were not above minimum quantification limits in the BN samples.

MDHES and EPA believe that the Agencies' soil characterization results for the IPC roundhouse area were accurate and that the area contains PAH levels considerably higher than background.

7. BN commented that the RI incorrectly indicates that contamination in the vicinity of the roundhouse was contributed by railroad operations.

Response: It was not the intention of the RI to identify the specific activity that caused the contamination that was determined as the result of field investigations. Since the railroad had operated a roundhouse near the current IPC plant, the substances that are typically used in roundhouse operations were a subject of the investigation. Among those substances are PAH compounds and they were detected at concentrations in the soil that are greater than background levels (See comment 6 above). The results of the RI indicate that past activities associated with the roundhouse may have contributed to soil contamination in the roundhouse area.

8. BN claims that contaminants in the roundhouse area are petroleum related chemicals that are exempt from CERCLA regulation.

Response: Although the contamination identified in the roundhouse area at the Site consists of PAH constituents, and some of these constituents are found in petroleum, the source of the PAHs is unknown. The occurrence of the higher molecular weight PAHs in the roundhouse area is not consistent with petroleum related chemicals; therefore, the CERCLA exemption does not apply.

9. Several reviewers of the Ecological Risk Assessment (ERA) observed that the ERA examines two human health exposure pathways and one ecological exposure pathway and questioned why the human pathways were included.

Response: The first paragraph on page 8-1 of the RI acknowledges that human exposures are not typically found in the ecological risk assessment. In this instance, however, the author felt that the cow-milk-child and the fish-fish fillet-child food chain scenarios were more appropriately located in the ecological risk assessment chapter than in the human health risk assessment chapter of the RI Report. Health concerns regarding human exposures to aquatic and domesticated species are linked directly to environmental quality and have therefore been included in the ecological risk assessment. These exposure scenarios form a link with the human health exposures evaluated in the Baseline Risk Assessment.

The Deer Mouse-Falcon food chain scenario was the only ecological exposure pathway identified by the author of the Ecological Risk Assessment.

IV. COMMENTS AND RESPONSES TO PUBLIC HEARING

MDHES and EPA conducted a public hearing on April 30, 1992, to accept oral comments on the RI Report, BRA, FS Report and Proposed Plan. The following comments are taken from the transcript of the public hearing.

1. Neighborhood concerns

a. Residents are concerned about potential sale of property, loss of property value and salability due to contamination and would like MDHES/EPA to assist them.

Response: MDHES and EPA are willing to discuss potential contamination with residents and prospective buyers although the agencies have no control over property values in Bozeman. Document repositories are set up at the Bozeman Public Library and the Gallatin County Environmental Health Office for the public to review Site information. MDHES has been conducting pentachlorophenol (PCP) monitoring of residential wells since the RI began, in order to provide up-to-date information to residents. This will continue throughout the cleanup. By addressing existing contamination, the cleanup is likely to increase current property values.

b. A concern was expressed about the potential risk that the people in the community, and particularly the people who live near the Site, face as a result of their exposure to PCP.

Response: MDHES and EPA are concerned about current risks posed by contaminants in ground water and soils associated with the Site. The purpose of the Remedial Action that will result from the RI/FS process is to reduce health risks posed by the Site to within an acceptable risk range. The acceptable lifetime risk range defined by EPA is less than from 1 in 10,000 to 1 in 1,000,000 excess cancers. After the Remedial Action has been completed, exposure risks will fall within this range.

c. A request was submitted to convert residential well monitoring from a quarterly monitoring system to a monthly monitoring system and to continue monitoring until clean-up is completed. Also the commentor stated that continued residential well monitoring will help people whose wells are affected settle on the best filtration system and determine whether or not their filtration system is effective for their contamination. With the potential for expanded contamination, continued monitoring of residential wells is absolutely essential. Monitoring would help MDHES and EPA evaluate the effectiveness of the remediation measures.

Response: Routine monitoring is a requirement of the selected remedy. Under the current situation, quarterly monitoring appears sufficient, because data from past monitoring events has shown that contaminant concentrations vary with ground water seasonal changes. During cleanup, more frequent monitoring may be warranted. Monitoring will evaluate the efficiency of home water treatment systems. Sampling of residential and monitoring wells will be an integral part of determining cleanup effectiveness and will be done throughout the cleanup. Additionally, post cleanup monitoring will be conducted for at least 3 years.

d. Commentors requested that the filtration [treatment] of residential wells in the area be continued.

Response: Currently one owner of a residential well that has become contaminated has installed their own on-tap treatment systems. The selected remedy for the Site, which will either be performed by the PRPs or EPA, includes treatment of contaminated residential wells.

e. The IPC has offered bottled water to any of the neighborhood residents that request it. One resident did not feel that bottled water is a solution to the contamination problem.

Response: MDHES and EPA agree that the use of bottled water is only a short term interim measure until on-tap treatment can be installed or the municipal water system is extended into the area. The City of Bozeman will consider extending the municipal water supply to the residential area if the area is annexed to the City. Before Remedial Action begins, any new contamination that is discovered would have to be addressed by individual well owners. Currently only one residential well has been contaminated and the owner of the well has installed a treatment system.

f. A resident commented that medical surveillance of people who have been affected by ground water near the Site is absolutely essential.

Response: MDHES and EPA are not able to include medical surveillance as part of the selected remedy. However, an agency of the U.S. Public Health Service, the Agency for Toxic Substances and Disease Registry, will be conducting a public health assessment at the Site during 1992. Depending upon the Agency's initial findings, it is possible that an in depth public health study could be conducted.

2. Health and ecological effects

a. The promotional material on PCP at the public hearing was distributed by the Intermountain Roundwood Association (IRA) representative. An attorney representing a neighborhood resident stated that the advertisement from one of the manufacturers and suppliers of PCP represented to be a perspective or a

summary report on PCP stands in stark contrast to EPA's determination that concentrations as low as one part per billion may be injurious to human health.

Response: The focus of the promotional material was that PCP has not been directly linked to cancer in people. While this is correct, a number of studies have identified adverse effects, including cancer, in animals from exposure to PCP. Furthermore, since PCP has been classified as a probable human carcinogen, the Agencies are charged with reducing or eliminating actual or potential health risks associated with exposure to PCP.

3. Responsibility for costs

a. Several individuals voiced concerns that the Potentially Responsible Parties should bear the burden of cleaning the Site and compensating residents for the diminished value of their property.

Response: MDHES and EPA will continue to actively pursue cleanup at the Site including cost recovery from, and performance of the selected remedy by the PRPs. MDHES and EPA do not have the authority to require the PRPs to compensate area residents for diminished property values.

4. Remedial investigation

a. IPC stated that products carried in the Yellowstone pipeline have constituents that are similar to what is seen on the Site. There are monitoring wells in the pasture upgradient of the pipeline that did not have detectable constituents in the ground water. Downgradient there were detectable constituents particularly at Res-10 and some of these other monitoring wells that may be an indication of a potential source. IPC stated that the RI Report incorrectly describes this pipeline as a conveyance for natural gas.

Response: PCP is the primary contaminant of concern present both up and down gradient of the Yellowstone pipeline. PCP cannot be attributed to Yellowstone pipeline, since the pipeline has never carried PCP. Therefore, MDHES and EPA have determined that no additional sampling is necessary in the vicinity of the pipeline. Potential contaminants in the pipeline common to the Site are polynuclear aromatic hydrocarbons (PAHs). Data evaluation does not indicate a contaminant source in the pipeline area. The RI was incorrect in stating that natural gas was conveyed in the pipeline. Since receipt of this comment, MDHES has verified that refined products such as gas, diesel and aviation fuel are carried in the pipeline.

b. IPC stated that the general quality of the laboratory data was not good and that a number of laboratory problems were documented in the RI Report. IPC

stated that 32 percent of the PCP data was thrown out and there was cross-contamination of some samples identified.

Response: The Fifth Quarterly Contamination Report provides the data limitations of the Remedial Investigation. The Fifth Quarterly Contamination Report is referenced in the Remedial Investigation Report and is Appendix F in the Remedial Investigation Report. The summary of this report is that all organics data (volatile, semivolatile, dioxin/furans, phenols, PAH, and PCP) were valid (useable) except for 4 soil samples. All inorganics data were valid (useable).

The RI Report includes discussion of all the data collected during the remedial investigation. This includes organics (6 methods were used covering approximately 150 compounds) and inorganics (1 method used covering 23 compounds). Discussion of this data documents specific problems such as estimated values for some samples. Again, the Remedial Investigation Report summary states that although there were limitations, all organics data were valid (except 4 soil samples) and all inorganics data were valid (useable).

According to the RI Report, no PCP data set was thrown out. The commentor may be referring to a phenol data set (that included the compound PCP) that was returned to the lab because of various problems. This data set represented the third monitoring well sampling event. In this ground water sampling event, phenols, including PCP, were analyzed by EPA Method 8040, PAHs were analyzed by EPA Method 8310, and PCP was analyzed by EPA Method 515.1. Although the phenols data set was sent back to the lab, concentrations of PCP (515.1) were available from the PCP data set.

The RI Report describes one PAH data set (November 1990) that had false positives (predominantly the compound chrysene) for certain (approximately 75%) ground water samples. These ground water samples were qualified by the data reviewer with the "X" flag (indicates that sample result is qualified due to carryover effects) and are described in the RI Report as only being used for screening purposes. Every data set in the remedial investigation was reviewed for carryover (instrumental memory effects occurring when a lower concentration sample follows a more concentrated sample) effects by the data reviewer; carryover effects did not occur on any other data set that was accepted from the CLP. There were no indications of cross contamination.

c. IPC stated that basic aquifer testing information was inadequate and could not be used to make estimates on rates for treatment.

Response: The data obtained was sufficient to develop a thorough estimate of treatment rates using procedures in the FS. Pump tests will probably be necessary during the Remedial Design phase to refine these estimates and design the extraction and treatment systems.

d. IPC stated that based on the data collected during the remedial investigation, there was no dioxin in the ground water.

Response: While no 2,3,7,8-isomer of tetrachlorodibenzo-p-dioxin (TCDD) was found in ground water, octochlorodibenzo-p-dioxin was found in two downgradient wells at about one part per billion.

e. A commentor asked for a description of the boundaries of the National Priorities List Site.

Response: The Site is defined by Rocky and Mill Creeks north and east, MRL tracks south and the residential area west. Lines are not specifically drawn; boundaries as such do not exist. The Site boundaries include all contaminated areas in close proximity to the area delineated by the above-listed features, including ground water.

f. A commentor wanted to know what volume of water is contained in the aquifer and what would be the rate of extraction and discharge in understandable units such as gallons per minute?

Response: Approximately 200,000,000 gallons of ground water has been estimated to have PCP concentrations greater than 1.0 μg/L, the MCL. There are no other estimates of ground water volumes. The rates of extraction and discharge will be determined during the Remedial Design phase and startup operations. For evaluation purposes, rates were estimated at 20 gallons per minute for extraction and 10 gallons per minute for discharge.

g. A commentor asked what the unenhanced rate of decontamination absent any additional contribution by pollutants would be.

Response: Ground water modeling has determined that it would take 5 years for contaminated ground water to reach cleanup levels naturally if all sources of contamination were removed, including removal of all LNAPL (light nonaqueous phase liquid or oily wood treating fluid) in the soils. The aquifer material is very transmissive and ground water flows through the Site quite rapidly.

h. A commentor stated that there was no information in the RI Report on measured oily wood treating fluid thicknesses.

Response: The thickness of the layer of oily wood treating fluid was measured by dipping a water sample from a monitoring well and measuring the floating oil on top of the water. The thicknesses of the oil layers were documented by the consultant in field notes and the overall results presented in Section 4.1.4 of the RI.

i. IPC commented that the RI did not discuss facilities and features that may have been sources of some of the types of constituents seen near the former roundhouse on the Site. There was apparently some type of treatment facility located there based on an old historical photograph. There is also a pipeline which conveyed something away from the former roundhouse.

Response: The RI investigated test pits in the former roundhouse area as part of the potential sources investigations. The RI identified pits in the photograph, but nothing conclusive was determined. The old pipeline was also investigated to determine what impact it may have had on Site contamination; no impact was identified.

j. IPC commented that a sample of the sludge material from the old pipeline was not obtained during the RI so there is not a good indication of what the sludge constituents may have been.

Response: Due to laboratory scheduling problems a sludge sample was not collected; however, an oily water sample was collected from the pipeline and the water was analyzed. Analysis of the water identified high concentrations of calcium, magnesium, aluminum and sodium but relatively low levels of PCP and PAHs.

k. IPC commented that a residential well sample was immediately resampled and the followup results did not confirm the original results. That fact makes those results suspect, similar to another residential well sample, that also had a suspect detection. IPC suggested that poor laboratory data could be one of the reasons that constituents of concern were detected and were not present in previous or subsequent sampling.

Response: Variability is inherent in the analysis of environmental samples. The samples in question were taken approximately one month apart and analyzed by different laboratories. Throughout the RI, periodic sampling indicated changing concentrations of ground water constituents and a change in the followup results for the residential wells was not unexpected. The QA/QC for residential well sampling events were conducted in accordance with EPA guidance.

l. IPC stated that there are some additional information needs that are required to develop a remedy that will work.

Response: MDHES and EPA do not believe that additional data collection is necessary. A number of design and operating parameters will be determined during the Remedial Design phase and startup testing.

5. Baseline Risk Assessments

a. A concerned citizen commented that risk levels displayed graphically may be helpful to understand this process. The commentor asked if there is an isorisk series of lines that would illustrate varying risks across the Site.

Response: Isorisk lines weren't prepared because risks were developed with the RME approach at two specific locations using assumed variables. Given the spatial separation assumed to exist between onsite and offsite receptors and the purpose of the Baseline Risk Assessment, isorisk lines have been determined by EPA not to be appropriate.

b. A commentor asked for a clear explanation of the actual reduction of risk odds. He asked how one would be exposed to a six in ten risk or a three in one thousand risk potential with existing conditions. Where would you have to stand? What area of soil would you have to swallow? What water would you have to drink in each of these extremes?

Response: Risks are reduced to acceptable levels by achieving cleanup levels which are judged to be protective to exposed or potentially exposed individuals.

The specific odds (e.g., 6 in 10) of excess lifetime cancer risk are based upon a particular set of exposure conditions to a particular contaminant of concern. For example, the Baseline Risk Assessment indicates that off-site children ingesting dioxin-contaminated soils/sediments/ground water would have an excess cancer risk of about 6 in 10. This estimate is predicated upon the following:

- the assumed characteristics (e.g., body weight, behavioral patterns) associated with the children, as given in the Baseline Risk Assessment;

- the media-specific exposure point concentrations for 2,3,7,8-TCDD toxicity equivalent, as given in the Baseline Risk Assessment; and

- the cancer slope factor and toxicity equivalent factors given in the Baseline Risk Assessment.

Some degree of uncertainty is associated with all of the above components of the risk analysis, as discussed in the Baseline Risk Assessment.

The following conditions would be necessary to present the reasonable maximum exposure risks outlined in the BRA:

Risk	Population	Location	Contaminant	Media	Route
6 in 10 ($6x10^{-1}$)	Children (6-12 yrs)	offsite (pasture)	Dioxin	soil/ground water	Ingestion
3 in 1000 ($3x10^{-3}$)	Adult	offsite (pasture)	PCP	soil	Direct Contact

c. A representative of the Intermountain Roundwood Association stated that PCP is rapidly eliminated from the body and only a small percentage of the amount absorbed by the body is deposited in the tissues. Most of the PCP, 99.99%, is excreted very rapidly in the urine as unchanged PCP.

Response: The primary route of PCP elimination in all species studied, including humans, is urine; this observation applies to all routes of exposure. The source of the commentor's statement that, "most of the PCP--99.99%--is excreted very rapidly in the urine as unchanged penta [PCP]," (Hearings Record, p.43) was not stated. However, Vulcan Chemical's Summary Report on PCP (4/91) notes that excretion rates in rats and humans, following oral and inhalation exposure to PCP, average around 50 %. Such values are somewhat lower than the 86% excretion rate as of PCP and its metabolic byproducts following oral exposure in humans developed by ATSDR (ATSDR Toxicological Profile for PCP, p.62; 12/89). Review of the literature could not verify the rate stated by the commentor.

d. The Intermountain Roundwood Association representative commented that the World Health Organization (WHO) states there is no conclusive health study linking PCP to cancer in humans.

Response: The commentor's statement (Hearing Record, p.42) appears to be based on the WHO's Environmental Health Criteria No. 71 - PCP (1987). Although no data regarding oral carcinogenicity in humans is evident, ample evidence exists to implicate PCP as an oral carcinogen in mice. EPA designated PCP as a probable human (B2) carcinogen, through the oral exposure route, in 1990. The basis for this designation was increased incidence of liver, adrenal and vascular tumors in mice. Further details are provided in EPA's Integrated Risk Information System (IRIS) database.

e. The Intermountain Roundwood Association representative commented that PCP's cancer potency factor is well within the range of other chemicals that are not regulated as acutely hazardous even though these chemicals may cause cancer in laboratory animals.

Response: The IRA indicates in this comment that PCP's cancer potency factor is similar to other chemicals that are not regulated by EPA as "acutely hazardous." EPA does not regulate PCP as an "acutely hazardous" chemical under the hazardous waste laws, however, PCP has been identified as a potential human carcinogen. There are many chemicals that are not classified by EPA as "acutely hazardous" that are potential carcinogens. Long term exposure to potential carcinogens is usually necessary to produce effects. This is not true for the "acutely hazardous" chemicals.

The RI procedures followed EPA protocol Risk Assessment Guidance for Superfund (RAGS I) in assessing the potential for excess cancer risk arising from exposure to PCP contaminated media. Furthermore, the Baseline Risk Assessment indicates the potential for noncarcinogenic health hazards arising from offsite individuals consuming PCP contaminated ground water.

f. IPC believes the Baseline Risk Assessment to be overly conservative and a misrepresentation of actual potential risk to the residents currently living in the area.

Response: The overall assessment was performed in general conformance with EPA's Risk Assessment Guidance for Superfund (RAGS), Volume I. RAGS provides guidance for evaluating human health concerns (e.g., excess cancer risk) associated with the "no action alternative" (i.e., baseline Site conditions). The evaluation of need for cleanup actions at Superfund sites should be based on an estimate of Reasonable Maximum Exposure (RME) expected to occur under both current and future land use conditions. RME is defined as, "the highest exposure that is reasonably expected to occur at a site", (RAGS, p.6-5). The intent of the RME is, "to estimate a conservative case (i.e., well above the average case) that is still within the range of possible exposures", (ibid.).

The RME scenarios are based on conservative assumptions, and may overestimate actual risk by an order of magnitude or more. The RI makes this likelihood clear in the Uncertainties Analysis Section of the Baseline Risk Assessment.

g. IPC stated that the Baseline Risk Assessment was not a reasonable estimate of risks for offsite residences along L Street. IPC believes that the Baseline Risk Assessment greatly overestimated risks to those offsite individuals from 10,000 to 100,000 times.

Response: PCP related estimates of excess cancer risk (via ingestion) range from 4.9 E-03 (i.e., ~5/1000) in adults to 9.0 E-03 (i.e., 9/1000) in children assumed to live at Residence-10 (Table 5-3, Part B of the Baseline Risk Assessment). These estimates are based on the geometric mean concentration of 1.005 mg/L PCP in downgradient wells because the downgradient wells had higher PCP concentrations than upgradient wells (Table 3-5). This value is about 10 times the concentration observed and

modeled at Res-10 (i.e., about 0.15 mg/L); in addition, the modelling results show PCP concentrations along L Street as varying between 0.01 and 0.08 mg/L.

Actual exposure point concentrations may result in PCP related excess cancer risks that are one-tenth (i.e., 0.15 mg/L) to one-hundredth (i.e., 0.01 mg/L) of that calculated for the RME case. "Actual" excess cancer risks would then vary from about 5/100,000 (i.e., 4.9E-03 * 0.01) up to 1/1000 (i.e., 9.0E-03* 0.15), assuming linearity in dose-response characteristics. Such potential risk levels were alluded to in Section 5.3 (Uncertainty Analysis) of the Baseline Risk Assessment. Cleanup is based in part on the RME results as required by EPA guidance (RAGS, Volume 1). The ground water model output (MSE Technical Memorandum 2, Addendum C) and analytical data for the L Street residences (Remedial Investigation, Appendix E) indicate the likelihood of residents consuming ground water containing more than 0.001 mg/L PCP. This level represents an upper bound excess cancer risk of 3 in a million exposed individuals (56 Federal Register 126: 30271; July 1, 1991).

h. IPC commented that the offsite exposure scenario was inappropriate because the State assumed that inhalation of contaminants during showering would be significant.

Response: Given the uncertainty of this approach, the worksheet appendices identify the contribution from this route of exposure. This allowed the calculation of contaminant of concern specific excess cancer risk independent of this route. The Baseline Risk Assessment recognized that inhalation of the semivolatile contaminants (e.g., PCP) during showering may not be equivalent to that of ingesting an additional 2 L/day of water.

i. IPC commented that the Site used for the offsite scenario is owned by Idaho Pole Company and is currently unoccupied.

Response: MDHES and EPA feel that it is reasonable to assume that Residence 10 could be occupied in the future. Although IPC is the owner of Res-10, the house has not been demolished and could be reoccupied.

j. IPC stated that if the appropriate exposure assumptions had been used, the risk goes from one in 100 to a risk of one in 100,000.

Response: The use of RME assumptions often results in excess cancer risk (or noncarcinogenic health hazard) estimates that may be one to several orders of magnitude greater than those actually present. The protective nature of the RME results was identified and discussed in the Uncertainties Analysis of the Baseline Risk Assessment. The Baseline Risk Assessment was performed in general compliance with RAGS I.

k. IPC commented that the data used for the Baseline Risk Assessment offsite scenario was collected in a study that was not part of this Baseline Risk Assessment or this remedial investigation.

Response: Table 3-5, footnote "f" of the Baseline Risk Assessment states that the "B" zone 2,3,7,8-TCDD toxicity equivalent (TE) RME concentration was based on Idaho Pole Phase One Sampling, EPA-Emergency Response Branch, May 1987, data from monitoring well No. 16B. The data package (including that for well No. 16B) was reviewed using EPA data validation protocols, and was found to be of acceptable quality for use in site characterization. This data package is part of the administrative record.

l. IPC commented that one data point for dioxin in ground water is not statistically significant and that it is difficult to defend a database of one sample.

Response: The analytical database for ground water associated with the IPC Site contained more than one dioxin value, and it was determined that those values could not be ignored. The analytical database for the RI indicates that octachlorodibenzo-p-dioxin (OCDD) was quantified in ground water.

The August 1990 Res-03 results (BRA, p.2-65) and November 1990 MW-27A results (BRA, p. 2-72) imply that "actual" TCDD TE levels in downgradient ground water may be closer to 0.001 parts per trillion (ng/L) than the $\leq$ 50 parts per trillion utilized in the RME case (Table 3-5, Part B). Two important conclusions follow:

- the ingestion related excess cancer risk for persons residing at Res-10 (and consuming ground water containing 0.001 $\pm$ ng/L TCDD TE) would be about 9.0E-06 (i.e., 4.0E-01 * 0.001/50);

- the residents northwest of L Street may be consuming ground water containing lower TCDD TE levels than have been proposed for public water supplies (i.e., 0.05 ng/L TCDD TE; 55 Federal Register 143: 30371; July 25, 1990).

This reevaluation indicates that dioxin levels in downgradient ground water are sufficiently low to delete this "compound" as a contaminant of concern in ground water

m. The Intermountain Roundwood Association representative asked if there has been a documented case of cancer or death associated with the Site.

Response: MDHES and EPA do not know of any documented cases of cancer or death associated with the Site.

n. The IPC would like to present a revised risk assessment using the state's information.

Response: MDHES and EPA have accepted and considered comments on the Baseline Risk Assessment and have made adjustments to the selected remedy as appropriate. The Baseline Risk Assessment was conducted in a manner consistent with EPA guidance and is therefore deemed to be an accurate representation of the past, present and future risks at and near the Site.

6. Feasibility study

a. A commentor asked how the 10 year projected time span for soil treatment is arrived at.

Response: The 10 year treatment period is a conservative time span based upon the volume of contaminated soils accommodated in each lift of the land treatment unit, the total soil volume to be treated and the years required to treat each unit. The time for treatment per lift is estimated from data obtained at other sites (Libby, MT, Paradise, MT, Montana petroleum refineries). *In situ* treatment time was estimated through modeling conducted by MSE and Western Research Institute.

b. The Intermountain Roundwood Association representative asked what contractors were consulted in coming up with the cost estimates for alternatives.

Response: The cost estimates were prepared by MSE, MDHES's technical consultant for the RI/FS. These efforts included consultation with, and review of technical literature received from vendors who specialized in the various treatment technologies evaluated in the Feasibility Study (FS). The resulting estimates were reviewed by MDHES and EPA.

c. A commentor asked if consideration had been given for the complete removal of the wood treating plant to effect efficient remediation and if it would be more efficient to directly treat soil underneath the actual treatment plant's structures and operating facilities.

Response: In the FS, the description of Soil Alternatives 3, 4, 5 call for removal of all structures overlying contamination. It is likely that better treatment would result with direct access to soils. However, in balancing the nine criteria, MDHES and EPA feel that the soil flushing is the best selection for contaminated soils underlying structures.

7. Proposed plan

a. A commentor asked what the difference in terminology between ground water and contaminated ground water in discussion of Alternative 3 and Alternative 4 is, and if this means that Alternative 3 is for a polluted system that has less risk.

Response: The FS contains detailed descriptions of each of the ground water alternatives that should answer questions concerning their application. Both alternatives concern the same contaminated ground water.

b. A commentor suggested that an alternative should have been developed that would provide for a domestic water distribution system from a municipal treatment source.

Response: Use of an alternative water distribution system was considered early in the alternatives development and screened out due to cost, municipal policy and potential to contaminate ground water during construction. Neither the public nor the residents have indicated a preference for city water. The Proposed Plan does not discuss domestic water distribution because it was previously screened out and was not a part of any alternative.

c. The Intermountain Roundwood Association representative stated that the statistics used in the Proposed Plan seem to have disregarded scientific information.

Response: The risk values were generated from site characterization information collected during the RI, exposure scenarios that have been standardized by the EPA, and toxicity values that were based upon extensive research.

8. Public participation

a. The Intermountain Roundwood Association representative commented that factual information about PCP might help the public understand the real health threats at the Site. He suggested that much of Vulcan Chemical Company PCP information should have been incorporated into the reports to allow the public the ability to make informed comments.

Response: The Vulcan Chemical Company information has not been verified and the accuracy of the data is questionable. MDHES and EPA are committed to providing the public with the most accurate, up-to-date information on the contaminants of concern at the Site.

b. The Intermountain Roundwood Association representative questioned the objectivity of the information presented in the Proposed Plan and suggested that it was biased.

Response: MDHES and EPA have worked diligently to present factual Site information. Addresses, phone numbers and names of agency personnel have been available since inception of the RI/FS and personnel have been and are willing to listen to the concerns of all interested parties. The RI/FS, Proposed Plan and ROD are the product of MDHES, EPA and the Federal Agency for Toxic Substances and Disease Registry. MDHES and EPA have worked hard to present the information as clearly and objectively as possible. The agencies are charged with protection of public health, welfare and the environment and, as such, assume a protective rather than permissive position.

c. The Intermountain Roundwood Association representative stated concern that the work and studies done at the Site have cost well over three hundred thousand dollars, paid for by the people of Montana.

Response: The RI/FS has been conducted as a federal Superfund financed project. The Superfund is funded by nationwide taxes on the chemical industry and from money received from potentially responsible parties. EPA intends to seek cost reimbursement from Potentially responsible parties identified at the Site. Costs incurred in conducting the RI/FS total approximately $1,000,000.

9. Selected remedy

a. A neighborhood representative commented that bioremediation is being considered at a number of sites around the country but an EPA document says there are only four where it's been implemented and only one where it's proven successful to date. The commentor stated those sites have not involved the level of contamination present at the Site. The commentor wants the agencies to select a remedy that is cost effective but also effective in the long run and protective of public health and the ground water quality.

Response: The preferred remedy was selected because it is protective of public health and the environment while being cost effective (as well as ranking above or comparable to other alternatives when compared against selection criteria). Bioremediation is in the process of being implemented at many more than four CERCLA sites (Bioremediation in the Field, No. 5, March 1992). Bioremediation has been utilized extensively at many non-CERCLA sites and waste treatment facilities. It is an accepted method for treatment of petroleum refinery wastes, even in Montana's harsh climate and limited "growing season".

The Idaho Pole Company Site actually has lower contaminant concentrations than many of the other sites that have implemented or are planning to implement this technology.

Polynuclear aromatic hydrocarbon (PAH) and PCP data for soils in the wood treatment and historic roundhouse areas are summarized below (in mg/kg):

Chemicals of Concern	Roundhouse Area	Treating Plant Area
B2[a] PAHs	10T/20M[b]	15T/175M
D PAHs	10T/25M	30T/260M
PCP	0.3T/0.6M	88T/578M

[a] B2 = probable human carcinogens, D = not carcinogenic to humans.
[b] T = "typical" value, M = maximum value.

Comparison of these data against that observed at other PCP/creosote pole treating sites does not indicate an unusually high degree of contamination at the IPC Site. For example, materials being bioremediated currently at the Libby NPL Site contain the following "typical"/maximum contaminants of concern levels: PCP, 29/2,700 mg/kg; B2 PAHs, 96/1,900 mg/kg and D PAHs, 775/22,000 mg/kg. Engineered land treatment of these materials over a 140 day (mid-June to mid-November) treatment season has produced the following results: PCP, 170 down to 25 mg/kg and 30 down to $\leq$ 2 mg/kg; and B2 PAHs, 275 down to 50 mg/kg and 125 down to 25 mg/kg. Such rates of contaminants of concern destruction, if transferable to the Site, would result in health protective levels following treatment. However, as stated in the FS, further refinement of the biological treatment technology for soils and ground water will occur during the Remedial Design phase.

Much work has been done in biological treatment of hazardous substances. A number of investigations have demonstrated its effectiveness. The critical feature of implementing bioremediation is determining the operating parameters necessary to achieve destruction of contaminants.

b. A commentor asked if ground water would really be cleaned up in 15 years.

Response: *In situ* bioremediation will be the primary remediation method for the dissolved phase ground water contaminant plume and current projections indicate that cleanup levels can be reached in 15 years. The rate of contaminant degradation will be determined during Remedial Design. Effectiveness and reliability will be quantified at this time. The MDHES and EPA will conduct five-year reviews during the course

of remediation in order to insure that the effectiveness and reliability objectives are being achieved.

c. A commentor asked what volume of soil would be treated *in situ* under the existing structures.

Response: Approximately 23,000 yd^3 will be treated *in situ*.

d. A commentor asked if biotreatment works at low temperatures and inquired about the temperature range for optimum biotreatment.

Response: Biological metabolic activity rates slow at low temperatures. The optimal temperature range for bioremediation in soils is 60 - 90° F. The calculated treatment time for Site soils takes into account a potential slow-down or halt of biological activity during the winter months. Greenhouses covering the land treatment units have been considered to allow the biological process to continue through the winter. Use of greenhouses will be explored further during the Remedial Design phase. Indigenous species of bacteria which will be used for treatment will already be acclimated to the extreme fluctuations in temperature that can occur in Bozeman. *In situ* ground water treatment will not be greatly impacted by temperature because the ground water remains at nearly a constant temperature the year round. Ground water pumped and treated during the oily wood treating fluid recovery process will not be exposed to subfreezing temperatures. The extraction and injection system will be designed to prevent problems associated with freeze ups. The biological reactor will be designed to maintain the optimal treatment temperature range. Addition of supplemental heat from an auxiliary source may be necessary during the winter months.

e. A commentor asked how long would water be held for treatment before reinjection.

Response: The treatment reactor will be designed to treat the maximum volume of water produced during the recovery process. This volume is estimated to equal a flow rate of 200 gallons per minute. The retention time in the treatment reactor(s) will probably be on the order of 30 to 60 minutes.

f. A commentor asked what would be the total expenditure at the end of the 15-year period.

Response: The present worth cost has been estimated at approximately $9 million.

g. A commentor asked if reclamation and revegetation would be implemented on Site after the completion of the treatment process.

Response: Excavated areas would be returned to a condition similar to what existed prior to cleanup, i.e., pole plant yard or pasture would be returned to same use and condition. The closed land treatment units would have a specific cover design that requires vegetation.

h. A commentor asked what would be the time frame for remedial requirements under the no action alternative.

Response: The time frame for no action is indefinite. Residential monitoring is the only activity that would take place.

i. The Intermountain Roundwood Association representative asked whether the contractor who does the cleanup has to competitively bid for the job or whether the contractor will already be hired by the EPA to do remediation.

Response: MDHES and EPA intend to negotiate with the Potentially responsible parties to conduct the cleanup. Contractual procurement procedures will be determined by the potentially responsible parties, but final approval of contractors will be granted by EPA in consultation with MDHES.

j. IPC stated that the remediation must be environmentally sound and economically sensible.

Response: EPA and MDHES agree with IPC's statement to the extent it reflects the requirements of the National Contingency Plan and believe that the selected remedy is both environmentally sound and economically sensible. The selected remedy was evaluated and compared with other remedial alternatives based on the following nine criteria which are specified in the National Contingency Plan:

i. Overall Protection of Human Health and the Environment.
ii. Compliance with Applicable or Relevant and Appropriate Requirements.
iii. Long-term Effectiveness and Permanence.
iv. Reduction of Toxicity, Mobility and Volume
v. Short-term Effectiveness
vi. Implementability
vii. Cost
viii. State Agency Acceptance
ix. Community Acceptance

The selected remedy represents the best balance of these criteria.

V. COMMUNITY CONCERNS

1. A local resident stated that he hoped that the flow underground has not contaminated the ground water at his business and home just across the highway and up the road.

Response: Based on available information, MDHES doesn't believe that ground water contaminants from the Idaho Pole Site are moving a significant distance from Rocky Creek. The ground water investigation conducted by MDHES indicates that ground water moves north from the pole plant towards Rocky Creek with a slight downstream tendency. Since the area of concern to the commentor is upstream from the Site, it is unlikely that it is impacted by contaminants from the Site.

2. One commentor questioned whether continuing pollution may be occurring from the treatment facility because reference is made to a "continuing release of hazardous substances" in the Proposed Plan.

Response: Soil and ground water are contaminated with pentachlorophenol solutions that have already been released and remain uncontrolled. The phrase is not meant to imply that releases from barrels, ponds or vats are presently occurring. Rather, it refers to soil and ground water that may be in contact with the oily wood treating fluid.

3. One commentor suggested that the preferred soil remedy should be segmented to first include excavation, recovery and treatment for polluted soil on the Site at the contamination source, then examine the remainder of the Superfund Site, including the areas north of I-90, to decide if additional remediation is required .

Response: The focus of the selected remedy, as well as the approach taken in the RI/FS, is similar to that suggested in the comment. The greater amounts of contaminants are present in the pole plant area, and they will be addressed initially.

Contaminants in the soil and ground water under I-90 and in the pasture north of the highway must also be addressed because they are the primary threat to residential wells northwest of L Street. The scheduling of soil excavation in the pasture area and the installation of the ground water treatment system will be established during Consent Decree negotiations with the potentially responsible parties.

4. A commentor recommended that options should be developed for each alternative, that compares cost and time frame with the Idaho Pole treatment facility not removed and with the treatment facility removed.

Response: The alternatives were not defined and written with such a breakdown. Soil Alternative 2 was defined for potential implementation in a limited area of the Site, outside of the pole plant and I-90. Soil Alternatives 3, 4, and 5 called for excavation

of all contaminated soils, including those under the structures and I-90, along with the removal of oily wood treating fluid. The only way that Alternatives 3, 4, and 5 could address contaminated soils under structures and I-90 was through removal of the structures and I-90. The costs for structure removal are summarized in the FS. Costs for replacement of I-90 were evaluated in the FS, but costs for reconstructing the pole plant were not. Since Alternatives 3, 4, and 5 would not address contamination if the structures remained in place, optional scenarios were not established. Alternative 6 did not require the removal of structures or I-90.

The chosen remedy involves selective application of a number of alternatives. Nevertheless, to make it possible to compare costs, costs were calculated assuming that each alternative would be applied over the entire Site. Because the surface capping alternative was considered as a possible alternative for the roundhouse area only, costs for each alternative were also calculated for the roundhouse area only, to facilitate comparison of costs of remediating that area.

5. One commentor felt that interim treatment at the wellhead ignores the obvious, which is to supply potable water to the residential area through a municipal type delivery system since this system would be a method of eliminating health risks and thus fulfilling the mandate to clean up the IPC Site, without having to excavate areas north of I-90.

Response: There has been considerable thought given to the installation of a treated municipal water system. While the benefit of installing such a system is recognized, there are associated problems: cost (capital cost and operating and maintenance cost), time period, the potential to provide preferential pathways for contaminated ground water or oily wood treating fluid movement, community opposition and municipal policy. The neighborhood residents have not expressed a preference to be added to the City's water distribution system. One neighborhood resident on city water actually uses his neighbor's well water for drinking. The City of Bozeman commented that any distribution of water would require annexation into the City. The residents have objected to such annexation in the past, citing tax increases as a concern.

Furthermore, actual cleanup of the Site, rather than simple replacement of the water supply, is the manner in which all the potential problems can be addressed and further spread of the contamination can be stopped. Without cleanup, risks could arise in the future which would not be addressed by a municipal water system. MDHES and EPA have determined that oily wood treating fluid that exists north of I-90 must be addressed by the cleanup to eliminate the source of contamination to residential wells and to return the area to unrestricted use.

6. One commentor stated that the cleanup should proceed with all due speed, which could mean that the pole plant and possibly the substation should be removed during the course of the cleanup activities.

Response: MDHES and EPA will strive to see that cleanup begins as soon as possible. The alternatives selected in the ROD are among the easiest to implement and among the alternatives considered most effective in the short term. Consequently, the remedy will be conducted expeditiously with minimal risks to workers and the community.

The selected remedy for soils in the IPC plant area, soil flushing and *in situ* biological treatment, is the most effective solution for dealing with contamination beneath the structures, so pole plant removal is not necessary. The substation need not be removed since oily wood treating fluid in that area is minimal.

7. One commentor stated that the proposed remedy appeared overly costly, inconclusive and prolonged and suggested that a few more months spent in the development of remedies framed around these comments could achieve mandated results.

Response: The estimated costs for the selected remedy are lower than costs associated with most of the other alternatives. The preferred remedy is expected to effectively reduce oily wood treating fluid contamination thereby removing the principal threat at the Site. MDHES and EPA have made adjustments to the remedy to accelerate anticipated cleanup, but it will still take time to complete the cleanup.

The selected remedy best satisfies the nine criteria used to evaluate remedial alternatives. In particular, the remedy will be protective of human health and the environment and will achieve Applicable or Relevant and Appropriate Requirements (ARARs) for cleanup. Thus, the remedy will achieve mandated requirements.

8. One commentor suggested that if the plant is a hazard, EPA and MDHES should close the plant or stop the hazard.

Response: At this time, available data suggests that contamination on site is a result of historic, rather than present, plant operations. Based on this information, closing the plant does not appear to be warranted. Any handling of hazardous wastes at the plant must comply with RCRA and other applicable or relevant and appropriate requirements.

9. One commentor suggests that rather than spend <u>another</u> $23 million, EPA and MDHES should let the Idaho Pole Company buy all the property north of the Interstate, east of the Burlington Northern spur and west of Rocky Creek including one residence directly across Rocky Creek , then let nature cleanup the plume as it is doing now. The commentor believed that at the rate nature is cleaning up the contamination, it will probably be done by the time all of the studies are complete.

Response: The estimated costs for the selected remedy are estimated at about $9,000,000, not $23,000,000 as the commentor suggests. Remedies at other Superfund sites have identified a residential buyout in cases where cleanup was not possible. The buyout alternative was not evaluated and neither MDHES nor EPA feel that it is appropriate for this Site, since the selected remedy is expected to be protective of public health and the environment.

Additionally, there is no evidence that the contaminant problems are cleaning themselves up now. Indeed, without removal of major volumes of the oily wood treating fluid, it is unlikely that the ground water would ever clean itself up.

10. One commentor requested that wells at the Bridger View Trailer Court be sampled and that residents be informed of the results.

Response: The Bridger View Trailer Court was included in the MDHES April, 1992, residential sampling. Generally when MDHES reports results for a residential sampling round, the sample site owner and occupant are sent the results of their well only. However, for the MDHES monitoring, complete reports of the residential sampling will be distributed to the document repository at the Bozeman Public Library. The report will contain results of all the sampling with a short narrative.

VI. LOCAL GOVERNMENT CONCERNS

1. County government officials commented that the time and money spent on paperwork for this project was not justifiable.

Response: In conducting community relations activities as required by CERCLA and the National Contingency Plan, MDHES and EPA produced a significant amount of information for state and local officials. In accordance with the county commissioners' request, MDHES discontinued sending documents to the commissioners' office.

2. The City of Bozeman had several concerns about the proposal to use the publicly owned treatment works (POTW) in this remediation effort. First, the City noted that the closest sewer is approximately 1550' from the site, requiring the wastes to be transported to said sewer, or directly to the plant. City of Bozeman ordinances preclude the acceptance of trucked wastes and wastes from other sewage treatment systems. The City also noted that its POTW was designed and intended to be used for the treatment of domestic sewage, not an industrial discharge, and that acceptance of wastes from the Site would set a precedent that is not acceptable to the community.

Response: The selection of a remedy through the RI/FS process is an attempt to determine the most effective and efficient manner of cleaning up contamination at a site. Including discharge to the POTW as part of the remedy selected is not a final

determination that such a discharge will occur, rather, it is the Agencies' determination that that alternative is the most desirable alternative for the cleanup.

There are a number of issues that remain to be resolved as part of the Remedial Design phase, the next step in the Superfund process. These issues include whether such a discharge will be allowed by the appropriate government authorities, including the authority operating the POTW. Among the legal requirements identified as ARARs with which the remedy must comply are the various legal restrictions governing discharges to POTWs, including 40 CFR Part 403, 40 CFR Part 421, and the RCRA permit-by-rule requirements at 40 CFR § 270.60. The ARARs analysis expressly notes that since any such discharge would occur offsite, the administrative, as well as the substantive portions of those requirements will apply. Thus the City of Bozeman is assured that such a discharge could occur only after the proper consultation and permit procedures are followed. Specific volumes, rates, effluent limitations and method of discharge would be clearly established and agreement reached with the City before any discharge to the POTW would take place.

3. The City commented that constructing an outfall sewer or permanent, below-ground supply line to serve this site is not viable because of the trenching through the contaminated soils that would be necessary. The City mentioned that in using the existing gravity sewer collection system, there is some risk of two occurrences. First, exfiltration between the site discharge point and the plant could occur, widening the area of possible pollution. Second, the City may find itself named as a potentially responsible party as the transporter of wastes if a problem with this method of disposal was later identified.

Response: The City's concerns would have to be addressed as part of the Remedial Design phase before this method of treatment could properly be implemented. The first concern would be alleviated through very strict effluent standards that will be clearly identified during the Remedial Design phase and exfiltration would be minimized by construction procedures. The second concern could be addressed through legal arrangements between the parties for allowing the discharge and treatment of effluent.

4. The City stated that the additional financial burden of oversight responsibility by the City must be addressed and that the financial costs of using Bozeman's POTW for disposal of this site's wastewater exceed the benefits.

Response: All costs associated with discharge to the POTW would be the responsibility of the potentially responsible parties. This would include all capital improvements as well as operation and maintenance costs.

5. The City commented that its sludge injection program would be permanently compromised if wastewater from the Site were discharged into the POTW because the

public's perception of the effect on the sludge is that the contaminants of concern will concentrate in the sludge.

Response: MDHES and EPA may not be able to impact the public's perception; however, a public education effort could be initiated. Extensive startup testing and routine testing would occur to ensure that sludge would meet current standards.

6. The City stated that reinjection of treated ground water would mitigate any hazard of aquifer depletion and avoid the possibility of wasting of ground water.

Response: MDHES and EPA agree with the City about the benefits of reinjection, and have selected reinjection as a means of disposing of treated ground water at the Site. However, it is possible that the capacity of the aquifer is insufficient to contain all of the treated ground water, so MDHES and EPA are considering other options including discharge to a POTW and discharge to surface water.

7. The City stated that if reinjection of treated wastewater is not acceptable, the Superfund contractor conducting the cleanup should be required to apply for, and operate under, its own MPDES permit. The City felt this should assure proper State oversight and eliminate any questions of responsibility and liability that could be raised if a permit violation at the Bozeman POTW occurs.

Response: If discharge to the POTW is not feasible for administrative or technical reasons, and not all treated ground water can be reinjected, a discharge to surface waters in compliance with MPDES requirements may be required. The agencies believe the possibility of discharging to the POTW should be explored as the preferable alternative, because of the obvious cost savings and efficiency of using an existing wastewater treatment facility.

8. The City stated that it would need a full evaluation of the hydraulic capacity of the collection system, as well as a full evaluation of the hydraulic and biological loading on the treatment plant before accepting discharges. This evaluation should include the effects of the bioremediation microbes on the biological processes of the plant.

Response: The concerns mentioned would all be developed and evaluated during the Remedial Design phase. MDHES and EPA anticipate that the potentially responsible parties will conduct the Remedial Design and Remedial Action with EPA and MDHES oversight. The City will be afforded a direct opportunity for review of specific activities that require City involvement.

9. The City commented that the preferred remedy identified a need for 1500 gallons per minute supply, initially from the municipal water system. This flowrate can exceed the City's current ability to supply treated water during the high demand periods,

commonly during July and August of each year. The City also stated that backflow/cross connection and contamination must be prevented.

Response: The limitations of the City's water supply system will be taken into consideration during scheduling of Remedial Action, and the design will attempt to make the remedy as self contained as possible, using water from the Site to the maximum extent practicable. Also, specific criteria developed during remedial design will address the prevention of backflow/cross contamination and the design documents will be provided to the City for review.

10. The City commented that the institutional control referenced in Ground Water Alternative #3, hookup to City water, will require trenching through potentially contaminated soil and that the closest existing main is approximately 2000' from the sites needing the hookup. In addition, the City will require annexation for water service.

Response: It is unlikely that MDHES and EPA will require that residences near L Street be provided municipal water. When Remedial Action is completed the ground water in the area will be suitable for drinking, and a long term alternate water supply will not be necessary. However, if water hookup is required, MDHES and EPA recognize the technical and institutional hurdles identified by the City. Those hurdles would be addressed during Remedial Design.

11. The City commented that any activities within the floodplain that would affect the hydraulics of the Creek and its floodplain would require that a floodplain development permit be secured through the City's Engineering Office.

Response: MDHES and EPA do not anticipate any changes to Rocky Creek hydraulics as a result of the implementation of the selected remedy. In any case, actions under CERCLA that occur "onsite" (i.e., within the areal extent of contamination together with all suitable areas in very close proximity to the contamination necessary for implementation of the response action) are exempt from federal, state, and local permitting and administrative requirements, but must still comply with the "substantive" provisions of those requirements.

VII. POTENTIALLY RESPONSIBLE PARTY COMMENTS ON THE REMEDIAL INVESTIGATION REPORT

1. IPC stated that historical accounts also point to a conveyance structure (i.e., a ditch, drain or wooden flume) which carried waste discharges from the roundhouse area northward, toward the present day IPC wood treating facilities, and that a drain system, originating from the roundhouse may have had an undetermined effect on Site contamination.

Response: The historical drain running from the roundhouse area was investigated and determined not be impacting the Site because the material contained in the drain was limited to the immediate area of the drain. Based on the results of the investigation, the drain pipe was not identified as a source of Site contamination.

2. BN commented that it is inappropriate to discuss the locations of test trenches C1 and C2 relative to the roundhouse, and to imply that any contamination found in the pipe is from the roundhouse area.

Response: Test trenches C1 and C2 were used to access the clay pipe. The clay pipe originates in the roundhouse area and most likely had been installed to convey some material from the roundhouse area. MDHES and EPA also recognize that the pipe went through the wood treating plant area and could contain associated material.

3. IPC commented that the observation of oily liquid at MW-20 during installation was never further evaluated.

Response: During the drilling of MW-20, a petroleum sheen was noted on water flowing away from the drill rig at approximately the 22-24 foot interval. Further investigation, however, revealed that the sheen was either coming directly from the contaminated surface soils, or from the engine(s) of the drilling equipment. Petroleum odors were barely discernable in the cutting. Discrete interval vertical profile (DIVP) water samples were collected from this interval and results showed no detectable compounds.

4. IPC stated that additional investigation of the roundhouse area is required to provide a reliable factual basis for selection of appropriate and effective remedial action.

Response: Additional characterization work is planned for the former roundhouse area as discussed in section XI, Documentation of Significant Changes in the Decision Summary. MDHES and EPA have determined that a limited data collection effort in the roundhouse area will take place during the Remedial Design phase of this project.

5. IPC also commented that there is a lack of quantitative information in the RI Report on the volume of LNAPL that was detected on the Site and this may affect alternative evaluations in the FS. IPC also stated that the RI does not explain how the LNAPL boundary was determined.

Response: Approximately 57 boreholes were used to determine the LNAPL plume and boundary. The data obtained was adequate to select the remedy, but additional data may be necessary during the Remedial Design/Remedial Action (RD/RA) to facilitate optimal design of the remedy. LNAPL is present within the plume boundary in varying thicknesses ranging from greater than 1 foot thick to little or no free product. LNAPL is found in pockets with variable thicknesses due to the irregular surface of

the semi-confining clay layer present north of I-90 in the IPC pasture area. Given the variability of LNAPL thickness, an average thickness of the plume was estimated at 6 inches to determine the LNAPL volume. Free-product depth was measured in each applicable borehole as well as in monitoring wells within the LNAPL plume. Volume was calculated within the +50%, -30% range as required by EPA guidance. This estimate is considered to be conservative. The bounds of the LNAPL contamination area or plume were determined with boreholes on 20-foot centers as described in the RI Report. Some additional data will be necessary during the Remedial Design phase.

6. IPC commented that several potential source areas such as a wood-treating station, disposal area for cinders and a disposal area for lubricating oils for locomotives were not adequately investigated.

Response: The review of historical activities at the Site did not reveal disposal areas for cinders or waste oils; however, limited additional sampling will take place in the roundhouse area during the Remedial Design phase. In addition, confirmation sampling will occur during the soil excavation process to ensure that all contamination is addressed.

A disposal area for locomotive lubricants was not discovered during the RI. No information was available to MDHES or EPA concerning the existence of a disposal area. PAH constituent levels in soil samples collected in the roundhouse area did not indicate oil disposal.

7. IPC suggested that the RI site history discussion be revised to include more information concerning the potential contribution of contaminants from historic railroad activities.

Response: The basis of the site history discussion in the RI is a report prepared for Burlington Northern Railroad (BN) by Historical Research Associates (HRA), entitled Report of Historical Findings - Northern Pacific Roundhouse Site, Bozeman, MT. (December 8, 1988) and the Idaho Pole Remedial Investigation Report, AGI, July 1985, prepared for the Idaho Pole Company.

The reports have been reviewed by MDHES and EPA and the descriptions of historic activities involving the former Northern Pacific Roundhouse and railroad in the Bozeman, Montana area were incorporated into the RI Report. MDHES and EPA have no basis to question the veracity of these reports, so do not intend to revise the historical discussion.

8. BN commented that the draft remedial investigation ("RI") report overemphasized the role of the railroad, which had minimal activities in Bozeman prior to 1945.

Response: The primary source of historic information on railroad activities in the Bozeman area was a report prepared for BN entitled Report of Historical Findings- Northern Pacific Roundhouse Site, Bozeman, MT, Dec. 8, 1988, HRA. This document was submitted to EPA by BN as a representation of the history of the railroad during the period of roundhouse operation.

9. BN commented that the draft RI report is misleading in its presentation of railroad activities in Bozeman including allegations of railroad tie treating.

Response: There is no information that refutes the possibility of railroad tie treating operations at the Site. PAH constituents that are commonly found in tie treating fluids, as well as many other products, were identified in the roundhouse area.

10. BN requested that MDHES redraft the historical section of the draft RI report to accurately portray the extremely limited involvement of the railroad in Bozeman.

Response: The historical section of the RI was based on a document prepared for and submitted to EPA by BN. The intention of the historical section was to identify the activities that took place in the past on the Site. EPA and MDHES believe the RI accurately characterizes those activities.

11. BN commented that if there were concern that the pit identified in the historic photograph could be a source of contamination, a test trench would have been accurately located in the field and on site maps, and sampled.

Response: The pit discussed in the comment was identified from a historic photograph of the rail yard area. At the time the photograph was available, the test trench potential source investigation had been concluded. The RI stated that it was possible that the pit had been used for treating. Also, when the Additional Sampling Investigation was planned and conducted, MDHES and EPA felt that adequate data were available in the roundhouse area and no additional remedial investigation work was planned for the roundhouse area.

12. BN commented that no pattern of contamination originating from the railroad tracks is presented by the data, and there is no reason to exclude J-flag data from this discussion.

Response: The conclusion that a contaminant source is present in the roundhouse area is based on the data that indicate a source inconsistent with releases of LNAPL from the wood treatment facility. The RI presents a brief summary of the investigation in the roundhouse area. The RI does state that four of the seven test pits with quantifiable PAHs were closer to the tracks than the other three. The roundhouse area will be subjected to further confirmation sampling prior to implementation of remedial action. J-flag (qualified) data was not excluded from this discussion.

13. BN commented that the use of kriging methods or any other contouring of data, especially for PAH in soil, is susceptible to error because of the heterogeneous distribution of the organics as a result of their release via spills, drips, or leaks.

Response: The kriging exercise was conducted as a tool to help evaluate potential volume of contaminants. The kriging results were not used to estimate PAH concentrations in soils in lieu of sampling and analysis. MDHES and EPA recognize that anthropogenic factors must seriously be considered in evaluating this data.

14. IPC commented that the RI did not provide a method to correlate a specific sample to the location at which it was collected.

Response: Attachment B to the RI (sample location map) depicts all monitoring well sample locations, all surface water sample locations, all sediment sample locations, all vegetation sample locations, all LNAPL sample locations and all soil sample locations. When one location is used for more than one sampling event (for example, monitoring wells), Appendix E to the RI (analytical data) identifies how the sample number correlates to the sampling round for ground water (01 through 05) and surface water (A through C).

15. IPC commented that the selection of remedial alternatives to remediate suspected LNAPL contaminated soils under I-90 is based on unsupported speculation and assumptions.

Response: LNAPL is present on the upgradient (south) side of I-90 in the highway right-of-way and has also been found on the downgradient side (north) of I-90 also within the highway right-of-way. In the absence of evidence that wood treating fluid was dumped on the north side of I-90, it is reasonable to assume that LNAPL has migrated under I-90. As long as the LNAPL remains, it will continue to act as the source of contaminants to the ground water dissolved plume. Collection of additional data pertaining to LNAPL present under I-90 will be necessary during the Remedial Design phase.

16. IPC commented that water levels were apparently not corrected using assumed or actual LNAPL thicknesses prior to preparing potentiometric maps and that ground water flow directions presented in the report for the LNAPL area may not be accurate.

Response: The data sets used to prepare the potentiometric maps are from water levels collected in the field where it was noted that there was not measurable product in any of the wells. Therefore, the ground water flow direction presented in the report for the LNAPL area is accurate.

17. BN commented that it would be helpful to have information concerning whether the recovery systems were working, and if so, how much free product had been removed by the recovery systems.

Response: MDHES and EPA requested records of LNAPL recovery from IPC; however, IPC stated that such records are not kept. Word of mouth reports indicate somewhere in the range of 500 gallons per year initially and less as time went on. The recovery systems are still operating.

18. BN stated that the effectiveness and adequacy of the LNAPL recovery systems should have been included in the RI.

Response: The effectiveness and adequacy of the recovery systems was not discussed in the RI because the recovery systems were determined to be ineffective. Based on cross-section elevation data obtained on the office interceptor ditch compared with LNAPL observations in boreholes, LNAPL is trapped below a subsurface clay lens approximately 10 feet below ground surface and isolated from and passing under the recovery ditch. The subsurface recovery trench was not constructed at a large enough diameter to accommodate the seasonal fluctuations in ground water level and is therefore only effective for portions of the year. Neither of these systems enhance recovery of the LNAPL in free or residual phases, nor do these systems remove LNAPL present under I-90.

19. BN commented that information from AGI's 1984 site investigation should have been used and also stated that a justification be presented on why the data were invalidated.

Response: The Final RI/FS Work Plan for the IPC Site (MSE, 1990) summarizes the AGI investigation. Additionally, the AGI report was one of the scoping documents used to develop the RI/FS Work Plan. EPA never "invalidated" the data, but felt that because AGI never validated the data, the data were not reliable for evaluating risk or selecting a remedy.

20. BN commented that the lack of saturated soil data may limit conclusions of the report.

Response: Saturated soil samples were not collected during the remedial investigation for a couple of reasons. Principally, the sand and gravel aquifers at the Site did not lend themselves to sampling. Ideally saturated soils would have been collected by augering and the use of a split spoon sampler. However, it was necessary to install the wells with air rotary techniques. One saturated soil sample, IPPSS27A, was collected for chemical analysis and others were collected for physical parameters.

Additionally, the detection limits for the contaminants are much lower in water samples than in soil samples. The sources of contamination at the Site are surface sources and soil sampling above the water table has characterized the source areas.

Contaminants below the water table in the saturated zone can be directly correlated to contaminant concentrations in the ground water at a given location through the use of partitioning coefficients.

The lack of more saturated soil information will not compromise the quality of the remedial investigation/feasibility study (RI/FS) because exposure to contaminants through ingestion of ground water poses a much higher risk than direct contact to saturated soils. Subsurface soils contribute contaminants to ground water but do not pose exposure risk.

21. IPC commented that the laboratory analytical data is questionable and that the RI contains numerous data gaps due to unusable laboratory results, poor quality data being used inappropriately or substitute "defeat values" being inappropriately inserted where no real data is available. IPC also commented that nearly 35% of the PCP samples collected during the investigation were invalid, rejected or questionable.

Response: The Fifth Quarterly Contamination Report provides the detailed data limitations of the entire RI. The Fifth Quarterly Contamination Report is referenced throughout the RI Report and is repeated as Appendix F in the RI Report. The summary of the Fifth Quarterly Contamination Report is that all organics data (volatile, semivolatile, dioxin/furans, phenols, PAH, and PCP) were valid (useable) except for 4 soil samples. All inorganics data were valid (useable). The data gap comment may be referring to a phenol data set that was returned to the lab because of various analytical problems. This data set represented the third monitoring well sampling event. In this sampling event, phenols (method 8040), PAHs (method 8310), and PCP (method 515.1) were analyzed in ground water. Although the phenols data set was not accepted by MDHES and EPA, PCP results were available from the EPA Method 515.1, PCP, data set. The RI Report summary does state that although there were limitations, all organics data were valid (except 4 soil samples) and all inorganics data were valid (useable); no data were used inappropriately. If the comment refers to data with flags (limitations), these data are useable as long as qualifications are considered. Matrix spike/matrix spike duplicate (MS/MSD) problems alone are not enough to qualify a data set according to "Laboratory Data Validation Functional Guidelines for Evaluating Organics Data" (EPA, 1988).

22. IPC stated that several problems were persistent and were not remedied throughout the investigation. These included lab contamination during extraction of samples, high octochlorodibenzo-p-dioxin (OCDD) recoveries in standards and surrogates, contaminant carryover and blank contamination.

Response: One water sample (GW-18C) had a high OCDD recovery of the surrogate and was flagged "J" by the data reviewer. One water sample (RES-02) had a high OCDD recovery of the standard and was flagged "J" (indicates that the result is estimated) by the data reviewer; these were the only instances of a high OCDD recovery. All

dioxin/furan lab blanks were found acceptable. IPC Site RI samples were not analyzed with samples from another project. The RI Report describes one PAH data set (November 1990) that had false positives (predominately the compound chrysene) for approximately 75% of the ground water samples. These ground water samples were qualified by the data reviewer with the "X" flag and are described in the RI Report as only being used for screening purposes. Every data set in the RI was reviewed for carryover effects by the data reviewer; carryover effects did not occur on any other data set.

23. IPC commented that it was difficult to determine from the RI report whether or not field QA/QC requirements were met.

Response: Appendix F of the RI report (Data Validation and Evaluation) indicates that all requirements were met for QA/QC.

24. IPC commented that RI table 4-26 suggests that 3 QC samples were taken for 63 samples. This suggests to IPC that the QAPP guidelines may not have been met in this instance. Also, no duplicates for water samples analyzed for volatile or semi-volatile analyses were collected (RI page F-24).

Response: The RI goal of one of each type of QA/QC sample per media per 20 samples was met for the project (see completeness in Appendix F of the RI Report). Duplicates for water samples were not taken for the first round of ground water samples for volatiles and semivolatiles, in accordance with the "User's Guide to the CLP" (EPA, 1988). To improve QA/QC for subsequent ground water sampling rounds duplicates were collected for phenols and PAHs.

25. BN commented that it appears that the laboratories involved with this program had a considerable problem with the ground water data.

Response: All analytical data were generated through the EPA CLP, with the exception of major analytes and physical or biological parameters. The RI Report includes discussion of all the data collected during the RI. This includes organics (6 methods were used covering approximately 150 compounds) and inorganics (1 method used covering 23 elements). Discussion of this data does document certain problems. Again, the RI summary states that although there were limitations, all organics data were valid (except 4 soil samples) and all inorganics data were valid.

26. BN commented that the RI would have been much better served if actual measurements had been made, rather than making assumptions about air emissions.

Response: The final Work Plan (1990) for the Site states that if air quality modelling indicates significant exposures, "the model output will need to be verified using appropriate field sampling procedures", (p. 5-52). Air pollutant dispersion/air quality

model output from ISCST are recognized as being conservative; such estimates can be 2-4 times greater than actual field measurements, especially in complex terrain. Nevertheless, no significant excess lifetime cancer risks or systemic health hazards were estimated through the air pathway/inhalation route (e.g., RI Tables 5-2/5-3). Therefore, although actual data are preferable to modelled data (even if used only to validate the model), such monitoring at the Site was not necessary to support remedy selection.

27. BN commented that Section 5.0, Nature & Extent of Contamination, should consider the entire RI database and take background into account to describe the distribution of the various analytes at the Site. BN stated that there should be no risk assessment procedure to identify contaminants of concern as part of this analysis.

Response: The procedures used were reasonable for defining the nature and extent of contamination. RI/FS guidance clearly states that analyses that will have subsequent importance on the risk assessment should be used in defining nature and extent of contamination. This procedure was not used to substitute for the BRA. Background is not discussed in this section but is discussed in Section 4.0 of the RI Report.

28. BN commented that Table 5-1 incorrectly presents the maximum concentrations of PAH found in this area.

Response: The text and table specifically refer to concentrations of contaminants in surface soils. Review of the data tables verifies the numbers listed in Table 5-1 as correct.

29. BN commented that the description of the nature and extent of contamination is confusing because portions of the database are neglected. This, according to BN, masks the fundamental findings of the RI, i.e., the soil and ground water have been impacted by releases of treating fluids from the treating area.

Response: The comment is correct in stating that only a portion of the data collected was used in this discussion. However, this section highlighted specific compounds and areas of contamination. It is evident from reading this section in conjunction with other sections of the RI that impacts from treating fluids are of principal concern.

30. BN stated that the conceptual model differs from the site geology described in Chapter 3.

Response: The conceptual model was presented merely to illustrate the overall relationship of physical features at the Site and possible contaminant distribution. It was not intended to represent geologic cross sections of the Site.

31. BN asked for an explanation of what is meant by: "the majority of PAH compounds do not contain active groups."

Response: This simply means that there are a lack of active functional groups attached to the polyaromatic rings, resulting in relatively stable compounds.

32. BN commented that data limitations should include a discussion of the scope of the database, not just the quality of the data.

Response: MDHES and EPA agree that data limitations should extend to the scope of the database. A principal result of the Data Quality Objectives process is to develop an adequate database to reach remedial decisions. MDHES and EPA believe this has been done with the possible exception of the roundhouse area. As discussed in related responses, additional sampling will be conducted in the roundhouse area to confirm contaminant levels.

33. BN stated that a justification be given for phenol analysis by Method 8040(GC-ECD).

Response: Besides lower cost, Method 8040 offers much lower detection limits and, with electron capture and Method 3630 for cleanup of phenols, interferences can be minimized.

34. BN commented that data flagged with an "X", "Y" and "Z" be defined.

Response: The RI Report states in Appendix F (Data Validation and Evaluation), and throughout the text, that data qualified with the "X" flag representing carryover effects will be used for screening purposes only. Qualifiers "Y" and "Z" were used similarly as qualifier "X". Within the text relating to specific results, the reason for the qualifier is explained. This discussion is summarized on p. E-i of the RI Report.

35. BN commented that the lists of compound and elements analyzed differ during the course of the program, and it is unclear how this affects the data usage.

Response: The lists of compounds and elements analyzed were different from one round to the another because various laboratories participating in the EPA Contract Laboratory Program (CLP) analyzed different rounds and used their respective, although similar, analytical lists. The contaminants of concern represented in the BRA were analyzed in each round.

36. BN commented that two different methods were used to analyze water and soil samples for PAHs.

Response: The Final RI/FS Work Plan for the Site (MSE, 1990) details the phased approach of the RI. That approach was to analyze one round of ground water and surface water samples and the initial onsite soil samples for the Target Compound List (TCL) according to the Statement of Work for Organics (EPA, 1988). The TCL was necessary for contaminant characterization and allowed selection of compound specific

analytes for the remainder of the RI. Based on the selection of compound specific analytes, Method 8310 for PAHs in soil and water was used during the remainder of the RI and was more appropriate than the initial method because of improved identification and detection limits.

37. BN commented that a lack of overall planning was demonstrated by frequent occurrences of resampling and failure to make prearrangements with the analytical laboratory were not made.

Response: The resampling discussed was a planned effort to phase RI activities. The RI/FS Work Plan clearly outlines this approach. The RI Report discussed phased RI activities that were conducted based on the Additional Sampling Plan. All organic and heavy metals analyses were done through the EPA CLP. Specific sample requests had to be submitted several weeks in advance of sampling. The CLP does not allow for the unscheduled submission of new samples, thus, prearrangements were always made.

38. IPC commented that the characterization procedures, including modelling, for the surface and ground water systems were inadequate and inappropriate.

Response: The modelling procedures are widely used in the hydrogeological field. The site characterization procedures for the surface water and ground water were the most cost-effective, accurate means available. The slug test procedure used to characterize the aquifer system was state-of-the-art, providing excellent data for numerous points across the Site, both laterally and vertically. The pumping test was considered as a test method, but after weighing the cost-to-benefit ratio, it was decided that conducting a pumping test would only evaluate a small portion of the Site.

The wide distribution of aquifer data points allowed for their use in setting up the ground water flow model, making the model much more accurate. By having a more accurate ground water flow model, the contaminant transport model becomes more accurate as it uses the output solution of the ground water flow model.

39. BN commented that rating curves for a specific time period should be constructed from streamflow measurements made during the same period. BN argued that, given the practices used in the RI and the absence of documentation of the basic data, there is no way to determine whether the RI produced reasonably accurate streamflow data.

Response: Methods used for developing rating curves were reviewed and approved by the U.S.Geological Survey. Rating curves were generated for varying stage levels of Rocky Creek corresponding with high, medium and low flows. EPA and MDHES disagree with BN's assertions regarding the practices in the RI, and believe the stream flow data are accurate.

40. IPC commented that continuous stage information collected during sample collection should be presented and that cited streamflow gains need to be presented. IPC added that overall differences in surface water flow measurements do not appear significant enough to make conclusions on gains or losses.

Response: Streamflow discharge measurements and ground water interaction data are summarized in the RI Report. Specific information is included in Technical Memorandum #2, Addendum A, which is part of the publicly available file. Continuous stream level and ground water level measurements indicate a close relationship between surface water and ground water. The data also indicate that Rocky Creek is a gaining stream at times of the year in the reach that would be most impacted by contaminated ground water.

41. IPC commented that using questionable data for RES-2 in the fate and transport portion of the model and ignoring several nondetect sample sites (Residence 3 and MW-10) skews the simulated contaminated ground water plume to the west, making the residential wells look more vulnerable than they may be.

Response: Actual monitoring well contaminant concentrations were only used during the modeling effort for the calibration process. Contaminant concentrations are not entered into the modeling program itself. They are only used to judge the accuracy of each model run, allowing the modeler to calibrate the model until it closely represents actual field conditions. The methodology used for MT3D contaminant transport modeling follows:

1. Create a ground water flow model that represents the site of concern.

2. Incorporate the ground water flow solution into the contaminant flow model.

3. Calculate contaminant loading rates and delineate source areas based on field data and observations.

4. Determine the factors that control contaminant spreading in the ground water (dispersion, sorption, advection, biodegradation, diffusion).

5. Run the model and compare the model's output to actual data.

6. Adjust the model input parameters to calibrate the model until the model closely represents actual site conditions.

7. Run additional simulations based on different cleanup scenarios.

The calibrated model presented in the RI Report accurately simulated field conditions observed at the Site and predicted PCP concentrations throughout the Site reasonably

well. The model predicts that there should be low concentrations of PCP in the western part of the Site in the vicinity of the residential wells, based on the source areas entered into the model along with dispersion, advection and retardation factors. The June, 1991 validated sampling data indicated that this was the case, as 0.51 μg/l PCP were detected in RES-2. The 0.51 μg/l PCP concentration result from the lab was flagged with a "J" qualifier because of a high recovery for the internal standard, which indicates a possible underestimation of dissolved PCP. The actual PCP concentrations may have been higher than that reported by the laboratory.

In addition, PCP data collected by Idaho Pole's contractor, AGI, found RES-2 and RES-3 to have 1.6 μg/l and 14.0 μg/l, respectively where samples were collected and analyzed in December, 1985. However, this historical data from 1985 was not validated under the EPA Contract Laboratory Program (CLP) process.

PCP was detected at or close to concentrations predicted by the model in the residential area. This helps substantiate the likelihood that PCP contamination exists in that area. Disregarding this data would be irresponsible in trying to protect the health and welfare of the residents in the area.

42. IPC commented that the "Kipp method" of ground water monitoring well testing is not listed in the document references, is not a commonly used technique and that the report does not demonstrate the appropriateness of this method.

Response: The slug testing procedure used to test the Idaho Pole monitoring wells was the pneumatic method. This procedure for slug testing wells was selected because of the expected high transmissivity values of the aquifer in which the wells were completed. The pneumatic method coupled with a data logger/pressure transducer system for recording water level recoveries in the well casing provide superior data in which to determine aquifer characteristics. Because of this more sophisticated method, inertial effects of the rising water column were observed at some of the monitoring wells. The inertial effects become apparent by the oscillatory nature of the water level recovery. The oscillatory response is to be expected while testing wells completed in aquifers having higher values of transmissivity.

The Kipp Method which is used for determining aquifer characteristics in wells exhibiting oscillatory responses was presented in a paper published in Water Resources Research, Volume 21, Number 9, pages 1397-1408, entitled "Type Curve Analysis of Inertial Effects in the Response of a Well to a Slug Test". The method of analysis was developed for wells exhibiting inertial effects not accounted for in other conventional slug test analytical methods as was the case with the IPC wells.

43. IPC commented that gravel and sand aquifer units are not described very well in the RI, and should have been mapped, like the clay strata units were, since they are mappable units.

Response: Unlike the silty-clay unit, none of the sand, silty, and gravel units are laterally continuous, even between adjacent wells. This phenomena is common to alluvial fans deposits. A great deal of effort could be expended attempting to correlate various silty-sands, silty gravels, and sandy gravels; however, all these lithologies are interconnected and they function and are treated as a single aquifer system for remediation purposes. EPA and MDHES determined that it was unnecessary to spend additional resources to further characterize these units.

44. IPC stated that available residential well completion information should be shown as well as water level information in order to verify ground water flow directions and help clarify whether or not the residential wells are actually vulnerable to contamination.

Response: Unconfirmed well construction details are included in pre-RI/FS EPA residential sampling plans. No attempt was made to verify those details. MDHES and EPA felt that sampling most accurately characterized the residential wells' vulnerability to contamination.

45. BN expressed concern that a number of the ground water monitoring wells installed by either the Idaho Pole Company or MDHES's RI/FS contractor may have created a pathway for downward contamination migration.

Response: Procedures used during the installation of wells 18-29d strictly followed SOP's (MSE-SOP-GW-12) that had been approved by MDHES and EPA prior to the start of the remedial investigation. Additionally, several EPA reference documents were used for guidance: A Compendium of Superfund Field Operations Methods, EPA/540/P-87/001, December 1987; RCRA Ground-water Technical Enforcement Guidance Document, OSWER-9950.1, September 1986; and, Practical Guide for Ground-Water Sampling, EPA/600/2-85/103, September 1985. These procedures insure that, to the maximum extent possible, cross-contamination between aquifers or zones within an aquifer is avoided. Wells completed in the upper zones (A and B) used standard drilling techniques; these two levels were determined to already be contaminated with PCP. Those wells completed in lower zones (C and D) utilized the "double casing" method of drilling and completing wells. This involves casing off the upper, PCP-contaminated zone, and drilling into deeper zones by placing a smaller casing within the upper casing. This procedure was also reviewed and approved by MDHES and EPA. Prior to drilling the wells, most of the wells and all of the aquifer zones were determined to be contaminated with PCP according to the IPC initial investigation; this included what was later to be called the "C" zone. If cross contamination had occurred during drilling, the analytical data would show a log-normal decay in concentrations from the time the first (cross-contaminated) sample was collected; this is not the case. Additionally, as later sampling and pneumatic slug testing proved, all the aquifer zones (A through D) encountered at the Site are interconnected with one another to some degree; gamma logging of each monitoring well, both the IPC

installed well nests and the RI wells, confirmed that seal integrity is intact such that the well bores are not interconnecting the aquifer zones.

46. BN commented that the role of well 17 as a preferential pathway for vertical contaminant migration was not explored in the RI.

Response: Well number 17 was constructed during a previous site investigation by IPC. Well 17 was located in the pasture to serve as a recovery well for LNAPL and contaminated ground water and aquifer testing. The well was cased to 54 feet below ground surface and screened from 4 feet below ground surface to the bottom of the casing. The well was abandoned prior to initiation of the remedial investigation/feasibility study conducted by MDHES. Detailed information on the procedures used to abandon well 17 were not available from IPC.

Well 17 could serve as a conduit for migration of contaminants due to improper abandonment procedures. MDHES and EPA do no believe that well 17 has acted or is acting as a conduit for vertical contaminant migration because dense or sinking phase contaminants have not been specifically identified at the Site. The oily wood treating fluid that has been characterized is less dense than water and floats on the ground water surface.

While MDHES did not specifically design the ground water monitoring network around well 17, vertical dispersion of decreasing concentrations of contaminants has occurred throughout the Site due to the interconnected aquifers. This has been identified at several monitoring wells indicating that hydrogeological characteristics have lent themselves to vertical movement of contaminants. Since there is a possibility that well 17 was not abandoned properly and because of its original construction, well 17 will be evaluated during remedial design/remedial action and, if necessary, removed.

47. BN commented that no surface water data are provided in the RI report. Instead, reference is made to Technical Memorandum 2, Addendum A (MSE, 1991). BN added that the latter document does not contain all the surface water information summarized in the RI report.

Response: Technical Memorandum 2, Addendum B (MSE, 1991) and the Additional Sampling Activities Report (MSE, 1991) should have also been referenced in this section of the RI report.

48. BN commented that in the RI to calculate hydraulic conductivity, the contractor simply divided T by the length of the well screen, rather than by the more conventional value of b, the aquifer thickness. BN stated that division of T by well screen length is not appropriate when the well is screened in only a discrete portion of the aquifer.

Response: When slug testing wells that only partially penetrate an aquifer, or are only screened in discrete portions of that aquifer, great care must be exercised when determining the hydraulic conductivity value based on the transmissivity, T, from slug test results. It must be pointed out that slug testing wells only effectively stress that portion of the aquifer immediately around the well screen. Furthermore, Ground-Water Hydraulics (Lohman, 1972), a source used by the commentor, says "For partially penetrating wells, the value of transmissivity obtained generally would apply to that part of the aquifer in which the well is screened or open." In the case of the slug tested wells at IPC, the obtained transmissivity value was divided by the length of the well screen to provide an average hydraulic conductivity value for the screened portion of the aquifer. To divide the T value by the entire thickness of the aquifer, b, would result in much lower hydraulic conductivity values, not representative of actual field conditions.

49. BN commented that the RI reports unsubstantiated storativity values as high as 10^{-9}.

Response: Storativity values can often be determined through slug testing according to Papadopulos (Papadopulos et al., 1973). After fitting the data set to the type curves, storativity values can be calculated using the following formula:

$$S=\alpha \frac{r_c^2}{r_s^2}$$

where

S = storativity
α = represents the value of the type curve best fitting the data
r_c = radius of the well casing
r_s = radius of the well screen

It should be noted that for small values of α, the type curves have a very similar shape, run very close to each other, and are almost parallel for most of their length. In their paper, Papadopulos et al state that determination of S by this method has questionable reliability. Storativity values presented are not exacting measurements, due to the variability of the method. The storativity values were presented mainly to give the reader an insight as to which type curve best fit the field data.

50. BN commented that the aquifer testing appears to be seriously flawed because of the aquifer characterization procedures used in the RI.

Response: Much time and effort were spent in maximizing the amount of data in terms of aquifer characterization, both in lateral and vertical extent. By conducting pneumatic slug tests in wells over the whole site, point measurements of aquifer hydraulic

conductivity were collected. In this type of investigation, a large number of point measurements were of greater use than a single value of hydraulic conductivity obtained from a long term pumping test.

Most of the aquifer system is under confining conditions, where it was appropriate to use the Cooper-Papadopulos (CP) method for type curve analyses. For the five wells that appeared to be unconfined (verses the 24 confined), the Bower-Rice technique was applied and had similar results when the data was fit to the Cooper-Papadopulos curves. Professional judgement was used in this case to use the CP method results due to the good fit of type curves.

51. BN commented that aquifer characteristics calculated and presented in Section 3 of the RI report were not used in constructing or calibrating the ground water flow model.

Response: The aquifer characteristics calculated and presented in Section 3 of the RI were used in construction and calibration of the ground water flow model. These values are presented in Figure 6-25 of the RI document. Discussion of modifications made to the flow model were presented in Technical Memorandum 2, Addendum C for the Idaho Pole Site, Bozeman, Montana.

52. BN commented that well construction activities such as filter pack placement and seal placement methods for wells 18 through 29 involved pouring the materials down the annulus. BN stated that this procedure is susceptible to bridging the material between the casing and the borehole, creating voids that are unnatural pathways for ground water (and contaminant) flow.

Response: Standard Operating Procedures and EPA guidance were followed regarding the installation of monitoring wells. Both the driller and the oversight geologists are Montana licensed monitoring well installers and have a great deal of experience installing monitoring wells. Bridging of annular materials is not generally a problem in monitoring well completions less than 50 feet deep as at the IPC site, if installed by a driller and geologist who are experienced, competent well installers. If any significant voids were within the seal, the gamma logging would have detected it. The only reason for having a seal of 2 or more feet in thickness is to assure that any voids are not interconnected and the bentonite provides an adequate seal. Aquifer testing was not negatively influenced because the ground water monitoring wells were constructed according to acceptable procedures.

53. BN commented that the term "oscillating recovery" and its causes should have been discussed.

Response: Oscillating recovery was not discussed in the RI; however, an oscillating recovery is in reference to the changing water level in the well casing of a slug tested well. If frictional forces acting on the water flowing into the well are low enough,

the recovering well acts as a damped harmonic oscillator. The inertial effects of the water flowing into or out of the well carry the changing water level past the equilibrium point (static water level). This in turn creates an additional disequilibrium in the system, causing a reversal in flow direction of the well aquifer system of a lesser magnitude. The process is repeated until all available energy is dissipated, and the water level in the well casing comes to rest at the original static water level.

In order to record water levels in a quickly recovering well, pressure transducers coupled with a data logger are necessary. This is especially true when a well exhibits an oscillatory response. However, experience at conducting slug tests in oscillating wells has shown that the pressure transducer may be affected by inertial forces. Due to these forces it is believed that the pressure transducer cannot accurately measure water levels during the rising portion of the recovery. During the falling portion of the recovery, the inertial effect on the transducer are not observed, and water level readings are accurate. This effect on the water level readings and subsequent type curve fitting can be overcome by using the data for the water levels moving in the downward direction for the curve matching.

54. BN stated that trimester sampling is not a common convention.

Response: This sampling frequency resulted from RI/FS negotiations with IPC and was carried on during the RI/FS.

55. IPC commented that because most wells were completed with water level surfaces above the screened interval, the accuracy of LNAPL measurements was significantly reduced. IPC argued that the accurate characterization of LNAPL can only be accomplished by actual measurement of LNAPL in all wells installed for site characterization.

Response: The LNAPL characterization was made from measurements taken at soil boring locations, not from samples taken from ground water monitoring wells. The well screen locations were not designed to collect LNAPL samples. LNAPL was found in measurable amounts only in well 5A. The ground water monitoring system was designed so that the wells were located in the dissolved PCP plume, not in the LNAPL plume. The LNAPL measurements taken during the core sampling event were used to calculate the volume of the LNAPL plume.

56. IPC commented that, contrary to the RI's conclusion, there is no evidence of LNAPL at the Montana Power Company substation.

Response: The RI states that based on the soil boring investigation south of the substation, it is possible that some LNAPL may be present under the west corner of the substation fill area. This approximate area is illustrated on Figure 5-3. IPC is correct in stating

that no samples were taken at the substation. Samples were not taken for safety reasons (high voltage lines) and the LNAPL plume boundary was estimated in this area.

57. IPC commented that the report indicates that because Rocky Creek sediments, Rocky Creek surface water, and the ground water levels are lower than semi-volatile and metal concentrations in the water from the clay pipe, this means the pipe is not "acting as a conduit to Rocky Creek or ground water."

Response: The RI Report states that concentrations of contaminants in the clay pipe do not correlate to concentrations in surface water; specifically aluminum, calcium and magnesium. Therefore it was assumed that the clay pipe was not acting as a conduit.

58. IPC stated that the RI contained contradictory statements about whether the LNAPL under I-90 is on the ground water surface or under a confining clay layer.

Response: On both sides of I-90, LNAPL exists on the ground water surface and under a confining clay layer. It is presumed the clay layer was left intact under I-90 when the interstate was constructed as indicated by Montana Department of Transportation (MDOT) personnel. LNAPL under I-90 is thought to be primarily under the confining clay layer with the possibility of some LNAPL on the water table.

59. IPC commented that a more detailed investigation in the wood storage area could likely reduce the volume of soil which requires remediation.

Response: None of the wood storage area has been identified for soil remediation.

60. BN commented that major omissions from the RI are test trench logs and detailed descriptions of how the soil samples were collected, where they came from, and exactly what was in the materials being sampled were omitted from the RI.

Response: The RI Report states that sample collection methods are outlined in the Field Sampling Plan (MSE, 1990), and Attachment B (Sample Location Map) of the RI Report provides all sample locations. A discussion of exactly what was in the material being sampled is provided in the RI Report text in each potential sources investigation. Test trench logs appear in the field logbooks.

61. BN commented that the most obvious omission in the RI Report is the lack of summary data (e.g., positive values detected or their sums for various analyte groups) for specific soil samples.

Response: Soil and sediment summary tables (PCP and B2 PAHs) are presented for the following potential source areas in the RI Report: pasture, IPC yard, treating area, background, Rocky Creek, Cedar Street ditch, MPC Substation ditch, L Street ditch,

Bohart Lane ditch, and the ground water drainage ditch. Summary tables do not appear for the following areas: roundhouse, old drainage channel, and the historic surface water bodies; summary discussions appear for these areas. A discussion was more appropriate for these locations because of the large number of compounds analyzed (approximately 170) and the large number of compounds detected. Appendix E (Analytical Data) to the RI contains all of the compounds detected and the sample locations.

62. BN commented that the report does not match the suggested RI report format in EPA guidance. The missing chapter is "Study Area Investigations," which is intended to relate what activities took place during the RI.

Response: The commentor is correct in noting that the RI Report format does not exactly match the EPA guidance format. Nevertheless, all chapters specified in guidance, including "Study Area Investigations", are included in the RI Report. The order in which the chapters are presented in the RI was modified. The chapter entitled "Study Area Investigations" is Chapter 4 in the RI.

63. BN stated that the roundhouse foundation is shown as a complete circle on one map but appears elsewhere (e.g., Attachment B, Figure 3-1, and Figure 3-8) as various portions of a circle, or as an arc with a straight line attached. Attachment B (not A) is the map of well and sampling locations. BN also stated that many of the wells and test trenches shown on Attachment B are in different locations from other maps in the report (e.g., compare locations for wells 2 and 21, and trenches Y3 and B1 in Figure 4-1.

Response: Sample locations depicted on Figure 4-1 and many of the other figures within the RI report are approximations only, as indicated on the drawing scale bar. Surveyed or otherwise measured sample locations are presented on Attachment B to the RI which is drawn to correct scale. The roundhouse foundation is shown on Attachment B as it was actually surveyed in the field.

64. BN commented that technical reports, drawings, or other documents that describe the interim remedial measures taken would have aided in site evaluation.

Response: MDHES requested "As Builts" and/or any documentation of construction detail for the office interceptor trench, and subsurface trench and sump from IPC. IPC claimed that none of this information was documented when these systems were constructed.

65. BN commented that the report should explain what information will be determined from soil structure.

Response: Soil characterization was determined from soil structure as explained in the RI. Soil structure was related to contaminant content because deteriorated, oil-stained soil is very dark with a shine and a massive structure. Lack of structure (massive) signifies soil that has deteriorated because it has become dense through the "filling in" of the pore spaces.

66. BN commented that a clarification should be presented on the contents of data tables in Appendix E (pages E-139 to E-159) to the RI Report.

Response: RI Report Appendix E summarizes all analytical data collected. The table of contents outlines the various categories of data by media and subsequent analytical method or group of compounds. Page numbers are listed in the table of contents for each heading and subheading. There is a brief description of reporting and data qualifiers for both inorganic and organic compounds. The first section of data is for ground water. A guide is presented that outlines the sample numbering scheme identifying medium, monitor well, well completion zone, field duplicate (as appropriate), sample round relating to date of collection and subsample designation. A similar guide is presented for the other media. The first data set is for phenols, analyzed by EPA Method 8040. The first results are from sample number IPGW01A02 indicating a ground water sample from monitoring well #1 from the A zone, collected in August 1990 (round 2). The various substituted phenols analyzed are listed in columns.

67. IPC commented that the detection of upstream background concentrations of PAHs in Rocky Creek sediments may indicate the presence of an upstream, offsite contaminant source.

Response: Given the ubiquitous nature of PAHs, their presence at about background levels (based on literature review) at the upstream monitoring stations is not surprising. This level of PAHs does not indicate an upstream source; it only reflects background concentrations. It may be expected that types and respective concentrations of both PAHs and chlorophenols increase considerably between SW-04 and SW-10 because this area is the zone of ground water interception by Rocky Creek.

68. BN commented that the results for M1, D5, and R8 should not have precipitated additional creek sediment sampling; the additional sampling resulted because of an inadequate database developed from the first sampling event.

Response: As outlined in the RI/FS Work Plan, the sediment investigation was established in a phased manner. It was clearly the intention of MDHES and EPA to conduct initial sampling at limited sample points for a broad spectrum of parameters. Upon review of the initial phase data, MDHES and EPA made the decision that additional information was required to more completely define the nature and extent of contamination.

69. IPC commented that the PCP contamination described in residential wells RES-02 and RES-09 is highly suspect because these wells have been clean during all previous sampling episodes. Confirmation sampling did not confirm contamination in these wells.

Response: The prior samples collected were analyzed with EPA Method 8040 phenol and substituted phenols procedure. The method detection limit for PCP in these samples was not low enough to quantify the concentrations determined in June of 1991. The June 1991 samples were analyzed with EPA Method 515.1, with a detection limit of .05 μg/L. The confirmation sampling was conducted about one month after the June 1991 sampling and samples were analyzed by a different laboratory. Considering the low levels detected in June 1991, and potential changes to ground water, it is not surprising that the confirmation results were different than the earlier results.

70. IPC questioned why biodegradation was not included in the fate and transport model.

Response: The biggest factor controlling the fate and transport of dissolved PCP in ground water at the Site is advection. The remaining factors such as sorption/desorption, dispersion, chemical reactions, and biodegradation all play a minor role in the spreading of PCP contamination. The biodegradation rate of PCP has not been determined at the Site for input into the model. Literature values varied greatly for biodegradation rates (half-lives from 46 days to 4.2 years), and selecting a value would result in uncertainty. These values were obtained from the Handbook of Environmental Degradation Rates written by Howard, et al. It was reasoned that the degradation rate would be at a slow rate, given the climatic conditions found in Bozeman and would not be a major factor in the spreading of contamination. Therefore, a biodegradation rate was not included in the model, making the model more conservative.

71. BN commented that the RI should address the potential for PAH impact on the roundhouse area from former activities, such as coal handling, and current activities, such as wood incineration and movement of treated wood.

Response: A review of site history and onsite observations concluded that pole treating operations, including Teepee Burner emissions, are not the major source of contaminants (e.g., B2 PAHs) within the roundhouse area. The historical review of roundhouse operations (prepared by HRA for BN) indicates the use of a "cinder pit", probably for disposal of wastes from the coal-fired locomotives. These wastes would have contained B2 PAHs, based upon literature review. Nevertheless, the RI's intent was to characterize the areal extent and magnitude of hazardous substances present within the defined study boundaries, regardless of site ownership pattern or to whom such releases of hazardous substances could be attributed.

72. BN commented that LNAPL's and DNAPL's are present at the Site.

Response: Although the presence of a light nonaqueous phase liquid (LNAPL) has been determined by sampling at the Site, a dense nonaqueous liquid phase (DNAPL) has not been identified. Sample analysis from the most contaminated areas on the Site demonstrate that PCP concentrations decrease with sampling depth indicating that the contaminant source lies in the upper soil/ground water profile.

VIII. POTENTIALLY RESPONSIBLE PARTY COMMENTS ON THE BASELINE RISK ASSESSMENT

1. IPC commented that the Baseline Risk Assessment (BRA) is flawed and does not accurately reflect true risks to human health associated with the Site.

Response: As was previous stated, the BRA was performed in general conformance with EPA's Risk Assessment Guidance for Superfund (RAGS), Volume I. RAGS provides guidance for evaluating human health concerns (e.g., excess cancer risk) associated with the "no action alternative" (i.e., baseline Site conditions). The evaluation of need for cleanup actions at Superfund sites should be based on an estimate of Reasonable Maximum Exposure (RME) expected to occur under both current and future land use conditions. RME is defined as, "the highest exposure that is reasonably expected to occur at a site", (RAGS, p.6-5). The intent of the RME is, "to estimate a conservative case (i.e., well above the average case) that is still within the range of possible exposures" (ibid.).

The RME scenarios in the BRA are based on conservative assumptions, and may overestimate actual risk by an order of magnitude or more. The RI makes this likelihood clear in the Uncertainties Analysis Section of the Baseline Risk Assessment.

2. IPC commented that it was difficult or impossible to determine whether any invalidated or questionable data was used in the BRA.

Response: No data designated "R" or "X" were used in preparing statistical summaries for use in the BRA.

3. BN commented that the BRA made no distinction between the roundhouse area and the rest of the Site. The roundhouse area should have been evaluated separately in the BRA as a distinctly separate operable unit.

Response: The cleanup of a site may be divided into a number of operable units if the complexity of the problems at the site warrant an incremental approach toward addressing the site. The nature of the contamination in the roundhouse area was sufficiently similar to that in other areas of the Site to allow the Site to be addressed as one unit. One party's desire to limit its liability is not an appropriate basis to create a separate operable unit.

4. BN commented that only a subset of the data was used to describe the Site, and that the RI data are more amenable to such groupings as "total PAH" that include all of the data collected.

Response: All validated data (not "only a subset") were used in describing Site contamination and in preparing the BRA. Critical contaminant of concern specific data for a particular medium (e.g., PCP levels in ground water, RI Table 4-26) were presented in the text; the availability of specific data (e.g., semivolatiles in particular ground water monitoring wells) in Appendix E is also noted in the text. Given the iterative and parallel nature of preparing both the RI and BRA, it was difficult to prepare the data groupings suggested by the commentor. However, media-specific summaries and additional data interpretation for the contaminants of concern are found in Section 2.0 of the BRA.

5. IPC commented that the information in the RI indicates that only trace quantities of some dioxins were detected in a very few samples.

Response: The 2,3,7,8-TCDD toxicity equivalent (TE) value (using "non-U" data only) of 1.8 μg/kg was recorded within the treatment plant area; specifically, the sample was taken 4-7 ft below ground surface at site T-07 (BRA, Figure 2-2). The TCDD TE value was calculated using "U" data in order to estimate an upper bound level of approximately 1 μg/kg in background soils (BRA, p. 2-10). Based on literature review, such a concentration would not be unreasonable or unexpected. Given the presence of higher chlorinated forms of dioxin/furans in technical grade PCP (e.g., OCDD) and despite their infrequent quantitation and relatively low toxicity equivalence factors (TEFs), the assumption that TCDD TE levels in Site soils slightly exceed those observed in "background" sites does not seem unreasonable.

Reevaluation of the dioxin/furan data in ground water indicates this "compound" is no longer a chemical of concern in ground water.

6. IPC stated that EPA guidance recommends the use of one-half the detection limit to approximate nondetects only for those databases where a constituent was detected once.

Response: IPC is correct in stating that EPA guidance recommends using a value to appropriate nondetects only where a constituent was detected. Although no dioxin was found in ground water, dioxin was quantified in soils at the Site. The BRA approximated values for dioxin for this reason. Table 2-16 presents PCDD/PCDF data for LNAPL sampled from monitoring well 5A. The 2,3,7,8-PCDD congeners are represented at the six chlorine level (per molecule) and higher. All 2,3,7,8 congeners of PCDFs are present except 1,2,3,7,8,9-HxCDF. Table 2-35 indicates the most abundant 2,3,7,8 congeners at well 5A were also detected in LNAPL contaminated soils in the IPC pasture, downgradient of the facility. MSE interpreted

these data to indicate PCDD/PCDF transport in the LNAPL to ground water. OCDD was detected in offsite ground water at RES-03 (Table 2-20). given that this class of dioxin occurred in greater concentration in LNAPL from well 5A, this observation was extended to the RME assumption that PCDD/PCDFs were also being transported in ground water, although present largely below analytical detection limits. The potentially overconservative nature of this assumption has been discussed elsewhere in the Responsiveness Summary.

7. BN commented that although these results are above literature background values, they are well below cleanup criteria of 100 to 500 ppm for total PAH that are embodied in U.S. EPA administrative records.

Response: The key factor in driving PAH cleanup levels is concentrations of B2 PAHs. The cleanup levels developed were from site specific BRA results, and are necessary at the Site to meet risk levels specified in the NCP. The B2 PAH cleanup levels are not dissimilar to levels established at other sites.

8. BN commented that the selection of the chemicals of potential concern appeared to be a random process.

Response: Site characterization data specific to each environmental medium (e.g., soils/sediments) were presented and interpreted in Section 2.1 of the BRA. Such evaluations provided the basis for selecting media specific contaminants of concern as presented in Section 2.2 of the BRA. The contaminant of concerns selected at the Site (Table 2-37) are very similar to those developed for other pole treating sites on the NPL.

9. BN asserted that exposure point concentrations were derived at random with questionable time-weighted nonsite-specific assumptions included.

Response: Exposure point concentrations were derived by the use of a "random number" generated for "U", or non-detect values. This procedure is an accepted statistical evaluation procedure. The alternative approach to the use of "U/2" surrogates for nondetects is documented in Section 3.4.3.1 of the BRA. Based on literature review, the method(s) applied should produce exposure point estimates as credible as those generated by the more conventional approach discussed in RAGS I.

10. IPC commented that the apparent use of overly conservative assumptions in the Baseline Risk Assessment (BRA) is not consistent with basic risk assessment practices and contrary to EPA guidance.

Response: The assumptions and scenarios used in the BRA were consistent with RAGS I.

11. BN commented that the risks were not appropriately summed across exposure pathways but rather were summed across exposure routes for each population subgroup.

Response: Risk characterization is presented in Section 5.0 of the BRA. The BRA text discusses pathway risks; however, the tables present route specific risk calculations. This is not an unreasonable presentation since pathway specific risks can be determined from the appendicized worksheets of the BRA.

12. IPC commented that the BRA did not follow EPA guidance (1989a) to evaluate reasonable maximum exposure (RME) for any given pathway, rather, the BRA evaluated worst-case conditions.

Response: The RME scenarios presented in the BRA represent reasonable maximum exposure as suggested by EPA guidance, and were not intended to be "worst case" evaluations. There is a narrow distinction between these two cases, and potential variations (e.g., the showering pathway) were noted in the Uncertainties Analysis.

13. IPC commented that inhalation exposure of individuals while showering with ground water was not evaluated properly, resulting in an order of magnitude overestimation of risk, in some cases.

Response: The use of inhalation exposure to individuals while showering with ground water provides a conservative estimation of risk. The BRA acknowledges the conservative nature of this approach. Since the contaminants of concern can be absorbed through the skin, this pathway cannot be eliminated completely. For example, the PCP worksheet for offsite children (p. A-24) indicates an RME intake of about 3.0E-03 mg/kg.d of PCP; use of the ingestion slope factor of 1.2E-01 $(mg/kg.d)^{-1}$ results in an excess cancer risk estimate of 3.6E-04. Recognizing that Res-10 ground water probably contains (over the longterm) about 0.1 mg/L PCP, and that the dermal slope factor may be only 90 percent of the oral CSF, actual risk via this pathway is probably $<$ 1E-04 but may be $\geq$ 1E-06.

14. IPC commented that the BRA (MSE, 1992) used incorrect inhalation rates.

Response: Table 3-1, Part B indicates the 2.5 m^3/hr inhalation rate is applicable only to that period of "moderate" activity (Exposure Factors Handbook, p. 3-4) wherein trespassing onsite occurs. It does not represent a longterm inhalation rate (i.e., the 15-20 m^3/d values) cited in EPA's 3/92 Supplemental Guidance to RAGS I.

15. IPC commented that a soil ingestion rate of 200 milligrams per day (mg/day) was selected for current onsite workers, and that EPA recommends use of 50 mg/day to evaluate adult industrial soil ingestion exposures.

Response: Although the "typical" workplace ingestion rate is 50 mg/d (SG. p. 10), allowances are made for short-term, weather-dependent rates of 480 mg/d in certain commercial/industrial settings, such as construction sites (SG, Attachment B). Given the nature of Site operations (including heavy equipment usage), the 200 mg/d rate (cited in Table 3-1) is within the bounds of RME for onsite workers.

16. IPC commented that dermal exposure to the constituents of concern in soil was overestimated.

Response: EPA guidance indicates default dermal absorption factors (DAFs) ranging from 1 percent (i.e., Region IV, 1992) to 80 percent (i.e., Region X, 1989). However, the data in EPA's Dermal Exposure Assessment generally supports the 2-3 percent DAF suggested by IPC. The 1.45 mg/cm^2 soil adherence factor (SAF) was used due to the silty nature of Site soils. A DAF of 1.5% was used as noted in BRA Table 3-1. The uptakes calculated by the Agencies for this pathway are less than or equal to those estimated by IPC.

17. IPC stated that the BRA text did not report how the average concentrations of Site contaminants were obtained.

Response: The BRA text did not describe how average site contaminant concentrations were obtained, however, footnotes and accompanying text associated with the data summaries were used to explain the preparation of arithmetically based statistics shown in Section 2.0 of the BRA. These statistics were used to determine the average concentration of Site contaminants in the RI. For example, the number of detects for a given data set and degree of confidence in the statistical results for chemicals in ground water are presented in Table 2-26. As discussed in Section 3.4.3, geometric-based statistics were calculated for those instances wherein such an approach appeared to generate more realistic exposure point concentrations.

18. IPC stated that nondetected polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs) were assumed to be present in environmental samples at the detection limit; however, IPC asserts there is no basis for this assumption in the EPA guidance.

Response: RAGS I remarks (on p. 5-10) that non-detected results cannot simply be omitted from the BRA, particularly if there is some reason to believe such compounds are present, e.g., literature review of source characteristics, even if not quantifiable in a given sample using a particular analytical method. Furthermore, a compound-specific, contract-required detection limit (CRQL) value can be used if there is reason to believe the concentration actually present is closer to actual level than is the CRQL/2 (RAGS I, p. 5-11). The assumption that PCDD/PCDF concentrations occurred at the respective CRQL values, even if actually below these levels, in

background samples was made so as to generate approximate "upper bound" concentration estimates for these contaminants of concern. this conservative approach should ensure that PCDD/PCDF levels observed in contaminated media likely exceed those concentrations expected in background media.

19. BN commented that the reference to the hazard index as the "health quotient (HQ)," is a departure from the EPA RAGS document (EPA 1989).

Response: In Section 7.3 of the RI and Section 5.0 of Human Health Risk Assessment, the term "health quotient" is not used. The Executive Summary contains the misused term although the text presented concerns the hazard index.

20. BN commented that the reference given in the text (MSE 1992) does not correspond to the reference given in Section 7.0 (MSE 1992a).

Response: The document referenced in the text, MSE 1992, was correct. The reference section inadvertently listed MSE 1992a.

21. BN commented that the reference to "presently observed on site contamination..." and the statement "Concentrations in both on site and off site media represent conditions in these media" are not clear and should be clarified.

Response: The above quoted statements may be awkwardly stated but simply mean that the RI data are assumed to be representative of the Site.

22. BN stated that by using the analytical values for dioxins on Table 2-2 for zone A (upper sampling interval) at background sample location A, a total TE of 0.151 is calculated; for zone A at background sample location B, a TE of 0.316 is calculated. The text identifies a TE of .33.

Response: Recalculation of the TE for zone A verifies the reported value of .33.

23. BN stated that chemical risk factor scores are to be used for the potential reduction of the number of compounds carried through the risk assessment. BN further stated that this was not the objective of the chemical risk factor scores shown in Table 2-12 of the BRA.

Response: Table 2-12 summarizes the results of the calculation of chemical risk factor scores. The calculation of the scores was used to establish and verify the contaminants to be carried through the risk assessment.

24. BN commented that the levels of PAH found at the roundhouse can be considered "ubiquitous" in nature, and questioned why phthalate was eliminated and not PAH?

Response: MDHES and EPA determined that PAH concentrations in the roundhouse area and elsewhere at the Site were above background levels and of potential health concern. Phthalate values were determined to be the result of laboratory contamination.

25. IPC commented that an exposure frequency of 240 days/year overestimates exposure since the ground was assumed to be frozen for 6 months of the year and as a result, a maximum of 180 days/year would be expected for any scenario involving contact with soils.

Response: The assumption used for direct contact with, and ingestion of, "outside" soils was 129 days within the 180 day "warm season" (i.e., 5/7 * 180 = 129). However, given the presence of dust within buildings (e.g., the lunchroom), significant exposures via the inhalation and ingestion routes of "inside" soils were assumed to occur on all 240 work days/yr (i.e., 48/52 * 5/7 * 365 $\simeq$ 240) -- even when the "outside" soils would be frozen or snowcovered. This approach is consistent with exposures evaluated at other extreme-weather sites.

26. BN commented that since the three compounds designated as chemicals of potential concern in the surface water were discussed, they should have been quantitatively evaluated; however, they were not included in the BRA.

Response: Although these compounds were detected occasionally in Rocky Creek waters, their respective concentrations were generally below levels of concern to freshwater life (Section 2.1.3.2). However, given the conservative nature of the assessment, they were designated as potential contaminants of concern and subjected to further evaluation in the Ecological Risk Assessment. No chronic toxicity data (for freshwater aquatic organisms) were identified for 2,4,6-TCP by MSE. However, Appendix Tables A-1/A-2 in the ERA indicates that PCP and PAHs (including benzo(a)pyrene) do not pose significant hazards to aquatic life present in Rocky Creek. Human health exposure pathways were not identified for Rocky Creek water.

27. BN commented that the body weights and skin surface areas presented in the BRA are questionable because no rationale or numbers are provided to show exactly how the numbers were derived.

Response: Data in Tables 5A-3/4 in the Exposure Factors Handbook (EFH, 1989) were used to calculate the 29.2 ($\pm$ 6.1) kg arithmetic mean body weight. The total surface area estimate (recalculated to be 10,447 $\pm$ 1,024 cm^2) utilized data in Tables 4B-3/4 of the EFH. Surface area data for arms and hands used information for 6-7 and 9-10 year old children in Table 4-3 of the EFH. The value for arm and hand surface area, shown in Table 3-2 of the BRA, was calculated as follows: 10,475 * 0.1767 (Total surface area * EFH factor for arms and hands) = 1,851 cm^2.

28. BN commented that the methodology for determining receptor point concentrations is not a common convention.

Response: Convention allows the use of the 95th Upper Confidence Limit (UCL) of the geometric mean if the data are distributed log normally as at the Site. The approach was used to generate what was felt to be exposure point concentrations that were reflective of Site conditions.

29. BN commented that the "frost free" days listed in paragraph 1, page 3-36 of the BRA appear to be inconsistent with the values provided on previous tables.

Response: The text is correct in the explanation of freeze free days or days that soil is available for direct contact or ingestion. Part B, Table 3-4 of the BRA, off site, future land use for children lists 103 days for direct contact and 103 plus 247 days for ingestion. Those values were used in the risk characterization calculations in the BRA.

30. IPC commented that risk calculations for dioxin (in ground water) are suspect, given the use (availability) of only two values.

Response: The infrequent and spatially diverse occurrence of higher chlorinated forms of dioxin/furan (largely OCDD), at toxicologically insignificant concentrations essentially eliminates dioxin/furan as a contaminant of concern in downgradient ground water.

31. IPC commented that the 2,3,7,8-TCDD toxicity equivalencies (TE) reported in the text on page 2-31 of the BRA could not be reproduced. The BRA reported "results for the Cedar St., MPC substation and L St. ditches are 2.33, 34.2 and 0.055 [micrograms per kilogram] TCDD TE μg/kg, respectively." Using the data in Table 2-9 only for 2,3,7,8 congeners, values of 1.52, 13.3, and 0.025 μg/kg were calculated for the Cedar St., MPC Substation, and L St. ditches, respectively, based only on the positive detections for the 2,3,7,8-congeners.

Response: MDHES recalculated the TEs of the 2,3,7,8 congeners and arrived at the same results reported in the BRA.

32. IPC commented that EPA has recently changed the cancer slope factor for benzo(a)pyrene.

Response: The BRA was reviewed by EPA and finalized March 1992. The change in the oral cancer slope factor value was established after the BRA and Feasibility Study (FS) were prepared.

The reduction of the oral slope factor (i.e., 5.8/11.5 mg/kg.d^{-1}) essentially halves the risk estimates presented in the BRA for benzo(a) pyrene. The (oral) toxicity

equivalent factors (TEFs) for the other probable human (B2) carcinogenic polynuclear aromatic hydrocarbons (PAHs) are based upon the slope factor for benzo(a)pyrene. Thus, halving of the TEF values would result in a revised cleanup level of (7.5 * 2) = 15 mg/kg B2 PAHs (FS, Table 2-4). This concentration is identified in the Decision Summary.

33. BN commented that the carcinogenic risk factor scores for PCP were not calculated correctly in Table 2-12.

Response: An error was made in this table regarding PCP; the stated values should be replaced with those calculated by BN (i.e., as given on p. 33 of their comments).

34. IPC commented that a flawed permeability constant was used for PCP, due to incorrect extrapolation from similar chlorophenolic compounds.

Response: The value used in the BRA was of the correct magnitude, as evidenced by the data in Table A-4 of the Superfund Exposure Assessment Manual (1988).

35. IPC commented that because the maximum modeled air concentrations were used to evaluate exposures of all receptor populations, the exposure and subsequent risk for individuals not located at the point of maximum impact were overestimated.

Response: As stated in subsections 2.1.4.1 and 3.4.3.2 of the BRA, annual average (not maximum) concentrations were used to represent contaminant of concern specific exposure point concentrations for onsite and offsite receptors. The air quality values in Part A of Table 3-5 are annual estimates for the Site. The air quality values in Part B of Table 3-5 were derived from the contaminant of concern specific concentration isopleth nearest Residence-10.

36. BN stated that dust generation would produce airborne particles and stimulate volatilization from meteorological events on the ground surface, not from 3 feet above ground level.

Response: The assumed emission source height of three feet was used because of the large tires on the heavy equipment operated throughout the Site. It was assumed that most dust generation would occur as the result of heavy equipment traffic instead of from a source at ground level. Section 2.1.4 presents the critical data and assumptions made regarding input to the air quality dispersion model. EPA methodologies were used to prepare the emission estimates for both vehicle and fugitive dust sources. The area specific emission factors, best available meteorological data and assumed arithmetic average contaminant of concern levels in soils are documented in the BRA.

37. IPC stated that the use of .42 mg/kg TE value for the IPC pasture, given the estimated maximum probable TE value of 0.5 mg/kg for background soils, appears to

indicate that dioxin risks for estimated background soils would be higher or similar to those for "offsite" soils.

Response: MDHES and EPA agree with this comment.

38. BN commented that the most appropriate method for estimating contaminant of concern levels (e.g., PCP) in vegetation, and consequent intake of such plant material by herbivores was to use the same procedure as was used for soils.

Response: Given the quantity and quality of data for soils and vegetation in the pasture area, the methodology applied in the ERA (pp. 24-25) generated credible estimates of contaminant of concern intakes for the given herbivores. The BN approach appears to generate intake rates (and consequently risk) that are several orders of magnitude greater than those calculated in the ERA.

39. IPC commented that the attractiveness of the wood treating area to trespassers (73.5%) appears questionable.

Response: Table 3-1, Part B states that trespassing occurs "usually on weekends and during the frost-free-soils period". It was judged that the plant buildings, machinery, etc., would be the most interesting things to investigate within the overall IPC Site. Given the nature of trespass, it is difficult to come up with a precise percentage to represent the attractiveness of the wood treating area.

40. BN commented that pooled surface LNAPL and high concentrations of contaminants of concern in the MPC substation ditch were ignored as a significant source of contaminants to local wildlife. BN also felt that the concerns regarding direct exposure to ponded LNAPL are very relevant and should not just be discussed in the uncertainty section.

Response: Based on field observations, the ponded LNAPL and associated soils appear to have a total surface area measured in tens of square feet; given the far larger area of contamination, which included pasture soils and vegetation, exposure to contaminants of concern in the latter media were considered. MDHES and EPA did address the potential for acute harm to individuals contacting the LNAPL pools and ditch sediments in the Uncertainties Section (6.2). Additionally, the LNAPL pools have not existed during the time that the RI/FS was conducted possibly because of low ground water.

41. BN questioned whether the use of the available toxicological data for mallards and domestic poultry was appropriate for extrapolation to peregrine falcons.

Response: The data in Table 3 represents the contaminant of concern/oral route specific toxicological end points for peregrine falcons. Assuming minimal bioaccumulation of

the three contaminants of concern in the terrestrial foodchain (ERA, p.19), it would not be unreasonable to assume toxicological equivalence between species of various trophic levels (e.g., mallards versus falcons). Therefore, no interspecific adjustments were made to the endpoint values in Table 3.

42. BN asked for a definition of "boot" stage grass, leaves, and stems.

Response: This term describes the stage of a grass species' development prior to emergence of any inflorescence, i.e., flowering stalks.

43. BN asked if the bioconcentration factor (BCF) given for PCP (i.e., <100) is for the entire food chain.

Response: Yes. This BCF value is representative of PCP accumulation in organisms at various trophic levels in aquatic and terrestrial foodchains. It is equally applicable to terrestrial herbivores and to freshwater salmonid species.

44. BN stated that limiting the Ecological Risk Assessment to only the oral ingestion exposure route introduces some level of uncertainty to the analysis.

Response: In the course of preparing the ERA, the inhalation of dust in underground burrows and dermal contact with contaminated soils were considered. Such evaluations were not presented in the ERA due to the large uncertainties associated with both exposure point concentrations (especially in air) and toxicological end points e.g., in unshaven mice. Ingestion intake (in mg/kg.d) of semivolatile contaminants of concern generally equals or exceeds that arising from the inhalation and dermal routes of exposure. Intake estimates based solely on the oral route may be ≥ 0.5 of that associated with all three routes of exposure. This potential underestimate in exposure is balanced by the low probability of underestimating contaminant of concern exposure in Table 6 of the ERA. No significant ecological threats appear to exist to the terrestrial (pasture) environment.

45. BN commented that they calculated higher intakes than the RI reported: a deer mouse dose of 6.2E - 01 mg/kg - d for the vegetation component rather than the 6.6E - 05 mg/kg - d value presented as a result of the transfer coefficient approach. B(a)P would yield 1.3E - 01 mg/kg - d versus 1.4E - 04 mg/kg - d and TCDD TE would yield 4.0E - 02 mg/kg - d versus 3.6E - 09 mg/kg - d.

Response: MDHES and EPA believe that the most desirable approach would have been the use of quantified data. Since that data was not available, the use of soil to vegetation transfer coefficients was assumed to be reasonable. The suggested approach of assuming ½ of the nondetect concentration would have resulted in higher concentrations of contaminants in vegetation than in soil which did not seem realistic.

46. BN commented about the assumption that cows would drink only half the year and asked where they would get their water the other half of the year.

Response: The cattle were assumed to be present and consuming potentially contaminated ground water only 6 months of the year because of the availability of other less contaminated surface water or by relocation to another pasture. Even if their contaminant intake through water is doubled, the environmental quotients for each compound are less than 1.0.

47. BN stated that the use of the higher vegetation tissue values from the field data would result in associated higher values in milk by 2 to 5 orders of magnitude and consequently increase a child's lifetime intake and risk characterization EQ.

Response: MDHES and EPA believe that the approach used was more appropriate than what is suggested. Given the quantity and quality of data for soils and vegetation in the IPC pasture area, the methodology applied in the ERA (pp. 24-25) generated credible estimates of contaminant intake for dairy cattle.

The uncertainties section identifies the possibility of moderate over or underestimation of risks based on the assumptions in the calculations used and identifies that this may result in 1-2 orders of magnitude error.

48. BN stated that they could not find a description of how the rainbow trout water exposure scenario, as presented on Table 4, was derived.

Response: A description of the rainbow trout scenario was not included in the ERA, however, the general approach used to calculate the fish-fillet scenario was as follows:

- calculation of contaminant of concern intakes via ingestion of prey and absorption via the gills, using the B_f values given in the ERA (p.31);

- summing these routes to estimate mg/kg.d intake of contaminants of concern (on a whole body basis); and

- calculating contaminant of concern "burdens" in fish fillets, assuming 81 percent by weight (w/w) moisture, 19 percent (w/w) protein and 1 percent (w/w) fat content.

These contaminant of concern levels in fish fillets were then used to calculate contaminant of concern intake in children using those assumptions stated on p. 30 of the ERA and the "ingestion of contaminated fish and shellfish" algorithm (i.e., Exhibit 6-17) in RAGS I (1989).

49. BN stated that given the level of uncertainty in the analysis, it would be difficult to conclude "no significant adverse environmental or human health effects" in the "fish-fish fillet-child scenario."

Response: Reevaluation of the database and assumptions leads to the conclusion that "moderate" should be replaced with "low" in Part D of Table 6 in the ERA. The overall ecological risk may be greater than originally envisioned. However, the data still result in the following conclusions:

- the likelihood of significant ecological damage to Rocky Creek is very small; and

- adverse effects on the terrestrial communities in the IPC pasture are generally limited to those low-lying spots that accumulate LNAPL-contaminated ground water.

50. BN asked where the environmental benchmark concentrations for aquatic organisms presented in the ERA came from.

Response: The environmental benchmarks are presented in Test Organisms and Methods Useful for Early Assessment of Acute Toxicity of Chemicals, Environmental Science and Technology, 12:1322-1329, E.E. Kenaga, 1978. The methodology for calculating sediment quality criteria (SQC) used the following USEPA formula:

$$C_{sed} = f_{oc} * K_{oc} * AWQC$$

Where: C_{sed} = SQC

f_{oc} = fraction of organic carbon (assumed to be 2 percent by weight in sediment)

K_{oc} = compound-specific organic carbon partition coefficient

AWQC = ambient water quality criteria (if published value exists); otherwise, used 1/100th of the reported 96-hr LC_{50} for the given compound.

The calculated values represent concentrations for chemicals in the sediment that, at equilibrium, will result in "no effect" interstitial water concentrations. This is based on the premise that the assimilation of chemicals by benthic organisms is the same as for pelagic organisms.

Ambient Water Quality Criteria are available for naphthalene (620 μg/L), acenaphthene (520 μg/L) and PCP (13 μg/L). For the remaining compounds, the

benchmarks were estimated by dividing the toxicity data by 100. Such sources were either 96-hour LC_{50} values if reported in the literature, or were estimated using the EPA's structure activity approach. In essence, various physicochemical and toxicological data for chemicals having similar properties to the "target" compound were used to estimate its environmental toxicity.

51. BN commented that the RI focused primarily on "purposive sampling" which, in turn, became data used in the risk assessments, and that EPA guidance states that purposive sampling should not be used to provide defensible information for the BRA.

Response: The Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A), (December 1989) states on page 4-18 "Although areas of concern are established purposively (e.g., with the intention of identifying contamination), the sampling locations within the areas of concern generally should not be sampled purposively if the data are to be used to provide defensible information for a risk assessment". The areas of concern identified for sampling at the Idaho Pole Company (roundhouse area, plant area, wood storage areas, pasture) were established purposively; however, the specific sampling locations were determined either randomly or systematically within the areas of concern.

IX. POTENTIALLY RESPONSIBLE PARTY COMMENTS ON THE FEASIBILITY STUDY REPORT

1. IPC commented that LNAPL was not adequately defined in the Feasibility Study (FS), and it appears that both soil staining and floating product are considered LNAPL by the State's consultant at the Site.

Response: The distinction between soils contaminated with residual product (referred to as stained soils) and actual free product or LNAPL is clearly made in the FS. The extent of residually contaminated soils and free product were adequately characterized during the remedial investigation for alternative selection. Additional LNAPL contamination area characterization may be necessary during remedial design for optimization purposes. Soil Alternative #6 was selected because it will mobilize and remove both the free-product LNAPL and the residual product in the smear zone soils and in the unsaturated zone above the ground water table.

2. IPC commented that the FS's preference for technologies that excavate contaminated soil and pump out contaminated ground water so it can be treated in above-ground facilities ("*ex situ*") increases complexity and costs as a result of all the digging and pumping, and the FS does not document that *ex situ* treatment is more reliable than bioremediation of soil underground.

Response: *In situ* treatment was generally preferred over *ex situ* treatment in the FS when warranted by site-specific conditions.

Some of the soil types found in the subsurface at the Site, including silts and silty clays, reduce the certainty that *in situ* treatment of vadose zone soils will be effective. No credible technology vendors were willing to speculate that their *in situ* biological processes would be effective at the Site within the above-mentioned, less permeable soil types. However, *ex situ* biological degradation of the contaminants of concern using either engineered land treatment or soil slurry reactors has been proven effective and demonstrated at several sites with similar soil types. The *ex situ* treatment of a portion of the Site soils is expected to decrease the total treatment cost. While taking several years to reach cleanup goals, the surface treatment is still expected to take significantly less time than *in situ* treatment of the soils as a stand-alone measure, assuming the process is optimized correctly during remedial design. *In situ* treatment should be effective within the coarse sand and gravel fill material within the wood treatment area, thus sparing the wood treatment facility structures from demolition.

Pump and treat of contaminated ground water has been identified primarily for use during the active steam stripping and soil flushing activities in order to prevent the release of any increased levels of dissolved contaminants of concern resulting from the recovery operation. *In situ* biological treatment of the ground water will be the primary mechanism for ground water dissolved plume treatment.

3. BN commented that the FS does not follow EPA guidance in the development of the Preliminary Remediation Goals (PRGs) in that a whole new set of chemical compounds are introduced that were not evaluated in the BRA.

Response: At the time that the BRA was prepared, TEFs were not available for PAH constituents, therefore PRGs were not calculated. Part B of Table 2-37 in the BRA lists the B2 PAHs that would be addressed qualitatively, given the lack of formal toxicity equivalent factors for these compounds at the time of document completion (i.e., March 1992). However, informal TEFs were utilized in preparing PRGs in the FS. These informal TEFs would have been used in preparing the BRA had they been available at that time. The potential adverse effects of the additional B2 PAHs could not be disregarded in the preparation of the FS.

4. IPC recommended that the FS PRGs should be revised using site-specific exposure assumptions and current toxicity values.

Response: The PRGs presented in the FS are based upon the BRA, which as has been stated, will not be revised. The PRGs are protective and are reflective of the Reasonable Maximum Exposure (RME). For soils, an industrial land use cleanup level has been identified from the upper range of the PRGs. The FS and BRA were prepared before release of the updated cancer slope factor (CSF) for benzo(a)pyrene and therefore the PRG is based upon the prior CSF. However, the Decision Summary identifies that change and the cleanup level has been adjusted accordingly.

5. BN commented that the difference is great enough between the wood treating area and the former roundhouse area to warrant separate evaluation. BN stated that the analysis of alternatives in the FS does not present sufficient information regarding risks reduction in the two areas to logically select a remedial alternative for either area.

Response: The Site was investigated as one operable unit since it is relatively small, the same types of contaminants are generally found in each area. The creation of an additional operable unit would have added administrative requirements and was not warranted. Nevertheless, each area of significant contamination was evaluated in light of specific characteristics, e.g. medium, contaminants, and potential land use. The RI Report data adequately supports the following conclusions:

- total B2 PAH levels of potential concern to public health (i.e., ≥ 15 mg/kg) occur within a portion of the roundhouse area;

- such levels occur in the upper seven feet of the soil profile, but do not appear to be contaminating the underlying ground water;

- the wood treatment plant area is contaminated with both B2 and D PAHs, chlorophenols and possibly dioxin, and contaminant releases have migrated down to ground water and consequently been transported downgradient.

The goals pertaining to risk reduction are as follows:

- elimination of the soil pathway/multiroute exposures posed by the B2 PAH-contaminated soils within the roundhouse area;

- removal of the residual LNAPL/"smear zone" soils to eliminate (or mitigate) the source of B2 PAH/chlorophenolic contaminants to the ground water pathway; and

- treatment of vadose zone soils/ditch sediments to eliminate known or potential exposures via the soils, surface water and air pathways.

6. BN commented that reduction of exposure does not receive appropriate evaluation in the FS.

Response: Exposure reduction remedies, including surface capping and fencing, were evaluated for Site cleanup. However, one of the four statutory mandates of CERCLA Section 121 for all remedial actions is that the action must "Utilize permanent solutions and alternative treatment technologies or resource recovery technologies, to the maximum extent practicable". Exposure reduction remedies do not meet this statutory requirement because they do not usually use permanent solutions. Remedial

actions must also satisfy the preference for treatment that reduces toxicity, mobility, or volume as a principal element. An exposure reduction remedy does not use treatment as a principal element and does not reduce toxicity or volume of contaminants.

7. BN believed that the selection of institutional controls, containment, collection, treatment, and disposal alternatives was arbitrary and subjective and was not consistent with a good engineering evaluation of alternatives.

Response: The FS identified approximately 40 process options for soil remediation that were evaluated in detail. An equal number of process options for ground water remediation were identified and evaluated in the FS.

The evaluation and selection of alternatives for soil and ground water remediation was conducted in conformance with the procedures outlined in Guidance for Conducting RI/FSs Under CERCLA, 1988.

8. BN commented that the detailed analysis of alternatives provides little guidance to the risk manager, does not provide information to the public regarding the logic behind remedy selection, and appears to be predisposed to the selection of a "preferred" alternative.

Response: The purpose of the detailed analysis of alternatives is to provide decision makers with sufficient information to adequately compare the alternatives, select an appropriate remedy for a site, and demonstrate satisfaction of the CERCLA remedy selection requirements in the ROD.

The FS detailed analysis of alternatives section follows EPA guidance and complies with the requirements of CERCLA. Each alternative identified during the selection process is evaluated against nine criteria. The alternatives that rank highest after this evaluation are chosen as the selected remedies for soils and ground water. A combination of remedies may be chosen if they provide the best remedy, as is the case at the Site.

9. BN commented that the comparative analysis of alternatives assembled as comprehensive treatment strategies is inappropriate and not recommended by EPA guidance.

Response: Although EPA Guidance (1988) does not mention grouping alternatives for comparison in an FS, this strategy is not inappropriate. The Site is extremely complex in nature because of the presence of I-90 and the operating pole treating facility and consideration of combined alternatives could provide a remedy that is the most appropriate.

The Decision Summary for the Site follows the approach outlined in EPA guidance by evaluating each of the alternatives individually prior to remedy selection.

10. IPC suggested that their proposed *in situ* treatment and containment of the ground water plume by downgradient recovery remedy should be preferred because it scores higher for key criteria, such as implementability and overall protection of human health and the environment and thus better satisfies the FS evaluation criteria.

Response: The IPC proposed remedy, *in situ* treatment and containment of the contaminated ground water plume by downgradient recovery, has been fully considered and evaluated by MDHES and EPA. The proposal is similar to certain technologies considered in the FS and eliminated as stand-alone remedies primarily on the basis that they are simply not effective for permanently reducing the risk and actually treating the contamination.

In situ treatment, as attempted at numerous sites throughout the country, has proven ineffective for actually achieving reductions in levels of contamination such as that found at this site. The levels of contamination found in the heavily oil-saturated soils at and above the ground water table are too high to allow effective biological degradation in place. This "floating" oily wood treating product must be recovered and removed from the soils before effective bioremediation can occur. Excavation of soils and *ex situ* treatment is necessary to implement an effective remedy.

The IPC proposal would require ground water capture and treatment in perpetuity since the most significant source of contamination, the floating oily wood treating fluid would remain in place. Superior implementability, as claimed in the comment, and lower cost are not justifications to select an alternative that is not effective, will not achieve a permanent solution, does not reduce toxicity, mobility or volume of the contamination, and does not include treatment for the bulk of the main contaminant source.

11. IPC expressed several concerns related to PRGs. First, IPC alleged that there was a discrepancy between the Remedial Action Objectives (RAO), which are set at the 10^{-4} risk level and the PRGs, which are set at the 10^{-6} risk level. Second, IPC asked when and where the PRGs would be applied and how they would be measured to determine when remediation is complete. Third, IPC stated that the goal of restoring all ground water to MCLs has been shown at most pump-and-treat sites across the United States to be infeasible and at this site it is not necessary or appropriate, since protection of public health can be addressed in numerous other ways.

Response: The RAOs are a <u>range</u> of risks from 1×10^{-4} to 1×10^{-6} or <u>less than 1×10^{-4}</u>. The PRGs, which reflect a 1×10^{-6} risk fall within this range. Ground water modeling results (Technical Memorandum 2, Addendum C) indicate the potential for attaining PCP levels at or near the MCL once LNAPL removal/smear zone soil

treatment has been completed. Therefore, use of the MCL as a PRG for ground water restoration is technically feasible and in compliance with ARARs.

The PRGs were used to derive cleanup levels that are established in the Record of Decision. The Record of Decision also defines the standard of performance to determine when remediation is complete. The cleanup levels for ground water will be attained by the combination of alternatives, not only pump and treat.

12. BN commented that previous investigations appear to focus on PCP while FS analysis and remedial action objectives (RAO) development focus on PAH.

Response: The previous investigations mentioned include the pre remedial investigation/feasibility study work conducted by EPA, MDHES and IPC. Since, PCP is the compound most prevalent and the primary component of the wood treatment process, it was the logical compound to track. The FS and the RAOs include PCP and PAH MCLs for remediation standards for the Site.

13. IPC commented that it was unable to verify the methodology followed in the FS to derive PRGs for potentially carcinogenic PAHs and the soil PRGs for non-carcinogenic PAHs, in spite of the fact that the same reference doses (RfDs) were used to derive PRGs.

Response: The procedure for development of these PRGs was presented in Section 2.2.1 of the FS. Reevaluation of the worksheets indicates that no critical data or assumptions were omitted from the text. MDHES and EPA believe that the preparation of the PRGs has been done properly.

14. IPC stated that the PRGs were derived for surficial soil exposures and they are applicable only for the upper one or two feet of soil and not for deeper soils.

Response: In those areas where only surficial soil exposures have been identified, PRGs would apply to the upper soil profile. The RI Report data indicates significant contamination of vadose zone soils by chlorophenols and PAHs below much of the wood treatment facility and vicinity. These soils and associated wood treating solution can be linked to contamination of ground water downgradient from the IPC operations. Contaminant source removal should be implemented to control the ground water pathway of contaminant of concern transport, regardless of PRG levels for "surface" soils.

15. IPC stated that the treatability study does not contain the types and amounts of data required to substantiate the applicability of *in situ* bioremediation methods at the Site, nor does it support the elimination of *in situ* bioremediation methods as a primary remedy at the Site.

Response: Treatability study data coupled with published literature from similar sites support bioremediation at the Site. Soil permeability data and classification obtained during the treatability studies dictate the difficulties of relying solely on *in situ* bioremediation of the vadose zone. Technology vendors were not supportive of *in situ* biological treatment in the vadose zone site-wide due to the nutrient and oxygen delivery problems in the tighter soils. Additional testing is necessary during remedial design to optimize the biological treatment systems chosen.

16. IPC noted that the *ex situ* soil remediation effort could be substantially slower than estimated in the FS.

Response: Treatment time estimates were made by evaluating operating engineered land treatment units in Montana, taking into account substantially decreased biological activity during winter months. Treatment rates may actually be increased by constructing modified greenhouses for the treatment area, using soil pile reactors or using soil slurry reactors. Additional optimization work is necessary during remedial design.

17. IPC stated that the use of the hot water/steam technology as proposed in the FS is not recommended because it will release toxins from flushed soils into the uncontaminated subsurface microbial population.

Response: Treatability study results showed a substantially less diverse microbial community within the LNAPL contamination area when compared with samples from outside the boundaries of the heavily contaminated area, leading to the conclusion that the existing contamination is already toxic to subsurface microbes. Literature reviewed also supports this conclusion. The hot water/steam technology is not expected to cause additional injury to the microbial population, and it will ultimately reduce residual product concentrations in the soils to a level no longer toxic to the bacterial degrading microbes.

18. IPC stated that one percolation test result does not adequately characterize the permeability of a volume of soil that could range from 4,300 cubic yards (high range cleanup standard) to 128,000 cubic yards (low range cleanup standard).

Response: In addition to the percolation test, porosity and permeability tests were run on an undisturbed soil core collected at approximately four feet below ground surface in the roundhouse area during the treatability studies. The data from the percolation test and the core sample was coupled with lithology descriptions from multiple test pits and wells in order to make conclusions about the permeability of soils in the roundhouse area.

19. BN stated that the use of the RfD for naphthalene in the roundhouse area is inappropriate because naphthalene was only identified with "J" qualifiers on the data collected from the roundhouse area.

Response: Naphthalene was included in calculating a PRG for the D PAHs based on guidance found in RAGS I. RAGS I states that "J" data "can be used just as positive data with no qualifiers or codes", as such qualified data indicates, "uncertainties in concentration but not in identification" (RAGS I, p. 5-15).

20. BN wanted references to a "creosote-like" substance removed from the text unless data to substantiate the makeup of the substance can be presented.

Response: The term "creosote-like" was used by inspectors in 1978 to describe materials found in a ditch originating at the Site. MDHES and EPA used the term in recounting what the 1978 inspection report had identified. Creosote was used as a wood preservative from 1946 until approximately 1951 or 1952.

21. BN commented that the no action alternative should be revised to reflect that no action does not include institutional controls.

Response: The no action alternative may include ground water monitoring but would not include institutional controls. This comment is reflected in the Decision Summary.

22. BN commented that technologies for different media are supposed to be combined into alternatives for the Site "as a whole." Instead, alternatives are assembled for each of the three media: soil, LNAPL, and ground water.

Response: Alternatives were assembled and evaluated by media in the IPC FS because remedial technologies have been developed on a media specific basis. A remedial technology, such as incineration, would not be feasible for ground water treatment, and carbon filtration would not be an appropriate technology to use for soil remediation.

The common practice, and the one used in developing remedies at other sites, is the media specific evaluation of alternatives.

23. BN pointed out that the three criteria described for evaluating the alternatives (effectiveness, implementability, and cost) are not the same as those given in EPA FS guidance.

Response: Section 300.430(e)(7) of the National Contingency Plan (NCP) states that effectiveness, implementability, and cost shall be used to guide the development and screening of remedial alternatives. A detailed analysis, using the nine criteria referenced in the FS guidance, shall be conducted on the limited number of

alternatives that represent viable approaches to remedial action after evaluation in the screening stage, pursuant to section 300.430(e)(9) of the NCP.

24. IPC commented that capping appears to be a viable option for the soils in portions of the pole yard as well as in the roundhouse area.

Response: Capping has been identified as ineffective at preventing continued contamination of ground water by contaminated surface and subsurface soils. Since soils in the pole yard area are contributing to ground water contamination, it has been determined that capping would not be appropriate in this area.

25. IPC noted that there are many kriging methods that can be used to contour data sets and questioned whether the kriging method used in this case was the most appropriate.

Response: The SURFER® program (Golden Software, Inc.) was used to krige the soils data for the IPC FS. Discussion of this kriging method can be found in the following references:

Davis, John C., 1986, Statistics and data Analysis in Geology, John Wiley and Sons, New York.

Jones, Thomas A., David E. Hamilton and Cralton R. Johnson, 1986 Contouring Geologic Surfaces with the Computer, Van Nostrand Rheinhold Company, New York.

The use of the kriging method was simply used to illustrate contaminated areas of concern and to estimate volumes. Specific areas for remediation will be confirmed during remedial action.

26. IPC stated that the data are insufficient to make assumptions regarding the extent of impacted ditch sediments and that the estimated ditch sediment volumes provided in Table 2-9 (page 2-33 of the FS) are, therefore, uncertain.

Response: Additional data would have been useful in this case. Volumes presented in Table 2-9 are estimates which are intended to be protective. Confirmation sampling during remedial action will verify volumes for removal.

27. IPC was concerned that the lateral area contaminated with PCP was overestimated by using the solute transport model.

Response: MDHES and EPA are in general agreement with the comment. The intent of the solute transport evaluation was to develop an estimate of the areal extent of ground water contamination over time and not to precisely define the boundaries of the

contaminated area. The area of existing ground water contamination has been verified through actual monitoring. It is not unexpected for this boundary to shift seasonally or with precipitation events.

28. IPC's contractor stated that the costs associated with constructing and operating a hydrogen peroxide injection system can be an order to magnitude higher than a simple bioventing system, which could achieve the same effect. They felt that such a cost differential could have implications regarding the implementability of the *in situ* biological treatment alternatives utilizing this technology.

Response: Bioventing was not identified during the FS process as a means of providing subsurface oxygen to enhance biological treatment primarily because higher concentrations of oxygen can be delivered by other systems.

Bioventing could be significantly less expensive than using hydrogen peroxide as an oxygen source. Costs of hydrogen peroxide compared to venting have little or no effect on the implementability of *in situ* biological treatment in vadose zone soils. Implementability is driven primarily by the ability to treat the soil types that are present at a Site.

29. IPC commented that the cost estimates provided in Appendix A of the FS appear to be low.

Response: The cost estimates were prepared as accurately as possible recognizing that many factors may change during design. The cost estimates were generated through the use of standard engineering planning techniques and are based on costs estimated at similar Sites, the consultant's experience and current costs from vendors. The consultant also used EPA's Cost of Remedial Action Model (CORA) to assist in developing estimated costs. The Agencies believe the costs are accurate within the ranges specified by guidance.

30. IPC commented that the FS incorrectly stated that the RCRA ground water protection requirements for solid waste management units (surface impoundments) would be applicable to capping of wastes in place.

Response: The commentor is correct that RCRA subtitle C requirements are not applicable when waste is simply capped in place. See CERCLA Compliance with Other Laws Manual: Interim Final, p. 2-16 (EPA/540/G-89/006, OERR, August 1988). The FS should have referred to the requirement as relevant and appropriate rather than applicable. This does not change the analysis, however, since the effect of a relevant and appropriate requirement is the same as that of an applicable requirement.

31. IPC commented that the identification of ARARs for the Site did not include requirements from Administrative Rules of Montana 16.14.501 et seq. regarding refuse disposal.

Response: While such requirements are indeed applicable to the proposed remedial action, they were not identified as ARARs because they do not impose requirements that are more stringent than federal ARARs specified for the Site. Many of the substantive portions of these requirements, such as the 100-year floodplain restriction, drainage requirements and ground and surface water protections, as set forth in ARM 16.14.505(1), are also included in other ARARs identified for the Site.

32. BN commented that *in situ* bioremediation is screened out due to Site and contaminant constraints. However, the technology is mentioned as a possible option for use after soil flushing.

Response: *In situ* bioremediation was screened out only as a "stand-alone" alternative.

33. BN commented that sheet piling would not prevent movement of LNAPL and that the FS does not discuss hydrological controls (i.e., free product recovery wells), which BN believes would be the most effective method of containing the LNAPL plume.

Response: Sheet piling can be used to stop movement and collect LNAPL if properly designed and are commonly used for this purpose. Hydrological controls are presented in Section 8.2.2.3 of the FS, page 8-30, and are discussed for use in conjunction with vertical barriers (sheet piling). The FS states that vertical barriers used with the recovery system may be necessary to prevent the escape of LNAPL.

34. BN questioned the FS's discussion of free product emanating from the ground surface, and stated that it is unlikely that this would occur.

Response: Surface expression of oily treating fluid in the pasture area has been a frequent occurrence. As the ground water levels nears the ground surface in the spring, treating fluid is commonly seen in several locations in the pasture. IPC attempted to contain and recover treating fluid in years past as is discussed in the RI Report.

35. BN commented that residual LNAPL will be toxic to microorganisms and a continued source of ground water contamination.

Response: The importance of removing the contaminant sources is stated repeatedly in the FS. Recovery of contaminants under I-90 and in the active plant area will be accomplished without excavation through flushing and *in situ* biological treatment while other source soils will be excavated and biologically treated.

36. BN commented that the residual risk for *ex situ* soil treatment in the roundhouse area is less than 1×10^{-5} risk; however, the soils in that area only present a 1×10^{-5} risk prior to treatment, therefore, no treatment is necessary.

Response: Soils are present in the roundhouse area that exceed the 15 mg/kg cleanup level for B2 PAHs and present an excess cancer risk of greater than 1×10^{-5}. This area will require further investigation to determine the extent of contamination and the level of B2 PAHs contained in the soil.

X. POTENTIALLY RESPONSIBLE PARTY COMMENTS ON THE PROPOSED PLAN

1. BN commented that it was improper to release the Proposed Plan to the public before the comment period for the FS was over.

Response: EPA Guidance on Preparing Superfund Decision Documents (Interim Final, July 1989), indicates that CERCLA Section 117 requires that upon completion of the Proposed Plan, the lead agency shall notify the public of the availability of the Plan, the RI/FS Report, and the administrative record file. The FS Report and the Proposed Plan public comment period began on April 16, 1992 for a 30 day period and was extended until June 16, 1992 at the request of the PRPs. Moreover, CERCLA does not require release of the FS prior to release of the Proposed Plan.

2. BN commented that the Proposed Plan incorrectly stated that inhalation, ingestion and skin contact were exposure pathways not exposure routes.

Response: The comment is correct in noting that inhalation, ingestion and skin contact are exposure routes, not exposure pathways. The information contained in the Proposed Plan is typically not technical in nature and MDHES and EPA do not believe that the error noted above has caused misinterpretation of the risk assessment.

3. IPC commented that the cleanup levels proposed for the soil onsite are much lower than necessary to protect the health of onsite workers.

Response: Cleanup levels for onsite soil have been identified at the 1×10^{-6} industrial use level. This risk level is within the range deemed acceptable by EPA. Preliminary remediation goals were developed from the human health risk assessment and are intended to be protective.

4. IPC requested that the issuance of the Record of Decision be postponed to allow ample time to fully consider comments. IPC also suggested that the proposed public meeting be postponed.

Response: The issuance of the ROD has been postponed to allow ample time for MDHES and EPA to fully considered all comments. For reasons detailed in response to the individual comments, many of the comments raised did not justify a change in the selected remedy, which still represents, in the determination of the agencies, the best balance of the appropriate criteria.

Certain concerns raised by the comments can and will be addressed in the activities undertaken as part of the design of the remedy and certain elements of the remedy have been modified in light of comments received as described in Section XI of the Decision Summary, Documentation of Significant Changes, details this determination.

EPA and MDHES have held several public meetings concerning the Site. The last public meeting/hearing was held on April 30, 1992. No other public hearing for receiving oral comment on the preferred remedy has been planned by the agencies. A public meeting to announce the release of the Record of Decision and to provide a brief summary of the selected remedy will be held in connection with the issuance of the Record of Decision.

5. IPC recommended that MDHES inform the public of any changes made to the Proposed Plan in response to these comments and allow additional public comment before MDHES makes a final decision and the Record of Decision is issued.

Response: No additional comment period will be held by the agencies prior to issuance of the Record of Decision. The recent comment periods solicited a broader spectrum of comments than that required by regulations or guidance, including comments on the RI Report, the Risk Assessment documents and the Feasibility Study, in addition to the required comments on the Proposed Plan. Hundreds of comments were received and considered in detail by the agencies. The final remedy is not significantly changed from the Proposed Plan, and thus, an additional opportunity to comment is not warranted.

6. IPC stated that hydraulically controlling the impacted ground water is a sound objective; however, there is a high degree of complexity involved in the construction and simultaneous operation of the preferred remedial system.

Response: The Agencies believe that the complexity of these systems can be adequately addressed through remedial design. This system has been designed conceptually to target withdrawal of the water in contact with the LNAPL and residually contaminated soils, mainly to achieve contaminant migration control and induce flushing through the highly contaminated materials. Due to the high hydraulic conductivity and flux in this area, a more conventional pump and treat system would require pumping up to an order of magnitude larger volume of water than proposed in the FS. This larger volume would be much more expensive to treat, especially in

comparison to the capital and operation and maintenance costs of the proposed system.

7. IPC expressed concerns about the use of hydrogen peroxide, noting that there are special safety precautions associated with the storage and use of hydrogen peroxide and that there is a clear trend toward the use of simple and more effective alternate sources of oxygen, such as air (i.e., bioventing or air sparging).

Response: There are definite advantages to both hydrogen peroxide and air systems for fulfilling oxygen requirements. Hydrogen peroxide is typically capable of achieving higher concentrations of dissolved oxygen in the aquifer than sparging or venting. This is beneficial in satisfying high biological or chemical oxygen demands. Hydrogen peroxide also oxidizes organic compounds, a process that assists in the degradation of the contaminants of concern. Sparging or venting may be effective enough to maintain desired oxygen levels after the majority of the LNAPL and residual product has been recovered. Testing during remedial design is necessary to optimize the oxygen delivery system.

8. IPC suggested that ground water could be remediated more easily and in a more cost effective manner through the use of a simpler technology, such as an interceptor trench, designed to achieve hydraulic control.

Response: In order to gain hydraulic control of the dissolved plume using an extraction trench or series of extraction wells north of the pasture area as suggested, preliminary modelling has indicated that at least 800-1000 gallons per minute must be pumped to create a sufficient capture zone. The selected remedy would capture the contaminated water at its source instead of after it has become dispersed and diluted. Preliminary modelling indicates that the selected remedy approach can be accomplished by pumping approximately 200 gpm. Increased pumping rates require larger capacity pumps and increase operation and maintenance costs.

The commentor's proposed location of the infiltration gallery or wells will not allow flushing of the contaminated vadose or interface soils within the LNAPL contamination area boundary.

9. IPC noted that simple math indicates that the operation of a single large dual pump well (i.e., the dual pump interceptor trench) is roughly an order of magnitude easier than operating ten small dual pump wells (i.e., the configuration on Figure 10-1 of the FS).

Response: The intent of the multiple pump approach is to develop more effective hydrogeological control than would be afforded by a single pump.

10. IPC commented that there are several disadvantages in using hot water/steam technology. First, IPC noted that the objective of the hot water/steam flushing technology directly contradicts the remedial action objective (RAO) for environmental protection of soils and aquifer sediments as stated in the FS by causing contaminants to migrate (page 5-2 of the FS). Second, IPC stated that this approach has the potential to significantly reduce the implementability of *in situ* biological treatment methods in the unsaturated soil zone. Third, IPC believes that the technology would be inefficient in mobilizing LNAPL at the Site.

Response: The ground water extraction system has been conceptually designed to mitigate potential migration of contaminants of concern through the use of the hot water/steam enhance recovery process. Soil permeability actually increases as a result of the process which would result in increased implementability of the *in situ* biological treatment as a follow up measure. The steam stripping process will be applied under I-90 where a confining clay layer is present and recovery efficiencies have been estimated at 70 percent. The concern that this process will result in decreased microbiological population in the unsaturated soil zone if unfounded. The unsaturated zone considered for soil flushing with hot water will not experience significant decreases in microbial population since only hot water will be used in this area. The unsaturated zone under I-90, identified for steam flushing, is very limited since it is mostly vadose zone. Finally, the FS has estimated through modelling that hot water and steam flushing may recover between 31% and 80% of LNAPL, depending upon conditions. This may be considered inefficient if 100% recovery is the measure of success.

11. IPC felt that application of the steam injection process will result in the *in situ* biological treatment taking longer and costing more.

Response: The steam injection process will not take longer to achieve remediation levels because it will be implemented within a semiconfined aquifer in the saturated zone in an area where the vadose zone is not expected to be contaminated. Microbes, which are key to *in situ* treatment, will easily recolonize themselves within the saturated zone. The hot water proposed for vadose zone flushing is not expected to stress the indigenous microbe population, although indigenous acclimated microbes could be cultivated and reinjected in the nutrient/oxygen solution following washing if additional testing conducted during remedial design deems such action necessary. Costs may be greater for use of the steam injection system; however, mobilization of the soil contaminants is necessary to move them to a location where they can be extracted.

12. BN commented that dewatering techniques can be used to lower the water table at the Site in order to excavate contaminated soils below the existing water table in lieu of <u>in situ</u> soils treatment.

Response: The comment is correct in stating that there are dewatering techniques that could be used to remove additional soils below the water table. However, MDHES and EPA have determined that excavation to the lowest static ground water level provides a convenient approach to removing contaminated soils, because the highest concentration of contaminants are found in this upper interval and more complex and costly excavation techniques are not required. Soil flushing and pump and treat systems will address contamination below the water table.

13. IPC commented that since all LNAPL recovered to date from the interceptor ditch at IPC has been recycled in the pole treating process, it is anticipated that this practice will continue for LNAPL recovered in the future.

Response: The ROD identifies recycling of LNAPL as a potential component of the remedy. The ROD also identifies ARARs for the remedial action at the Site. Prior to recycling LNAPL, ARARs, including substantive FIFRA requirements, must be attained.

14. IPC commented that the proposed *ex situ* treatment of the hazardous wastes in the soils will trigger ARARs requirements such as land disposal restrictions and RCRA surface impoundment requirements that would not be triggered by the type of *in situ* treatment proposed by the commentor.

Response: As indicated in the ARARs analysis, land disposal restrictions are not ARARs since treatment standards were not set prior to issuance of the Record of Decision. Therefore, the LDRs impose no additional burden on the *ex situ* treatment alternative for this site.

The evaluation of remedial alternatives considered whether the alternatives complied with ARARs and did not weigh the number of ARARs triggered by the various alternatives. The selected remedy was determined to be capable of complying with all ARARs. Although *in situ* treatment might not need to meet the same or as many ARARs as *ex situ* treatment, *in situ* did not fare as well as *ex situ* in the comparative analysis, and therefore, it has not been chosen as the primary means of remediating the Site.

15. BN commented that biological treatment of a separate phase organic liquid is not technically feasible and that high concentrations of contaminants are toxic to microorganisms.

Response: The selected remedy does not contemplate biological treatment of a separate phase organic liquid. To effectively use biological treatment to reduce contamination from the LNAPL, the separation technology would have to be applied to soil or ground water that contains the LNAPL, as is contemplated in the selected remedy.