Record of Decision

Missoula White Pine Sash Facility

Missoula, Montana

Prepared By:
Montana Department of Environmental Quality
Remediation Division
Helena, Montana

February 2015

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PART 1

DECLARATION OF RECORD OF DECISION

Declaration of Record of Decision

FACILITY NAME AND LOCATION

The Missoula White Pine Sash (MWPS) Facility is a high priority state Superfund facility listed on the Montana Comprehensive Environmental Cleanup and Responsibility Act (CECRA) Priority List. The MWPS Facility is within the City of Missoula (City), Montana.

STATEMENT OF PURPOSE AND BASIS

This Record of Decision (ROD) is the document that presents the Montana Department of Environmental Quality's (DEQ's) selected remedial action for the MWPS Facility and was developed in accordance with CECRA. The remedial action selected in the ROD is based on the administrative record, which consists of the documents DEQ cited, relied upon, or considered in selecting the remedy for the MWPS Facility. The administrative record is identified in Part 2, Section 14.0 of the ROD. The complete administrative record is available for public review at the offices of DEQ, Remediation Division, located at 1225 Cedar Street in Helena, Montana. A partial compilation of the administrative record is available at the Main Branch of the Missoula Public Library, 301 E. Main St., Missoula; the University of Montana Mansfield Library; and on DEQ's website at http://www.deq.mt.gov/StateSuperfund/missoulawhitepinesash.mcpx.

ASSESSMENT OF THE FACILITY

DEQ is authorized to take remedial action whenever there has been a release or a threatened release of a hazardous or deleterious substance into the environment that poses or may pose an imminent and substantial endangerment to the public health, safety, or welfare, or the environment. Section 75-10-711, MCA. CECRA defines a hazardous or deleterious substance in Section 75-10-701(8), MCA. The primary contaminants that DEQ identified at the MWPS Facility are pentachlorophenol (PCP), dioxins/furans (hereinafter referred to as "dioxin"), metals, methane, and petroleum hydrocarbons. These and other identified contaminants are described in Part 2 of the ROD. DEQ has determined that these contaminants are hazardous or deleterious substances under CECRA. Based on the administrative record, DEQ has determined that hazardous or deleterious substances have been spilled, leaked, discharged, leached, dumped, or disposed into the environment, which constitutes a release or threatened release under Section 75-10-701(19), MCA.

The potential for an "imminent and substantial endangerment to public health, safety, and welfare, or the environment" is present when contaminant concentrations in the environment exist or have the potential to exist above risk-based screening levels (ARM 17.55.102) and an imminent and substantial endangerment does exist if contaminant concentrations exceed site-specific cleanup levels (SSCLs). DEQ has determined that contaminant concentrations at the MWPS Facility exceed risk-based screening levels and SSCLs. Therefore, DEQ has determined that a release or a threatened release of hazardous or deleterious substances from the MWPS Facility poses an imminent and substantial endangerment to the public health, safety, or welfare, or the environment and further remedial action is necessary. In selecting the remedial action, DEQ evaluated the criteria found in Section 75-10-721, MCA.

DESCRIPTION OF THE REMEDY

Section 75-10-721(2)(c), MCA, directs DEQ to consider present and reasonably anticipated future uses of a facility when selecting remedial actions. The alternative selected must then meet SSCLs protective of the reasonably anticipated future uses.

Section 75-10-701(18), MCA, defines "reasonably anticipated futures uses" as "likely future land or resource uses that take into consideration:

(a) local land and resource use regulations, ordinances, restrictions, or covenants;
(b) historical and anticipated uses of the facility;
(c) patterns of development in the immediate area; and
(d) relevant indications of anticipated land use from the owner of the facility and local planning officials."

DEQ's evaluation of reasonably anticipated future uses of the MWPS Facility is found in Part 2, Section 6.0 of the ROD. In summary, DEQ determined that the reasonably anticipated future use of the WWW Investments, LLC (WWW) property, the City shop property, and the western portion of the Scott Street, LLP (SSLLP) property is commercial/industrial. DEQ also determined that the reasonably anticipated future use of the City park property is recreational, and that the reasonably anticipated future use of the eastern portion of the SSLLP property and the property east of Scott Street is residential.

The remedy for the MWPS Facility consists of remediation of contaminated media to meet SSCLs as described in the ROD, with reliance on institutional controls. Numerous interim actions have occurred at the MWPS Facility. DEQ considered the interim remedial actions and integrated that information and those actions into the remedy to the extent possible. Major components of the remedy are summarized below. Details of the remedy are provided in Part 2, Section 11.0 of the ROD.

Institutional Controls

The selected remedy partially relies on the placement of DEQ-approved restrictive covenants on some of the properties that make up the MWPS Facility to limit the future use of portions of the WWW, City shop, and western portion of the SSLLP properties to commercial/industrial and to limit the use of the City park to recreational. (These restrictive covenants are not needed on the existing residential property east of Scott Street or on the eastern portion of the SSLLP property.) Groundwater use will be regulated in these restrictive covenants or a controlled groundwater area (or both) to prohibit installation of non-remediation wells at the Facility until SSCLs for groundwater are met. On the WWW property with subsurface soil contamination that will be treated over time, irrigation will be prohibited until SSCLs are met (or DEQ otherwise approves it) to ensure that the addition of irrigation water does not disrupt or otherwise change conditions during treatment. Use of a portion of the western portion of the SSLLP property will also be restricted for a short time to allow treatment of soils in a land treatment unit. These restrictive covenants will be in effect until DEQ determines they are no longer needed to ensure protection of public health, safety, or welfare or the environment.

Long-Term Groundwater and Soil-Vapor Monitoring

The selected remedy includes long-term monitoring, which includes sampling of any, or all, of the existing monitoring well network that now includes approximately 54 wells or additional wells that may be installed or added as part of remedial design. Monitoring may also include some or all of the existing irrigation or public water supply wells. The monitoring wells and other wells that will be included in the long-term monitoring network will be determined after the ROD is issued, during or after remedial design.

The groundwater monitoring of both the Missoula Aquifer and the perched groundwater will be used to monitor the effectiveness of the cleanup activities and to ensure SSCLs are met. Monitoring of natural attenuation for dioxin and metals in groundwater will also occur. In addition, long-term monitoring will include soil vapor monitoring from existing and any newly-installed monitoring points to confirm the effectiveness of the soil and groundwater remedies. Long-term monitoring is included in the site-wide elements.

Soil

The selected remedy includes a combination of excavation and offsite disposal, excavation and onsite enhanced ex-situ bioremediation, and in-situ chemical oxidation (ISCO), to treat the onsite residual sources of contaminants in soil at the MWPS Facility. These remedies will reduce contaminant concentrations in soil and soil vapor.

The remedy includes excavation and off-site disposal at a licensed and permitted disposal facility of methane-containing surface and subsurface soil, ash/metals-contaminated subsurface soil, and dioxin-contaminated surface and subsurface soils that do not contain PCP. This soil may be disposed of at a local landfill (such as Allied Waste landfill). Methane-containing soil, which is primarily composed of wood waste, may also be recycled at a local composting company if it is determined through sampling not to contain contamination and is accepted by the composting company.

Onsite enhanced ex-situ bioremediation of surface and subsurface soil includes the excavation and placement of PCP-impacted soil, which are classified as F032 listed hazardous waste, from the former treatment area into a land treatment unit located on the western portion of the SSLLP property within the Facility. DEQ will designate a Resource Conservation and Recovery Act corrective active management unit that will allow treatment of the PCP-impacted soil onsite. Bioremediation will significantly reduce the amount of contamination in soil.

The selected remedy includes ISCO following excavation of surface and subsurface soils in the former treating area, and to address remaining subsurface soils contamination in the former above-ground storage tank area and beneath Scott Street. ISCO consists of adding a chemical oxidant to soil in concentrations that result in the destruction of contaminants. While ISCO is expected to be effective in reducing PCP and petroleum hydrocarbon concentrations to SSCLs, the ability of ISCO to oxidize dioxin is less certain. However, even if ISCO is not capable of reducing dioxin concentrations to SSCLs, data from ISCO bench-scale and field-scale pilot testing at similar sites in Montana have shown that dioxin concentrations are likely to decrease in soil and groundwater. Therefore, it is expected that these reductions in dioxin concentrations, combined with the treatment of PCP-contaminated soils, will reduce concentrations such that there is no longer leaching to groundwater, which will allow a groundwater treatment remedy to be successful.

Groundwater

The selected remedy includes ISCO to treat the PCP, dioxin, and petroleum hydrocarbon-contaminated groundwater at the MWPS Facility. As previously indicated, ISCO is capable of reducing PCP and petroleum hydrocarbon concentrations to SSCLs. This remedy will reduce contaminant concentrations in groundwater, which will also help reduce concentrations in soil vapor.

However, the ability of ISCO to reduce dioxin and metals concentrations to SSCLs is less certain, although it is anticipated to reduce dioxin concentrations in groundwater. If the ISCO treatment of the groundwater does not achieve the dioxin or metals SSCLs and the plume is not expanding, then monitored natural attenuation, which is the reduction of contaminant concentrations through naturally occurring processes, will be used for the dioxin and metals and will continue to be sampled as part of the long-term monitoring plan.

STATUTORY DETERMINATIONS

The selected remedy will attain a degree of cleanup that assures present and future protection of public health, safety, and welfare, and the environment, and complies with federal and state environmental requirements, criteria, and limitations that are applicable or relevant to the remedial action and Facility conditions. DEQ considered current and reasonably anticipated future uses of the Facility and institutional controls in selecting the remedy. The selected remedy mitigates risk, is effective and reliable in the short- and long-term, is practicable and implementable, uses treatment and resource recovery technologies and engineering controls, and is cost-effective. DEQ has considered all public comment received during the public comment period on the Proposed Plan and has responded to these comments in Part 3 of the ROD. DEQ has also considered the acceptability of the remedy to the affected community, as indicated by community members and the local government, in determining the final remedy at the MWPS Facility.

AUTHORIZING SIGNATURE

Original signed and in facility file	2/18/15
Tom Livers Director Montana Department of Environmental Quality	Date

PART 2

DECISION SUMMARY

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Acronyms

ARM	Administrative Rules of Montana
AST	above-ground storage tank
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
BRA	Baseline Risk Assessment
CalEPA	California Environmental Protection Agency
CAMU	corrective action management unit
CECRA	Comprehensive Environmental Cleanup and Responsibility Act
CFR	Code of Federal Regulations
City	City of Missoula
COC	contaminant of concern
COPC	contaminant of potential concern
CSF	oral cancer slope
DEQ	Montana Department of Environmental Quality
DEQ-7	Montana numeric water quality standards
DLC	dioxin-like compounds
EPA	U.S. Environmental Protection Agency
EPH	extractable petroleum hydrocarbons
ERCLs	environmental requirements, criteria, and limitations
FS	Feasibility Study
ft^2/day	square foot per day
GAC	granulated activated carbon
IARC	International Agency for Cancer Research
ISCO	in-situ chemical oxidation
LEL	lower explosive limit
LTU	land treatment unit
MCA	Montana Code Annotated
MCCHD	Missoula City/County Health Department
MCL	maximum contaminant level
mg/kg	milligrams per kilogram
MNA	monitored natural attenuation
MOPG	Missoula Office of Planning and Grants
MWPS	Missoula White Pine Sash
NAS	National Academy of Science
ng/kg	nanograms per kilogram
ppmv	parts per million/volume
PCP	pentachlorophenol
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RfD	reference dose
RI	Remedial Investigation
ROD	Record of Decision
RME	reasonable maximum exposure

RSL	regional screening level
SVOC	semi-volatile organic compound
SCEM	site conceptual exposure model
SSCL	site-specific cleanup levels
SSSL	site-specific screening levels
SSLLP	Scott Street, LLP
SVE	soil vapor extraction
TEF	toxicity equivalency factor
TEQ	total dioxin toxic equivalency
TFR	total fluids recovery
UAO	Unilateral Administrative Order
UEL	upper explosive limit
ug/L	micrograms per liter
µmhos/cm	micromhos per centimeter
UST	underground storage tank
UV	ultraviolet
VI	vapor intrusion
VOC	volatile organic compound
VPH	volatile petroleum hydrocarbons
WWW	WWW Investments, LLC
yd^3	cubic yards

1.0 FACILITY NAME, LOCATION AND DESCRIPTION

The Missoula White Pine Sash (MWPS) Facility is a former lumber mill and wood treating facility. The Montana Department of Environmental Quality (DEQ) is overseeing remediation of the Facility under the Montana Comprehensive Environmental Cleanup and Responsibility Act (CECRA).

The historical operational area of the MWPS Facility is approximately 43 acres and is located west of Scott Street at the intersection of Scott Street and Stoddard Street on the north side of the City of Missoula (City), Missoula County, Montana (Township 13 North, Range 19 West, Section 16) (Figure 1). The surficial boundaries of the MWPS Facility include the former operational area to the west of Scott Street, extend into the residential area to the east of Scott Street, to the active Montana Rail Link railroad tracks on the south, Rodgers Street and Clawson Manufacturing to the north, and Bulwer Street and Allied Waste Service to the west. The actual MWPS Facility boundaries are based on the extent of contamination, and includes one location east of Scott Street. Also, groundwater contamination is known to extend to the east outside of these surficial boundaries, across Scott Street and beneath the adjacent residential area (Figure 2).

2.0 FACILITY HISTORY

2.1 OWNERSHIP AND OPERATIONAL HISTORY

The MWPS Facility is a former lumber mill and wood treating facility. Historical documents and photos indicate that a lumber mill has been present at the current location of the MWPS Facility since shortly after 1900. Ownership of the mill prior to 1920 is not well documented but the R.L. Polk City Directories from the years 1905 through 1909 list the “Missoula Lumber Co.” residing at “Scott and N.P. Tracks.” The Polk directories from the years 1911 through 1913 have a listing for “Missoula Lumber Co. (Largey Mill)” at this same address. A map of Missoula dated 1914, on the wall of the Montana Room at the Missoula City Library, shows the “Largey Lumber Co.” at the MWPS Facility location. No listings for lumber companies are found in the Polk directories for 1915 through 1919. Beginning in 1922, the Polk directory lists “Missoula White Pine Sash” as occupying this address (Polk, 1905-1922; Envirocon, 1998). MWPS Company owned and operated the mill from approximately 1920 to 1971. Huttig Sash and Door Company (now known as Huttig Building Products, Inc.) (Huttig) acquired the MWPS Company on July 31, 1971, and operated the mill until it closed in December 1996 (Envirocon, 1998). The MWPS Company was involuntarily dissolved as a Montana corporation in December 1991 (MSOS, 2015).

In March 1999, Huttig sold all of its property at the MWPS Facility to WWW and SSLLP (Grant Deed, 1999; Grant Deed, 1999a). The portions purchased by WWW and SSLLP are shown respectively on Figure 2. On October 13, 2000, WWW and SSLLP each sold portions of their properties to the City (Grant Deed, 2000; Grant Deed, 2000a). The portions of each property sold to the City are shown on Figure 2. As part of this transaction, all three parties to the transaction donated one acre each to the City to be used as a park. The location of the park is also shown on Figure 2. At this time, SSLLP vacated a railroad easement that formerly extended to the log pond from the south across the City property, and added a rail easement across the extreme west end of the City property (Douglass, 2015).

The MWPS mill manufactured precision millwork products, primarily wood window and door components. Beginning in the mid-1930s, selected milled products were treated by dipping in formulations of pentachlorophenol (PCP) that used diesel or mineral spirits as a carrier. In 1987, the MWPS Company replaced the PCP formulations with a non-PCP treating solution (Envirocon, 1998).

The first reported dipping system was located north of the MWPS office, located in the southeast portion of the Facility, from the mid-1930s until approximately 1950. This dipping system included underground diesel storage tanks, an above-ground mixing vat, and an above-ground dip tank that was located in the first dip room. The underground storage tanks (USTs) stored diesel that was pumped out of the tanks into the mix vat where solid PCP flakes or granules were added. The mixture was stirred and heated by steam coils, then pumped into the dip tank. Pieces of wood were then dipped in the vat to preserve the surface of the wood until they were painted or stained by the end user (Envirocon, 1998). The location of the first dipping system is shown on Figure 2.

A replacement system was installed adjacent to the first dip system in approximately 1950 and was used until 1988. This second dipping operation consisted of two 12,000-gallon aboveground storage tanks (ASTs); an underground, open-top dip tank; and connecting piping.
The dip tank was housed in a new cinder-block building directly east of the first dip room. The second dip room was taken out of service in 1988 and the building and tank were demolished in 1989. All of the PCP formulations used in the second dip room were delivered pre-mixed and used mineral spirits as a carrier stored initially in the two onsite ASTs (Envirocon, 1998). Historic interviews and investigations indicate that a pipe ran from above the liquid level in the second open-top dip tank, through the east wall of the dip-tank room, and into a rock well which was located under the west slope of the northern approach to the Scott Street overpass. The top of the rock well was located approximately 5 feet below the grade of the slope, and the bottom was a concrete slab located approximately 12 feet below the top of the rock well. The walls of the well, approximately 4 to 5 feet in diameter, were constructed of round 4-6” rocks, stacked without mortar. The rock well was filled in with soil in 1996 (Envirocon, 1998). The location of the second dipping system, ASTs, and rock well are shown on Figure 2.

In 1988, a new dipping system was installed in the new factory building. The new dipping system consisted of a double-containment tank and piping, with leak detection and a tank for emergency draining of the treating solution for fire protection. The two ASTs remained in use for storage of the non-PCP treating solution for the new dip tank. This system was decommissioned in approximately 1997, the ASTs were removed, and the soil beneath the tank was sampled. No contaminants were detected beneath the dip tank and there was no other evidence that this tank had leaked (Envirocon, 1998). Subsequent sampling at the location of the former ASTs indicated PCP, dioxin/furans, and petroleum contamination in soils to a depth of 26 feet below ground surface (bgs) (Douglass, 2012).

Prior to 1996, several log, overflow, and drain ponds were present on the northern portion of the Facility (see Figure 3). Several of the ponds were backfilled in the 1950s and 1960s. The remaining log pond and drain pond were emptied in 1996 and backfilled (Envirocon, 1998). In addition, aerial photographs taken between 1967 and 1981 show a teepee burner adjacent to the northern end of the log pond (Envirocon, 1998).

Onsite soils and shallower groundwater (19-48 feet bgs) are contaminated with hazardous or deleterious substances, including but not limited to PCP, dioxins/furans, petroleum hydrocarbons, metals, and methane. (Hereinafter, dioxins/furans will be referred to as “dioxin.”) The deeper groundwater (greater than 60 feet bgs) in the Missoula Aquifer is contaminated with PCP, dioxin, barium, arsenic, manganese, and petroleum hydrocarbons. The former wood treatment area is gated and fenced and the northern portion of the former MWPS operational area is fenced on the east and north boundaries. Soil and groundwater in the southern portion of the MWPS Facility is contaminated with PCP from process residuals, preservative drippage, and spent formulations from a wood treating process that used chlorophenolic formulations. Therefore, the Facility contains F032 Resource Conservation and Recovery Act (RCRA) listed hazardous wastes and the various media and wastes contaminated by the F032 wastes are hazardous wastes pursuant to 40 Code of Federal Regulations (CFR) Part 261. PCP on the northern portion of the MWPS Facility does not meet the regulatory definition of a listed hazardous waste and does not carry an F032 designation.

Currently WWW Investments, LLC (WWW) operates a beverage distributing business on the southern portion of the Facility (Figure 2). The City uses the central portion of the Facility to house and operate City maintenance equipment and shops, and a three-acre area to the east has been developed as a City park. The vacant northern portion of the Facility is owned by Scott Street, LLP (SSLLP). Figure 2 illustrates current property ownership.

2.2 REGULATORY HISTORY

A number of regulatory actions have been conducted at the MWPS Facility over the years. These actions are briefly described below:

- The MWPS Facility was listed on the Environmental Protection Agency's (EPA) Comprehensive Environmental Response, Compensation and Liability Act Information System list in July 1994 (EPA, 2014).

- DEQ (through its predecessor agency the Montana Department of Health and Environmental Sciences) listed the Facility on the CECRA Priority List in December 1994. (Hereinafter, MDHES will be referred to as "DEQ.") DEQ sent a notice of potential CECRA liability to the Crane Company, the MWPS Company, and Huttig in December 1994 (DEQ, 1994).

- On March 17, 1995, DEQ issued a Unilateral Administrative Order (UAO) requiring completion of a remedial investigation (RI) and feasibility study (FS) to the Missoula White Pine Sash Company and Huttig (DEQ, 1995). In that UAO, DEQ determined that both companies were liable for the Facility as provided for in Section 75-10-715(1), Montana Code Annotated (MCA). DEQ amended the UAO in October 2001 and January 2011 and it is currently in effect (DEQ, 2001; DEQ, 2011). The MWPS Company is a dissolved Montana corporation (MSOS, 2015) and Huttig has conducted remedial actions under the requirements of the UAO.

- On October 21, 2009, DEQ issued a notice of violation to Huttig for violations of the Montana Hazardous Waste Act. The violations included failure to use the appropriate waste code on the Uniform Hazardous Waste Manifest, and failure to send a one-time written notice to each treatment or storage facility receiving the waste and placement of a copy in the generator's file. DEQ and Huttig entered into an Administrative Order on Consent to resolve the violations (DEQ, 2010).

2.3 INVESTIGATION HISTORY

There have been a number of investigations conducted at the MWPS Facility. These investigations are briefly discussed below:

- DEQ's Hazardous Waste Program conducted multiple inspections and evaluated analytical data between 1980 and 1993 regarding disposal of sludge and waste water from one of the dip tanks and associated USTs utilized in the wood treating process (DEQ, 1981; DEQ, 1986; DEQ, 1988; DEQ, 1990; DEQ, 1990a; DEQ, 1993; DEQ, 1993a; DEQ, 1993b).

- DEQ was involved between 1986 and 1993 in oversight of removal, sample collection, and disposal of four USTs. In 1989, DEQ was notified that PCP was detected at 85 milligrams per kilogram (mg/kg, or parts per million) in soils beneath one of the USTs (DEQ, 1990). In March 1993, PCP and diesel fuel contamination were detected beneath another UST following removal (Huttig, 1993).

- In 1993 and 1994, Huttig installed 22 monitoring wells, excavated test pits, and collected soil and groundwater samples to determine the depth and extent of contamination in soils and groundwater (DEQ, 1995a). These investigations indicated PCP, petroleum hydrocarbon, and dioxin contamination in the perched groundwater and in the Missoula Aquifer.

- In 1995, DEQ conducted a Preliminary Assessment at the MWPS Facility under a Multi-Site Cooperative Agreement with EPA. The intent of the Preliminary Assessment was to assess threats posed to human health and the environment and to determine whether additional actions were warranted. In March 1995, EPA recommended the Facility for a high priority site inspection, but has not taken further action at the Facility to date (DEQ, 1995a).

- In 1995 through 1998, Huttig conducted an RI in two phases that included installation of 18 monitoring wells, completion of soil borings, collection of groundwater samples, and an aquifer pump test (Envirocon, 1998). The investigation results indicated much higher contaminant levels in the perched groundwater than in the Missoula Aquifer. Surface and subsurface soil samples were also collected to determine the extent of contamination in soils. An indoor and outdoor air investigation was conducted which demonstrated that PCP and dioxin were not detectable in air at concentrations above screening levels available at the time. A Final Draft RI report was prepared in July of 1997 and DEQ received and evaluated public comment. DEQ required changes to the RI as a result of public comment, and Huttig finalized the RI in June 1998 (Envirocon, 1998).

- In 1996 and 1997, after closure of the log pond, overflow pond, and drain pond, Huttig collected soil samples from the base of the former log and drain ponds. The objective of the soil investigation was to determine whether soil beneath the ponds contained PCP and to inspect the integrity of the log-pond bentonite liner through the completion of test pits. The soil samples were analyzed for semi-volatile organic compounds (SVOCs), including PCP. No PCP was detected in any of the samples. The bentonite liner was encountered in only two of the four test pits excavated in the log pond. Two soil borings were also completed at the location of the former overflow pond to collect subsurface samples of native soil. The samples were collected between 16 and 20 feet bgs and analyzed for PCP. No PCP was detected in the samples (Envirocon, 1998).

- In May 1998, Huttig collected surface soil samples from 25 randomly selected locations on the northern portion of the MWPS Facility. Surface soil samples collected following the RI were collected from the top two inches of soil to focus on dust. Each sample was analyzed for PCP and five were analyzed for dioxin. Two additional indoor air samples and one outdoor air sample were also collected and analyzed for dioxin (Envirocon, 1998a). Of the 25 soil samples analyzed for PCP, the concentrations ranged from 0.003 mg/kg to 12 mg/kg. A single sample (12 mg/kg) exceeded the site-specific cleanup level (SSCL) (5.69 mg/kg) for leaching to groundwater from surface soil. Of the five samples analyzed for dioxin, the concentrations ranged from 24.6 nanograms per kilogram (ng/kg, or parts per trillion) to 3,587 ng/kg. Concentrations at four of the five sample locations were less than the commercial/industrial and construction worker SSCLs of 310 and 470 ng/kg. The sample with the dioxin concentration of 3,587 ng/kg was collected within 10 feet of a treated utility pole and in the former drain pond (Envirocon, 1998a; Douglass, 1999).

- In 1999 and 2000, Huttig collected 20 additional surface soil samples at random locations from the northern portion of the Facility and analyzed for dioxin. Two additional surface soil samples were also collected from two residential yards adjacent to the former wood treating area. These samples were collected and analyzed to determine if dioxin was present in these areas. Analysis of the surface soil samples collected in the residential yards indicated that the PCP (0.0094 mg/kg and 0.026 mg/kg) and dioxin (13 ng/kg and 8.6 ng/kg) concentrations were less than the residential SSCLs (8.5 mg/kg and 40 ng/kg PCP and dioxin, respectively) (Douglass, 1999; Douglass, 2000).

- In 2000, the Missoula City/County Health Department (MCCHD) conducted a Brownfields Site Assessment in the residential areas east of Scott Street and south of the former MWPS operational area. The samples collected included surface soil, indoor dust, drinking water, and produce grown in gardens (Hydrometrics, 2001). The samples were collected and analyzed for PCP and dioxin to determine their presence in the residential area east of Scott Street. The home-grown produce samples were collected from the yards with the highest concentrations of PCP and dioxin. No dioxin was detected in any of the produce and a low-level concentration of PCP was detected in one sample. During completion of the Brownfield Site Assessment, a single surface soil sample collected from the residential garden at 1028½ Stoddard Street contained a dioxin concentration (70.3 ng/kg) greater than the residential SSCL of 40 ng/kg (Hydrometrics, 2001).

- From 1994 through 2002, Huttig sampled perched groundwater and the Missoula Aquifer at the MWPS Facility on a quarterly basis (Douglass, 2014b).

- In 2003, Huttig changed from quarterly sampling to collection of perched groundwater and Missoula Aquifer samples on a semi-annual basis. The semi-annual collection of perched groundwater and Missoula Aquifer samples is ongoing to date (Douglass, 2014b). Huttig submits Progress Reports and Groundwater Monitoring Reports to DEQ to document Facility conditions and sampling results.

- In 2002 and 2003, Huttig collected surface and subsurface soil samples from the northern portion of the MWPS Facility. The samples were collected to assist in the fate and transport evaluation and modeling for leaching of contaminants of concern to groundwater (Douglass, 2003; Douglass, 2003b).

- In 2004, a prospective purchaser for the northern portion of the Facility (currently owned by SSLLP) conducted seismic and test pit investigations, which included the collection of subsurface soil samples (Maxim, 2004). The purpose of the investigation was to determine if the existing native soils and fill material were suitable for the development of multi-family apartments, single and two-story housing units, and residential streets. The results indicated that the existing materials in this portion of the Facility would need to be removed prior to constructing standard building foundations (Maxim, 2003; Maxim, 2004).

- In 2004, the City conducted a Phase I Environmental Assessment of properties within the MWPS Facility purchased by the City (Maxim, 2004a).

- In 2005, the City conducted an investigation on the portion of the Facility owned by the City, collecting composite and grab surface and subsurface soil samples to assist in determining which areas would require cleanup. Also in 2005, the City constructed a shed to store road-sand and equipment on a portion of the MWPS Facility owned by the City (Maxim, 2005). The concentrations of PCP detected in surface soil on City property ranged from 2.9 to 0.01 mg/kg, which is less than the commercial/industrial SSCL of 45 mg/kg. The concentrations of dioxin detected in surface soil on City property ranged from 142 to 0.094 ng/kg which is less than the commercial/industrial SSCL of 310 ng/kg (Douglass, 2007; Geomatrix, 2007)).

- In 2006, Clawson Manufacturing collected surface soil samples on its property to the north of the Facility for PCP and dioxin analysis. Each of the soil samples were compared to either the EPA leaching-based soil screening levels of 0.1 mg/kg for PCP or 10 mg/kg for dioxin, or the EPA residential direct contact regional screening levels (RSLs) of 0.89 mg/kg or 4.5 mg/kg for PCP and dioxin, respectively. Based on this evaluation, no exceedances were identified and no chemicals of potential concern (COPCs) were selected for either the direct contact or leaching to groundwater pathways (CDM, 2012). Based upon this data, the Clawson Manufacturing property is not included within the MWPS Facility.

- In 2006 and 2007, Huttig collected soil and groundwater samples and installed three new monitoring wells as part of an in-situ chemical oxidation pilot test in the former wood treating area of the Facility. The soil samples were analyzed for PCP, dioxin, and natural oxidant demand. The groundwater samples were analyzed for PCP, dioxin, bacteria, metals, and groundwater chemistry. The samples were collected to estimate the amount of oxidant required to reduce the concentrations of PCP in saturated and unsaturated soils, to determine the potential for mobilizing metals, and to determine the impact the oxidants have on naturally occurring bacteria (Douglass, 2006; Douglass, 2007).

- In 2007, Huttig collected additional subsurface soil samples on the City's property to further delineate PCP concentrations found in several locations on the City's property. The concentrations of PCP in the samples ranged from <0.0053 mg/kg to 0.26 mg/kg. Dioxin was not analyzed during this sampling event (Douglass, 2007).

- In January 2007, Huttig conducted an investigation on the northern portion of the Facility owned by SSLLP. The purpose of the investigation was to evaluate areas of buried wood waste to determine whether and in what concentration methane vapor was present and to further investigate the location of a 1998 soil sample (2090-SO-118). The investigation included installation of five soil vapor monitoring points (SG-01 through SG-05) in areas of identified wood waste, including the former overflow pond and former log pond. Soil vapor measurements were collected from the monitoring points in February, March, April, May, July, and September 2007. The concentrations of methane ranged from 0.0% methane by volume to a high of 22.6% methane by volume. The highest methane concentrations were measured in monitoring points SG-01 and SG-04, located within the former overflow pond and the north end of the former log pond, respectively (Douglass, 2008).

- In 2009, Huttig conducted an investigation on the northern portion of the Facility owned by SSLLP and the adjacent Clawson Manufacturing property. The purpose of the investigation was to delineate the extent of methane-generating soil. The investigation included surface and subsurface soil samples, delineation of the areas where methane is present in soil vapor, and the installation and sampling of three monitoring wells (Douglass, 2010a).

- In 2009, the City installed two irrigation wells in the Scott Street right-of-way, near the corner of Scott and Palmer Streets, and adjacent to the City park. The wells were sampled twice in 2009, and were sampled annually until 2013 during seasonally high groundwater conditions, as required by DEQ(AMEC, 2009). Sampling was discontinued in 2013 because concentrations of COCs were less than detection limits for a number of sampling rounds and the wells did not appear to be impacting the plume in the Missoula Aquifer (DEQ, 2013).

- In 2010, Huttig collected composite and grab soil samples to further delineate the extent of PCP and dioxin impacts present on the WWW property. The results indicated that with the exception of the former treating and AST areas, direct contact and leaching-based SSCLs were not exceeded on the property (Douglass, 2012).

- In early 2012, DEQ completed a vapor intrusion (VI) investigation in five commercial buildings at the MWPS Facility and 10 residential structures located east of Scott Street to determine if a potentially complete VI exposure pathway exists at the Facility and its surroundings. The investigation included installation and sampling of four soil vapor monitoring points at two locations (two monitoring points at different depths at each location) and collection of sub-slab soil vapor (beneath the building slab), indoor air from structures, and ambient air samples. Four of the five commercial buildings had at least one indoor air sample exceed the site-specific screening level (SSSL) for C9-C12 aliphatics. However, indoor sources were also present in the commercial buildings and the contribution of these sources could not be separated from those associated with the Facility. At the residential structures, C9-C12 aliphatics were present in sub-slab soil vapor samples and indoor air. However, indoor sources were also present in the residential buildings and the influence from Facility-related VI appeared to be minimal or not quantifiable. Indoor sources were a significant contributor to indoor air concentrations; however, potential contribution via Facility-related VI could not be dismissed because of the consistently elevated concentrations in sub-slab samples (CDM, 2012a). Therefore, DEQ did not require mitigation of the buildings, but required that Huttig install and monitor additional soil vapor monitoring points throughout the residential neighborhood east of Scott Street (DEQ, 2012).

- In late 2012, Huttig installed 15 additional soil vapor monitoring points at five locations (three monitoring points at different depths at each location) in the neighborhood east of Scott Street which, along with the soil vapor probes installed as part of DEQ's VI investigation, are used to monitor subsurface soil vapor and evaluate trends. Samples were collected from each of the 19 soil vapor monitoring points in December 2012, March, and June of 2013 (CDM, 2013). This data, as well as data to be collected during implementation of the final remedy, will be used to confirm the effectiveness of the soil and groundwater remedy on soil vapor.

- In May 2014, Huttig conducted soil vapor monitoring for methane from soil vapor sampling points SG-01 and SG-04, the two original sampling points (from the 2007 methane sampling events on SSLLP property) that had the highest methane gas concentrations. The observed methane concentrations were 5% by volume at SG-01 and 9.1% methane by volume at SG-04 (Douglass, 2014a).

The results for the various investigations described above are discussed in Section 5.0.

2.4 INTERIM REMEDIAL ACTIONS AND TREATABILITY STUDY HISTORY

There have been a number of interim remedial actions conducted at the MWPS Facility. These actions are briefly described below:

- In 1988, the MWPS Company removed a 500 gallon UST containing gasoline from the MWPS Facility (DEQ, 1990).

- In 1989, the MWPS Company removed two USTs from the former dip tank/process area; a 3,500 gallon tank and a 1,000 gallon tank. The MWPS Company also collected closure soil samples and confirmed a PCP release in the location of one of the tanks (MCCHD, 1989).

- In 1993, the MWPS Company removed a 1,500 gallon UST from the former process area and closure samples confirmed a release of PCP and diesel fuel (MDA, 1993; MWPS Company, 1993).

- In late 1996, Huttig conducted a pilot test for a total fluids recovery (TFR) system to determine if it was possible to recover contaminated groundwater from the perched zones (Envirocon, 1998). Following successful completion of the pilot test, Huttig constructed a building to house the TFR system in the former wood treating area in 1999 (Douglass, 2000). The TFR system continued operating until 2004, and operated intermittently in 2005. Approximately 644,550 gallons of water were treated during that period (Douglass, 2015).

- In 1996, Huttig conducted a pilot test for soil vapor extraction (SVE) to determine if volatile organic compounds (VOCs) could be recovered from unsaturated zone soils. The SVE system was used intermittently until early 2011. The system was periodically shut down during cold weather and during treatability study activities. The SVE system operated from 1996 until 2011. In 2009, Huttig calculated that approximately 20,000 pounds of VOCs had been recovered. Huttig estimated that the mass recovery of the system had declined from an initial 30 pounds per day to 4 to 5 pounds per day when the system was shut down in 2011 (Douglass, 2011).

- In early 1999, Huttig removed surface soil from the location of sample 2090-SO-129 near the former drain pond on the northern portion of the Facility. A surface soil sample collected from this point had elevated concentrations of dioxin (3,587 ng/kg). The soil was excavated from an area approximately five feet in diameter and to an approximate depth of 1.5 feet bgs. Following DEQ approval, the soil was disposed of at the Safety Kleen Facility in Clive, Utah. Post-excavation confirmation grab samples were collected from the same location in April 1999 and results were below SSCLs (Douglass, 1999).

- In 1999, Huttig constructed the TFR building at its current location without the approval of DEQ. Construction was preceded by removal of less than two feet of soil beneath the building footprint to allow placement of footings/foundation. The removed soil was placed on top of the northern portion of the fenced former process area and samples were collected from the excavation before building construction. The soil was later disposed of at the Safety Kleen Facility in Clive, Utah (Douglass, 1999; Douglass, 2000; Douglass, 2013b, Douglass, 2013d).

- Between 2003 and 2008, Huttig conducted bench and pilot-scale biotreatability studies in the perched groundwater at the MWPS Facility. The purpose of the evaluation was to conduct an initial, focused test that would determine whether biological degradation was occurring in the perched groundwater and whether enhanced biological degradation would be effective in the perched groundwater (Douglass, 2003a).

- In 2003/2004, Huttig conducted a bench-scale test to evaluate the feasibility and effectiveness of using potassium permanganate as an in-situ treatment at the MWPS Facility (Douglass, 2003c).

- In 2006, Huttig completed a pilot-scale in-situ chemical oxidation treatability study in the source area, also using potassium permanganate (Douglass, 2008a).

- Beginning in 2004, the City conducted an interim remedial action on property within the MWPS Facility that is owned by the City so that it could be developed as a park. Cleanup activities included excavation and disposal of contaminated surface soil. Soils in the area directly west of the park area and north of the public works office building were also excavated to approximately one foot bgs. A total of 8,000 cubic yards (yd^3) of soil were removed and disposed of at the Allied Waste Service landfill in Missoula, Montana (AMEC Geomatrix, 2011). Confirmation samples were collected and analyzed for dioxin. The results indicated that dioxin concentrations were less than SSCLs, with one exception. Additional sampling was conducted in this area and following an additional excavation of 730 yd^3 of soil, a confirmatory sample indicated dioxin concentrations in this area were 2.68 ng/kg, which was less than the SSCLs used at the time. Following completion of this task the area was backfilled with approximately 10,000 yd^3 of fill material and 4,000 yd^3 of topsoil. The park area was seeded in June 2010 (AMEC Geomatrix, 2011). During preparation of the baseline risk assessment (BRA) Addendum, a review of information provided by the City involving remediation of the park area indicated a lack of certainty regarding removal depths in the three acre park. Since soils may not have been removed to below two feet in some areas, some of the confirmation samples may be considered representative of surface soil concentrations, rather than subsurface soil concentrations as originally thought (CDM, 2012). As a result, a current recreator scenario was evaluated for the park in the BRA Addendum (CDM, 2012), and is discussed in Section 7.0.

- In 2007, Huttig excavated soil on the City property in the location of sample 2090-SO-118 with PCP exceeding the commercial/industrial SSCL. Confirmation samples were collected following excavation (Douglass, 2007). The concentrations of PCP in the confirmation samples were less than the SSCLs (AMEC Geomatrix, 2011).

- In 2008, Huttig completed a second chemical oxidation bench-scale study on soil from the MWPS Facility using alternative oxidants: Cool-Ox™ and Klozure™ (Douglass, 2009). The purpose of this effort was to evaluate other oxidants as part of potential remedies at the Facility. Detailed results are available in the FS (Douglass, 2015).

- In 2011, DEQ required that Huttig conduct an interim action to remove approximately 120 yd^3 of soil contaminated with PCP and dioxin in the area of the former ASTs. The excavation was cone shaped and approximately 5 feet by 10 feet. Huttig excavated, transported, and disposed of the soil at the Clean Harbors Aragonite LLC hazardous waste disposal facility in Grantsville, Utah. The confirmation samples collected from the base of the excavation indicated exceedances of SSCLs (Douglass, 2013).

3.0 COMMUNITY PARTICIPATION

DEQ complied with the public participation requirements found in Section 75-10-713, MCA, of CECRA. In addition, DEQ provided additional opportunities for public involvement not required by CECRA (including but not limited to seeking public comment on the RI Work Plan, the RI Report, the BRA Work Plan, the BRA, and an interim action work plan) (DEQ, 2015).

DEQ conducted a public meeting on April 23, 1995, to assist with establishing a Community Advisory Group for the MWPS Facility that would work with the state and help communicate facility information to the affected community.

DEQ issued a public notice in April 1995 to announce a 30-day public comment period and planned public meeting to discuss its requirement for the completion of an RI at the MWPS Facility. During the May 4, 1995, public meeting, DEQ presented the draft RI work plan and answered questions from the public. Following completion of the public comment period on the draft RI work plan, on June 5, 1995, DEQ issued a public notice indicating that a responsiveness summary responding to comments received on the draft RI work plan had been completed, and based on responses to those comments, the RI work plan amendment was finalized.

DEQ solicited public comment in June 1996 regarding the final Draft RI Phase I Data Summary Report and Phase II Work Plan. DEQ provided notice of a 30-day public comment period and public meeting associated with the two documents via a legal ad and a progress report distributed to the mailing list. DEQ held a public meeting on June 19, 1996, regarding completion of Phase I of the RI and the work plan for the proposed Phase II activities.

DEQ solicited public comment in January 1998 for the Final Draft RI and the Groundwater Monitoring Plan. DEQ provided notice of a 30-day public comment period and public meeting associated with the Final Draft RI via a legal ad and a progress report distributed to the mailing list. The public comment period included a public meeting held on January 15, 1998.

DEQ solicited public comment during a 30-day public comment period and held a public meeting on April 19, 2000, to discuss the BRA Work Plan. DEQ provided notice of the public comment period and public meeting via a legal ad and a fact sheet distributed to the mailing list.

In July 2001, DEQ announced a 30-day public comment period for the BRA and conducted a public meeting on July 31, 2001, to discuss the risk assessment. DEQ provided notice of the public comment period and public meeting via a legal ad and a fact sheet distributed to the mailing list.

In March 2004, DEQ announced a 30-day public comment period and public meeting regarding a draft interim remedial action work plan, which was submitted by Sparrow Group for cleanup of the SSLLP property. The plan focused on soils contaminated by PCP and dioxin on the SSLLP property. The public meeting was held on April 7, 2004. DEQ also issued fact sheets prior to these 2004 activities and another in 2013 to keep the public updated.

The Proposed Plan was made available to the public in February 2014. DEQ provided notice of a 30-day public comment period and public meeting/hearing associated with the Proposed Plan via postcard mailings and a fact sheet distributed to the mailing list. A legal notice of the public comment period and public meeting/hearing was published on March 2, 2014, in the Missoulian and on DEQ's website. On February 28, 2014, DEQ also sent letters to the Missoula County Commissioners, the Mayor and the City Council, the MCCHD, Huttig, WWW, SSLLP, the North-Missoula Community Development Corporation, and others notifying them of the public comment period and public meeting/hearing. DEQ held a public meeting/hearing on March 11, 2014, to present and discuss the Proposed Plan, answer questions, and to receive oral public comments. DEQ received requests to extend the public comment period and agreed to provide a two-week extension, until April 14, 2014. A legal notice of the extension of the public comment period was published in the Missoulian and on DEQ's website (DEQ, 2015).

Notice of the issuance of this Record of Decision (ROD) for the MWPS Facility will be published and copies of the ROD will be available to the public for review at the information repositories and on DEQ's website. DEQ will also provide notice of the ROD to the Missoula County Commissioners, the Mayor and City Council, the MCCHD, Huttig, WWW, SSLLP, the North-Missoula Community Development Corporation, and others. The ROD is accompanied by a discussion of any notable changes to the selected remedy presented in the Proposed Plan along with reasons for the changes. Also included in the ROD is a Responsiveness Summary, which provides a response to the comments received during the comment period.

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

Montana Department of Environmental Quality
Remediation Division
PO Box 200901
1225 Cedar Street
Helena, MT 59620
Telephone: (406) 444-6444

A partial compilation of the Facility files can be found on DEQ's website at http://deq.mt.gov/StateSuperfund/missoulawhitepinesash.mcpx and at:

Mansfield Library
University of Montana
32 Campus Drive
Missoula, MT 59812
(406) 243-6866

Missoula Public Library
301 East Main Street
Missoula, MT 59801
(406) 721-2665

4.0 SCOPE AND ROLE OF REMEDIAL ACTION

In general, the purposes of the RI, BRA, BRA Addendum, fate and transport evaluation, FS, and supplemental investigations were to collect data necessary to adequately characterize the MWPS Facility for developing and evaluating effective remedial alternatives that address human health and environmental risks at the facility. The primary objectives of the RI, BRA, BRA Addendum, FS, and supplemental investigations for the MWPS Facility include the following:

- Adequately characterize the nature and extent of releases or threatened releases of hazardous or deleterious substances;
- Allow an assessment of health and ecological risks and development of SSCLs; and
- Allow the effective development and evaluation of alternative remedies to be included in the FS to allow selection of a final remedy.

DEQ developed a BRA for the MWPS Facility in 2001 (CDM, 2001) and updated the BRA using new soil and VI investigation data, screening levels, and toxicity information in a BRA Addendum in 2012 (CDM, 2012). A site-specific fate and transport evaluation of how contaminants move through the soil to groundwater was also conducted using site-specific data (CDM, 2011).

Based on the findings of the RI and supplemental investigations, DEQ finds that the data obtained is adequate for DEQ to evaluate and select an appropriate remedy for the MWPS Facility. Any data gaps will be evaluated and/or implemented during remedial design. The ROD contains SSCLs for all known contaminants of concern (COCs) associated with the Facility.

The ROD documents the final remedy for MWPS; it addresses the principal threats to public health, safety, and welfare and the environment posed by contaminated media; and selects a remedy that will comply with applicable or relevant state and federal environmental requirements, criteria, and limitations (ERCLs).

DEQ anticipates that remedial design for the remedy will begin shortly after the ROD is issued, and implementation or construction will begin as soon as possible upon completion of remedial design. Institutional controls will be implemented during and/or after the construction phase of the remedy, as identified during remedial design.

5.0 SITE CHARACTERISTICS

5.1 SITE CONCEPTUAL EXPOSURE MODEL (SCEM)

The SCEM (Figure 4) is the framework for understanding the receptors and exposure pathways included in the risk assessment and the way contaminants move in the environment. It identifies the primary sources located at the MWPS Facility as the leakage of contaminants from the treatment area tank and rock well and from the AST area. Secondary sources include contaminated surface and subsurface soils, soil vapor (including subslab soil vapor), and groundwater. Contaminants migrate from the soil to the groundwater and flow with the groundwater to form a contaminant plume. Contaminants may also volatilize from the soil and groundwater, forming vapors, which can move into overlying structures. These sources and migration pathways result in potential exposures for humans through drinking or using contaminated groundwater, breathing contaminated air inside buildings, breathing contaminated air from utility or construction trenches and excavations, or coming into contact with contaminated surface or subsurface soils.

5.2 MWPS OVERVIEW

5.2.1 Geology

The MWPS Facility is located in the Missoula Valley, a wedge-shaped intermontane basin. The Missoula Valley is bounded to the northeast by the Rattlesnake Hills and to the southeast and southwest by the Sapphire and Bitterroot Mountains respectively. The mountains and material underlying the valley are composed primarily of metasedimentary rock of the Belt Supergroup. Unconsolidated and semi-consolidated Tertiary fill, up to 2,500 feet in depth, contained in the valley is overlain by approximately 150 feet of coarse-grained glacial outwash and lake-bed deposits from the Pleistocene glacial period (McMurtrey et al., 1965). Missoula Valley sediment, deposited during the forming and reforming of Glacial Lake Missoula, consists primarily of fine-grained silts and clays. During repeated periods when ice dams melted and the glacial lake drained, coarse-grained gravel and boulders were deposited. Soils at the MWPS Facility consist of gravelly loam that is a deep, excessively-drained soil formed in alluvium on alluvial fans and stream terraces (USDA, 1995). The MWPS Facility is underlain primarily by non-cohesive, coarse-grained sands and gravels with some silts, cobbles, and clay to a depth of approximately 150 feet.

The unsaturated zone above the Missoula Aquifer at the MWPS Facility is composed of several discontinuous low permeability layers of intermixed silt, clay, and fine sand. A silty clay layer ranging in thickness from three to six feet is present at approximately 30 feet bgs and a silty sand layer is located at about 48 feet bgs (Envirocon, 1998). Additional information on the nature of these layers was provided from further groundwater investigations (Douglass, 2001). These layers can intercept recharge precipitation and create perched water bearing zones. The layers also serve to impede the vertical flow of water beneath the Facility and from the perched groundwater above the Missoula Aquifer.

5.2.2 Surface Water Hydrology

The MWPS Facility is located one-half mile to the north of the Clark Fork River, which generally flows from east to west. Administrative Rules of Montana (ARM) 17.30.607 provides that the Clark Fork River is classified “B-1” for water use. Waters classified B-1 are to be maintained suitable for drinking, culinary, and food processing purposes, after conventional treatment; bathing, swimming, and recreation; growth and marginal propagation of salmonid fishes and associated aquatic life, waterfowl and furbearers; and agricultural and industrial water supply (ARM 17.30.623). The MWPS Facility is situated outside of the Clark Fork River 100 and 500 year floodplains. It is estimated that the Clark Fork River provides as great as 90 percent of the recharge to the Missoula Aquifer (Cook et al., 2004).

Prior to 1996, several log, overflow, and drain ponds were present on the northern portion of the Facility (see Figure 3). Several of the ponds were backfilled in the 1950s and 1960s. The remaining log pond and drain pond were emptied in 1996 and backfilled in January 1999 (Envirocon, 1998).

Infiltration storm drains, or dry wells, are present on both the City and WWW properties. These dry wells are not connected to the City storm sewer system, but infiltrate runoff into the ground. The wells capture runoff from paved areas and roofs of buildings that drain to downspouts. The City property, with five dry wells, also includes small, elongated vegetated swales in the parking lot where storm water is allowed to infiltrate or evaporate (CDM, 2011). There are 12 dry wells on the WWW property which capture precipitation and allow runoff to infiltrate into the subsurface (WWW, 2011). Rain water that infiltrates into the subsurface likely provides recharge to the perched groundwater.

5.2.3 Hydrogeology

Groundwater is present in the unconfined Missoula Aquifer composed of highly permeable coarse-grained sand and gravel and is encountered at approximately 55 to 65 feet bgs beneath the MWPS Facility, depending on the season. The majority of the recharge to the Missoula Aquifer is via infiltration from the Clark Fork River. Regional groundwater direction in the Missoula Aquifer is westward and northwestward, following the Clark Fork River (Envirocon, 1998). The portion of the Missoula Aquifer directly beneath the MWPS Facility is relatively stagnant and direction of groundwater flow in the immediate vicinity is not clear from water-table elevation measurements. A transmissivity estimate was calculated for the Missoula Aquifer of 440,000 square foot per day (ft^2/day) based on a pumping test conducted in December 1997 as part of the RI (Envirocon, 1998).

The geology/hydrogeology at the MWPS Facility is complex. The unsaturated zone above the Missoula Aquifer contains several silt and clay layers that intercept recharge precipitation and create perched water bearing zones. An evaluation of this perched system indicates that the perched zones are divided into three distinct and separate units based on water-level elevation (Envirocon, 1998; Douglass, 2002; Douglass, 2003a). Although the units do not appear to be directly hydraulically connected, contaminated water from upper units appears to provide recharge to the lower units through overflow and spilling from one unit to the next. (See Section

5.3.1.1 for more discussion.) The lower of the three confining units, at approximately 48 feet bgs, may intersect the Missoula Aquifer during periods of elevated seasonal water fluctuations. Figure 5 presents a conceptual geologic model of the perched zones.

The groundwater at the MWPS Facility is classified as Class I groundwater (ARM 17.30.1006), which is generally suitable for public and private water supplies, culinary and food processing purposes, irrigation, livestock and wildlife watering, and for commercial and industrial purposes with little or no treatment. Class I groundwater has a specific conductance of less than 1000 micromhos per centimeter (µmhos/cm) at 25 degrees Celsius. Groundwater samples collected during the June 2013 groundwater sampling event indicated that the specific conductance of perched groundwater ranged from 360 µmhos/cm at well B-09S to 1190 µmhos/cm at well B-02S and the specific conductance of the Missoula Aquifer ranged from 374 µmhos/cm at well WPS-14D to 699 µmhos/cm at well WPS-04D (Douglass, 2013c). Based on these results, groundwater at the Facility is classified as Class I groundwater.

Industrial wells that could potentially supply drinking water are located within the MWPS Facility and public water supply wells that supply drinking water are located near the MWPS Facility in the Missoula Aquifer (Figure 6) (Douglass, 2015).

5.3 FACILITY CONTAMINATION

Data was collected prior to the RI, during Phases I and II of the RI, and subsequent to the RI. The data identifies sources of contamination and the extent of contamination in soils, groundwater, soil vapor, and indoor air. DEQ also evaluated the data to determine risks to human health and the environment and to develop and evaluate cleanup options. During both phases of the RI and supplemental investigations, groundwater, surface soil, and subsurface soil were sampled. Indoor and outdoor air samples were also collected as part of the RI. Indoor, sub-slab, soil vapor, and ambient air samples were collected subsequent to the 1998 RI. Delineation of methane in soil vapor was also part of the supplemental RI investigations.

The findings of the RI and subsequent Facility investigations are summarized below:

5.3.1 Groundwater

Groundwater at the MWPS Facility is contaminated primarily with PCP, dioxin, VOCs, petroleum hydrocarbons, and metals (Figures 7 and 8).

During Phase I and Phase II of the RI, groundwater samples were collected from monitoring wells in both the Missoula Aquifer and perched groundwater. Groundwater samples were also collected from several public water supply wells near the Facility. Groundwater is sampled at the MWPS Facility on a semi-annual basis, during seasonal high and low groundwater (in approximately June and February).

5.3.1.1 Missoula Aquifer

Groundwater has been impacted beneath the Facility in both the perched groundwater and the Missoula Aquifer. The lowest perched groundwater layer is hydraulically connected to the Missoula Aquifer during high groundwater periods, and the more shallow perched layers also appear to be hydraulically interconnected in some locations. Due to these interconnections, a single set of COCs for groundwater was identified at the Facility: PCP, dioxin, C9-C12 aliphatics, C-9-C18 aliphatics, C9-C10 aromatics, and C11-C22 aromatics, 2-methylnaphthalene, 1,2,4-trimethylbenzene, isopropylbenzene, isopropyltoluene, sec-butylbenzene, tert-butylbenzene, arsenic, barium, iron, lead, and manganese. The current distribution and extent of COCs greater than SSCLs in the Missoula Aquifer is shown on Figure 7.

The concentrations of each COC in each of the Missoula Aquifer wells have decreased significantly over time. The only Missoula Aquifer wells that periodically contain COCs greater than SSCLs are WPS-01D, WPS-04D, WPS-06D, WPS-14D, and WPS-26DD (Figure 7a); however, the concentrations of PCP and dioxin in these wells has decreased to, and are regularly less than, the SSCLs. WPS-01D contained barium above the SSCL between 2006 and 2009 (1,450 to 1,830 micrograms per liter (ug/L) or parts per billion). In February 2013 the sample from WPS-01D had a barium concentration less than the SSCL, but was above the SSCL again in February 2014. WPS-04D has contained 1,2,4-trimethylbenzene, C9-10 aromatics, arsenic, barium, and manganese at concentrations greater than SSCLs (Douglass, 2014). The latest two samples from WPS-04D have not contained C9-C10 aromatics greater than the SSCL. Arsenic, barium, and manganese remained at concentrations greater than SSCLs in the latest samples collected in February 2014. WPS-06D has contained 1,2,4-trimethylbenzene, C9-C10 aromatics, C9-C12 aliphatics, arsenic, barium, and manganese greater than SSCLs. Each of these COCs remained above SSCLs in the latest samples collected in February 2014 except C9-C12 aliphatics, which have been below SSCLs since July 2011 (Douglass, 2014).

5.3.1.2 Perched Groundwater

The concentrations of PCP and dioxin have also decreased over time in many perched groundwater wells, but remain greater than SSCLs in most of them. The concentrations of other COCs, such as 1,2,4-trimethylbenzene, 2-methylnapthalene, arsenic, barium, iron, manganese, and extractable petroleum hydrocarbons (EPH) and volatile petroleum hydrocarbons (VPH) fractions still exceed SSCLs in wells nearest the former process area, as well as in WPS-36S, WPS-37S, and WPS-49S in the latest samples (Douglass, 2014; Douglass, 2014b). PCP, dioxin, and manganese concentrations remain greater than SSCLs in well WPS-48S as well (Douglass, 2014; Douglass, 2014b). The current distribution and extent of COCs greater than SSCLs in the perched groundwater system is shown on Figure 8.

5.3.2 Soil

Surface (0-2 feet bgs) and subsurface (greater than 2 feet bgs) soil samples were collected throughout the MWPS former operational area and in the residential area to the east of Scott Street. Surface and subsurface soils at the MWPS Facility are contaminated with PCP (maximum concentration of 1,330 mg/kg) and dioxin (maximum concentration of 5,690 ng/kg).

During wood treating operations at the MWPS Facility, both mineral spirits and diesel fuel were used as carrier fluids for PCP (Envirocon, 1998). Elevated concentrations of VPH fractions C9-C12 aliphatics and C9-C10 aromatics exceeding the SSCLs have been found in surface soils (CDM, 2012).

Concentrations of contaminants in surface and subsurface soils are highest in the area where wood treatment took place, or in areas where treating solutions were stored (See Figures 9 and 10a through 10c). Additional information regarding concentrations for individual chemicals detected in soil can be found on Tables 10 and 13 of the Final RI (Envirocon, 1998) and in subsequent sampling reports (Douglass, 2003; Douglass, 2003b; Douglass, 2012; Douglass, 2013).

Historic log and overflow ponds in the northern part of the MWPS Facility were filled in with various materials including wood waste (Envirocon, 1998). Wood waste extends to a depth of approximately 18 feet bgs in the area of the historic overflow pond. Subsurface soils with high concentrations of decaying wood waste material in two locations at the MWPS Facility are generating methane gas in subsurface soil at levels that may be flammable or explosive (ATSDR, 2001a) (Figure 9). In May 2014, monitoring of methane concentrations at two sampling points, SG-01 and SG-04, located within the former overflow pond and the north end of the former log pond, respectively, identified methane concentrations exceeding the action level of 25% of the lower explosive limit (LEL). This monitoring showed little change in the methane concentrations since the previous sampling events completed in 2007 (Douglass, 2008; Douglass, 2014a).

The SSLLP property also contains an area where ash was disposed. The ash contains cadmium at levels that exceed SSCLs and therefore has the potential to leach to groundwater at levels that may exceed Montana’s numeric water quality (DEQ-7) standards (Figure 9).

5.3.3 Soil Vapor and Indoor Air

DEQ collected soil vapor, sub-slab, indoor air and ambient air samples in January and February of 2012. Huttig installed additional soil vapor points in November 2012 to monitor subsurface soil vapor concentrations and trends. All soil vapor points were sampled in December 2012. Sample results indicate fluctuating concentrations of several identified COCs for indoor air related to the MWPS wood treating operations, in particular several petroleum fractions (C9-C12 and C5-C8 aliphatics). Sample results indicate COC concentrations in soil vapor and in sub-slab vapor samples vary from elevated to non-detectable.   Indoor sources of COCs were found to be present in the structures sampled, but due to the apparent variable subsurface conditions, VI also may be contributing to measured indoor air concentrations during intermittent periods. However, investigation results indicated that the influence of contaminants in soil vapor on indoor air appears to be minimal and does not appear to present a continuous or immediate risk to building occupants (CDM, 2012a). DEQ required two additional soil vapor sampling events in March and June 2013. Due to differences in data from the initial and subsequent sampling events, soil vapor samples were collected from a subset (two) of the soil vapor points in January 2013, and from all soil vapor points in March and June 2013. Following completion of the

March 2013 sampling event, DEQ indicated additional sampling may be required in the future (DEQ, 2013a).

5.4 SUMMARY OF CONTAMINANT FATE AND TRANSPORT

Facility physical characteristics, contaminant characteristics, and analysis of the fate and transport processes were combined in the evaluation of contaminant fate and transport.

5.4.1 Soil Vapor and Indoor Air

A numerical fate and transport model was used to develop SSCLs for near-surface and deep unsaturated zone soils contaminated with PCP, dioxin, 1-methylnaphthalene, 2-methylnaphthalene, hexachlorobenzene, C9-C10 aromatics, cadmium, and barium that will be protective of perched groundwater and the Missoula Aquifer (CDM, 2011). The SSCLs were identified by calculating the contaminant concentration in surface soil that would result in a concentration greater than the DEQ-7 groundwater standard for each COC in the groundwater being evaluated (e.g. perched groundwater and the Missoula Aquifer). The COCs and corresponding SSCLs computed for the soil leaching to groundwater pathway are provided in Table 2. A detailed discussion of the calculation of the soil leaching to groundwater SSCLs can be found in the fate and transport evaluation (CDM, 2011).

5.4.2 Modeling for Evaluation of Remedial Alternatives

No timeframes were projected for cleanup in the perched groundwater or Missoula Aquifer at the Facility due to the likely extended periods that will be required and the high degree of uncertainty associated with these time frames. The COCs were originally dissolved in the carrier oils that were released at the MWPS Facility and migrated vertically to the perched groundwater or Missoula Aquifer. As carrier oils migrated, small quantities of the oil remain along the flow pathway in the unsaturated zone and within the upper portion of the saturated zone. Seasonal fluctuation of water tables has also resulted in development of a smear zone with residual oil in the soil. Immobile globules of oil containing the COCs are present within the pore space in the soils. COCs slowly dissolve from the oil into water that surrounds the residual globules. The COCs that partition to the water phase will reach equilibrium with soil, with much of the COC mass sorbing to the soil. In addition, low permeability intervals in the soil also serve as a repository for COCs. As source zone materials are depleted, concentrations in water will decrease and sorbed mass from the soil will move back into the actively flowing groundwater. These processes are complex and limited modeling methods and data are available to allow reasonable time projections for cleanup to meet DEQ-7 standards or SSCLs. Monitoring of remedy performance will be required to assess effectiveness and assess when the remedy reaches a point where the slow release mechanisms dominate control on concentrations in groundwater (CDM, 2014a).

6.0 CURRENT AND REASONABLY ANTICIPATED FUTURE USES

6.1 LAND USES

Current and potential future land use was evaluated as part of the BRA and SSCLs protective of those uses were calculated. The current land use at the MWPS Facility includes commercial/industrial, recreational, and residential. In order to determine which SSCLs must be met as part of the remediation at the Facility, DEQ must determine the reasonably anticipated future uses of the Facility using the factors identified in Section 75-10-701, MCA.

Section 75-10-701(18), MCA, defines “reasonably anticipated futures uses” as “likely future land or resource uses that take into consideration:

(a) local land and resource use regulations, ordinances, restrictions, or covenants;
(b) historical and anticipated uses of the facility;
(c) patterns of development in the immediate area; and
(d) relevant indications of anticipated land use from the owner of the facility and local planning officials.”

Section 75-10-721(2)(c), MCA, directs DEQ to consider present and reasonably anticipated future uses when selecting remedial actions. The alternative selected will meet SSCLs associated with the reasonably anticipated future use, which is an important consideration in determining the appropriate extent of remediation. Under CECRA, DEQ is required to ensure that the selected remedy protects public health, safety, and welfare and the environment. Generally, evaluating the protectiveness of a remedy includes analysis of the underlying assumptions for exposure based on the reasonably anticipated future use (as defined in Section 75-10-701, MCA) of land at the Facility. The remedial actions selected by DEQ will achieve SSCLs consistent with that reasonably anticipated future land use.

The MWPS Facility is owned by a number of different parties. In order to ensure a comprehensive evaluation of the reasonably anticipated future use of the Facility, DEQ has evaluated the reasonably anticipated future use (as defined in Section 75-10-701, MCA) of the following properties:

1. Property owned by WWW;
2. Property owned by the City;
3. Property owned by SSLLP; and
4. Existing residential neighborhood to the east of Scott Street but within the Facility due to dioxin in one residential yard (1028½ Stoddard Street) exceeding the SSCL and an area where groundwater exceeds SSCLs.

<u>1. Property owned by WWW</u>

a) local land and resource use regulations, ordinances, restrictions, or covenants

WWW purchased approximately 10 acres of property at the southern end of the Facility from Huttig in March 1999 (Grant Deed, 1999). (The exact acreage is not identified in the transfer deeds, so this is an estimate of the acreage size; it does not affect the evaluation of reasonably anticipated future use (as defined in Section 75-10-701, MCA).) In the grant deed, WWW took the property "subject to certain negative easements and restrictive covenants." One of these restriction covenants provides: "[n]o portion of the Property shall be used in any manner for residential purposes or for any type of human residential habitation, whether permanent or temporary. If [WWW] is able to obtain the consent of the Government to lift this restriction on human residential habitation, [Huttig] agrees to remove such restriction from the Property…." These restrictive covenants run with the land, and the restrictive covenants are required to be transferred to subsequent owners of the property. The restrictive covenants can be modified if approved by the Government (as defined in the deed), Huttig, and the current owner of the property.

The WWW property is currently zoned M1R-2 (MOPG, 2011). Missoula Zoning Ordinance 20.15.010 (as updated on January 17, 2014) indicates that "Missoula's industrial (M) zoning districts are primarily intended to accommodate manufacturing, warehousing, wholesale and industrial uses. The regulations are intended to promote the economic viability of manufacturing and industrial uses, encourage employment growth, allow residential uses in the M1R district, and limit the encroachment of unplanned residential and other non-industrial development into the M1 – and M2-zoned areas."

An evaluation of the local land and resource use regulations, ordinances, restrictions, or covenants indicates there is one difference between the local ordinance/zoning and the restrictions and covenants placed on the property when it was transferred to Huttig to WWW. The M1R-2 zoning allows residential use and the restrictive covenants do not allow residential use.

(b) historical and anticipated uses of the Facility

The MWPS Facility is a former lumber mill and wood treating facility, which began operations in 1905 and continued until 1996 (Polk, 1905-1922; Envirocon, 1998). Huttig acquired the MWPS Company on July 31, 1971, and operated the mill until it closed in December 1996 (Envirocon 1998). The operation included using PCP to treat wood, and the former treatment area is on WWW property. Historically, the WWW property was used for industrial purposes.

Currently, WWW is operating a beverage distributing business on its property. Since moving its business to this property, WWW has expanded the operation a number of times. A sampling and analysis plan was submitted and approved for the completion of the phases of expansion (Douglass, 2010). In addition, there is a small woodcutting business on the southern end of the property and it also recently housed a motorcycle repair business (CDM, 2012a).

(c) patterns of development in the immediate area

The eastern boundary of the WWW property is Scott Street and east of Scott Street is a residential neighborhood. The northern boundary of the WWW property is the property owned by the City, which has been developed into commercial use for the City Public Works Department (vehicle maintenance, gravel and sand stockpiles, equipment parking), along with the City park (City, 2013). The western and southern boundaries of the WWW property are industrial properties operated by Montana Rail Link. With the exception of the existing residential neighborhood and the City park, the development in the immediate area of the WWW property has been commercial/industrial.

(d) relevant indications of anticipated land use from the owner of the Facility and local planning officials.

To evaluate anticipated land use of the WWW property, DEQ sent a letter to WWW, who indicated that its property would be used for commercial/industrial purposes in the future (DEQ, 2014b). DEQ also considered WWW's April 7, 2014, comment letter on the Proposed Plan, which indicates that WWW operates a warehouse on its property and supports cleanup to commercial cleanup levels.

To evaluate anticipated land use of the WWW property by local planning officials, DEQ considered a number of sources. First, the Joint Northside/Westside Neighborhood Plan (Plan) (City, 2000) indicates that "[l]ight industrial uses are most intense west of Scott Street, on both sides of the tracks. East of Scott Street, the industrial uses are generally less intense, with a few exceptions. Small shops, mini-storage units, Ozzie's Oil and Refinery, Bitterroot Gymnastics, offices, and construction companies are some of the businesses in the vicinity. These uses have the ability to blend with the adjacent residential areas." The Plan also acknowledges:

> "An adjacent industrial neighborhood to the west, which overlaps with the Northside neighborhood, relies heavily on the railway corridor, rail spurs, truck routes, and adjacent businesses. Elements which these two neighborhoods have in common include transportation, economic development, land use recommendations, and environmental impacts. Scott Street, as the edge of the abutting industrial neighborhood, is a main truck route running through a residential area south of the tracks; it is also the major road for residents to access their homes on the Northside. The location of light industrial uses along the railway corridor of the Plan area is important because it is compatible with the adjacent industrial neighborhood."

The Plan discusses environmental health issues in the Northside and identifies concerns associated with "the presence of diesel fumes blowing into the neighborhoods and trains idling all day" as well as the proximity to Northside transportation corridors (proximity to the Interstate highway, the Orange street interchange, the railroad corridor, and the Louisiana Pacific manufacturing plant) and the potential for a train derailment with a toxic substance release (City, 2000).

The Plan was updated in the 2006 Limited Scope Update to the Northside/Westside Neighborhood Plan (City, 2008). The updated Plan indicates that "[e]nvironmental health issues continue to trouble residents" and that they "would like to work with current owners of the former White Pine Sash property to ensure safe and compatible development." It reiterates that the neighbors are interested in meeting with industry representatives to discuss "adoption of pollution abatement standards and strategies for mitigating environmental health risks such as diesel fumes from idling engines, herbicide spraying, and particulate pollution."

DEQ also considered a January 31, 2011, letter from the Missoula Office of Planning and Grants (MOPG), which states that "it is difficult to imagine that the Zip Beverage property … bounded by the City maintenance shops, the switching yard, and the Scott Street Bridge – would ever be developed for residential use. Instead, it is most likely that the Zip property will continue to be used in a light industrial and/or commercial capacity" (MOPG, 2011).

Summary of Reasonably Anticipated Future Use for WWW property

Local land use regulations provide for commercial/industrial and residential use of the property. Restrictive covenants on the property allow for commercial/industrial use of the property, and restrict residential use unless specifically authorized by Huttig and DEQ. The historical and anticipated uses of this property are commercial/industrial. Patterns of development in the immediate area have been commercial/industrial. WWW and local planning officials have indicated that the WWW property will most likely be commercial/industrial in the future.

There were numerous public comments on the Proposed Plan indicating commenters' request that the entire MWPS Facility (including WWW property) be remediated to residential-based SSCLs. However, requiring cleanup to this level is only warranted if the reasonably anticipated future use of the property is residential. In the case of the WWW property, the only factor that points to future residential use is the current zoning and all other factors point to future commercial/industrial use of this property. In addition, the WWW property has been developed into commercial property, with a number of expansions of the commercial operations in recent years. After carefully considering and weighing the relevant information in the administrative record, and using the factors in Section 75-10-701(18), MCA, DEQ has determined that the reasonably anticipated future use of the WWW property at the MWPS Facility is commercial/industrial.

2. Property owned by the City

a) local land and resource use regulations, ordinances, restrictions, or covenants

The City purchased around four acres of property at the Facility from WWW in 2000. (The exact acreage is not identified in the transfer deeds, so this is an estimate of the acreage size; it does not affect the evaluation of reasonably anticipated future use (as defined in Section 75-10-701, MCA).) In the grant deed from WWW, the City took the property "subject to certain negative easements and restrictive covenants." One of these restrictions provides: "[n]o portion of the Property shall be used in any manner for residential purposes or for any type of human residential habitation, whether permanent or temporary" (Grant Deed, 2000). The City also purchased around 10 acres of property from SSLLP in 2000. (The exact acreage is not identified in the transfer deeds, so this is an estimate of the acreage size; it does not affect the evaluation of reasonably anticipated future use (as defined in Section 75-10-701, MCA).) In the grant deed from SSLLP, the City took the property "subject to certain negative easements and restrictive covenants." One of these restrictions provides: "[n]o portion of the Property shall be used in any manner for residential purposes or for any type of human residential habitation, whether permanent or temporary" (Grant Deed, 2000a).

The City property was zoned as D (industrial) until 2004, when the City approved ordinance number 3261 which rezoned the City property to City Maintenance Facility Special District. This rezoning classification resulted in a prohibition of residential use (City, 2004).

The City, WWW, and SSLLP also each donated one acre of property to create the three-acre White Pine Park, which is owned by the City. This property has been zoned OP1. According to the Missoula Zoning Ordinance 20.20.010 (as updated on January 17, 2014), the OP1 district is "primarily intended to preserve open space and sensitive natural resource areas, including environmentally sensitive and agricultural areas."

An evaluation of the local land and resource use regulations, ordinances, restrictions, or covenants indicates that they are consistent in disallowing residential use of the City property.

(b) historical and anticipated uses of the facility

The MWPS Facility is a former lumber mill and wood treating facility, which began operations in 1905 and continued until 1996 (Polk, 1905-1922; Envirocon, 1998). Huttig acquired the MWPS Company on July 31, 1971, and operated the mill until it closed in December 1996 (Envirocon, 1998). While the actual wood treatment occurred on WWW property, the City property was part of the historical industrial operations including a portion of the former log ponds and lumber storage areas (UM, 2014).

Three acres of City-owned property has been developed into a City park. The other portion of City property is being used for its Public Works Department.

(c) patterns of development in the immediate area

The eastern boundary of the City property is Scott Street and east of Scott Street is a residential neighborhood. The northern boundary of the City property is the property owned by SSLLP, which is vacant. The southern boundary of the City property is property owned by WWW, and the western boundary is property operated by Montana Rail Link. With the exception of the existing residential neighborhood and the City park, the development in the immediate area of the City property has been commercial/industrial.

(d) relevant indications of anticipated land use from the owner of the facility and local planning officials.

To evaluate anticipated land use of the City property, DEQ sent a letter to the City, who indicated an intention that its property, with the exception of the park, be used for commercial/industrial purposes in the future (DEQ, 2013b; City, 2013). This intended use is underscored by the significant commercial development of the property undertaken by the City in recent years. For example, the City property includes its Public Works Department maintenance shops, a small office building, and a large shed for road sand (MOPG, 2011). The

City has also planned for additional storage sheds and additional City maintenance shops and offices (MOPG, 2011). More recently, the City indicated its intent to construct a heated equipment storage building adjacent to the north shop wall (City, 2013). In addition, DEQ staff visited the City property on May 9, 2014, and observed covered equipment sheds that the City had recently constructed.

To evaluate anticipated land use of the City property by local planning officials, DEQ considered a number of sources. First, the Plan (City, 2000) indicates that "[l]ight industrial uses are most intense west of Scott Street, on both sides of the tracks. East of Scott Street, the industrial uses are generally less intense, with a few exceptions. Small shops, mini-storage units, Ozzie's Oil and Refinery, Bitterroot Gymnastics, offices, and construction companies are some of the businesses in the vicinity. These uses have the ability to blend with the adjacent residential areas." The Plan also acknowledges:

> "An adjacent industrial neighborhood to the west, which overlaps with the Northside neighborhood, relies heavily on the railway corridor, rail spurts, truck routes, and adjacent businesses. Elements which these two neighborhoods have in common include transportation, economic development, land use recommendations, and environmental impacts. Scott Street, as the edge of the abutting industrial neighborhood, is a main truck route running through a residential area south of the tracks; it is also the major road for residents to access their homes on the Northside. The location of light industrial uses along the railway corridor of the Plan area is important because it is compatible with the adjacent industrial neighborhood."

The Plan discusses environmental health issues in the Northside and identifies concerns associated with "the presence of diesel fumes blowing into the neighborhoods and trains idling all day" as well as the proximity to Northside transportation corridors (proximity to the Interstate highway, the Orange street interchange, the railroad corridor, and the Louisiana Pacific manufacturing plant) and the potential for a train derailment with a toxic substance release (City, 2000).

The Plan was updated in the 2006 Limited Scope Update to the Northside/Westside Neighborhood Plan (City, 2008). The updated Plan indicates that "[e]nvironmental health issues continue to trouble residents" and that they "would like to work with current owners of the former White Pine Sash property to ensure safe and compatible development." It reiterates that the neighbors are interested in meeting with industry representatives to discuss "adoption of pollution abatement standards and strategies for mitigating environmental health risks such as diesel fumes from idling engines, herbicide spraying, and particulate pollution."

DEQ also considered a January 31, 2011, letter from the MOPG, which states "that only foreseeable uses of the City property are current uses: a park for the eastern portion of the City-owned property and City office and maintenance shops facilities for the balance" (MOPG, 2011).

Summary of Reasonably Anticipated Future Use for City property

Local land use regulations provide for commercial/industrial use of the western portion of the City property and the eastern portion is restricted to open space. The zoning no longer allows residential use of the City property. Restrictive covenants on the City property allow for commercial/industrial use of the property, and restrict residential use unless specifically authorized by Huttig and DEQ. The historical and anticipated uses of this property are commercial/industrial (with the exception of the eastern portion of the City property where the park is located). Patterns of development in the immediate area have been primarily commercial/industrial (with the exceptions of the park and the existing residential neighborhood to the east). The City and local planning officials have indicated that the property will most likely be commercial/industrial in the future.

There were numerous public comments on the Proposed Plan indicating commenters' request that the entire MWPS Facility (including City property) be remediated to residential-based SSCLs. However, requiring cleanup to this level is only warranted if the future anticipated use of the property is residential. In the case of the City property, an analysis of the factors does not support a finding of future residential use for the City property. In addition, most of the City property has been developed into commercial property, with a number of expansions of the commercial operations in recent years. After carefully considering and weighing the relevant information in the administrative record, and using the factors in Section 75-10-701(18), MCA, DEQ has determined that the reasonably anticipated future use of the western portion of the City property at the MWPS Facility is commercial/industrial and the reasonably anticipated future use of the eastern portion of the City property at the MWPS Facility (the park) is recreational/open space.

3. Property owned by the SSLLP

a) local land and resource use regulations, ordinances, restrictions, or covenants

SSLLP purchased around 30 acres of property at the Facility from Huttig in March 1999 (Grant Deed, 1999a). (The exact acreage is not identified in the transfer deeds, so this is an estimate of the acreage size; it does not affect the evaluation of reasonably anticipated future use (as defined in Section 75-10-701, MCA).) In the grant deed, SSLLP took the property "subject to certain negative easements and restrictive covenants." One of these restrictions provides: "[n]o portion of the Property shall be used in any manner for residential purposes or for any type of human residential habitation, whether permanent or temporary. If [SSLLP] is able to obtain the consent of the Government to lift this restriction on human residential habitation, [Huttig] agrees to remove such restriction from the Property…." These restrictive covenants run with the land, and the restrictive covenants are required to be transferred to subsequent owners of the property. The restrictive covenants can be modified if approved by the Government (as defined in the deed), Huttig, and the current owner of the property. SSLLP subsequently sold the City approximately 10 acres of property in 2000 and also donated one acre to the City for the park. Currently SSLLP owns approximately 19 acres of property.

The SSLLP property is currently zoned M1R-2 (MOPG, 2011). Missoula Zoning Ordinance 20.15.010 (as updated on January 17, 2014) indicates that "Missoula's industrial (M) zoning districts are primarily intended to accommodate manufacturing, warehousing, wholesale and industrial uses. The regulations are intended to promote the economic viability of manufacturing and industrial uses, encourage employment growth, allow residential uses in the M1R district, and limit the encroachment of unplanned residential and other non-industrial development into the M1 – and M2-zoned areas." As indicated in its comments on the Proposed Plan, SSLLP requested that its property be rezoned to exclude potential residential use, but that rezoning has not been approved.

An evaluation of the local land and resource use regulations, ordinances, restrictions, or covenants indicates there is one difference between the local ordinance/zoning and the restrictions and covenants placed on the property when it was transferred from Huttig to SSLLP. The M1R-2 zoning allows residential use and the restrictive covenants do not allow residential use.

(b) historical and anticipated uses of the Facility

The MWPS Facility is a former lumber mill and wood treating facility, which began operations in 1905 and continued until 1996 (Polk, 1905-1922; Envirocon, 1998). Huttig acquired the MWPS Company on July 31, 1971, and operated the mill until it closed in December 1996 (Envirocon, 1998). Although wood was not treated on the SSLLP property, it was part of the MWPS operations and included the log ponds and a teepee burner. Historically, the SSLLP property was used for industrial purposes. Currently, the SSLLP property is vacant.

(c) patterns of development in the immediate area

The eastern boundary of the SSLLP property is Scott Street and east of Scott Street is a residential neighborhood. The northern boundary of the SSLLP property is the property owned by Clawson Distributing, which has historically been commercial property and is not included within the MWPS Facility. The western boundary of the SSLLP property is property operated by Montana Rail Link. The southern boundary of the SSLLP property is property owned by the City, which has been developed into a City park and into commercial use for the City Public Works Department (vehicle maintenance, gravel and sand stockpiles, equipment parking). With the exception of the existing residential neighborhood and the City park, the development in the immediate area of the SSLLP property has been commercial/industrial.

(d) relevant indications of anticipated land use from the owner of the Facility and local planning officials.

To evaluate anticipated land use of the SSLLP property, DEQ sent a letter to SSLLP, who indicated an intention that its property be used for commercial/industrial purposes in the future (DEQ, 2013b; DEQ, 2013c; DEQ, 2014). SSLLP had previously indicated its intention to use its property for commercial/industrial purposes in 2011 (SSLLP, 2011). DEQ also considered SSLLP's April 11, 2014, comment letter on the Proposed Plan, which indicates that "the intended purpose for development is commercial/industrial."

To evaluate anticipated land use of the SSLLP property by local planning officials, DEQ considered a number of sources. First, the Plan (City, 2000) indicates that "[l]ight industrial uses are most intense west of Scott Street, on both sides of the tracks. East of Scott Street, the industrial uses are generally less intense, with a few exceptions. Small shops, mini-storage units, Ozzie's Oil and Refinery, Bitterroot Gymnastics, offices, and construction companies are some of the businesses in the vicinity. These uses have the ability to blend with the adjacent residential areas." The Plan also acknowledges:

> "An adjacent industrial neighborhood to the west, which overlaps with the Northside neighborhood, relies heavily on the railway corridor, rail spurts, truck routes, and adjacent businesses. Elements which these two neighborhoods have in common include transportation, economic development, land use recommendations, and environmental impacts. Scott Street, as the edge of the abutting industrial neighborhood, is a main truck route running through a residential area south of the tracks; it is also the major road for residents to access their homes on the Northside. The location of light industrial uses along the railway corridor of the Plan area is important because it is compatible with the adjacent industrial neighborhood."

The Plan discusses environmental health issues in the Northside and identifies concerns associated with "the presence of diesel fumes blowing into the neighborhoods and trains idling all day" as well as the proximity to Northside transportation corridors (proximity to the Interstate highway, the Orange street interchange, the railroad corridor, and the Louisiana Pacific manufacturing plant) and the potential for a train derailment with a toxic substance release (City, 2000).

The Plan was updated in the 2006 Limited Scope Update to the Northside/Westside Neighborhood Plan (City, 2008). The updated Plan indicates that "[e]nvironmental health issues continue to trouble residents" and that they "would like to work with current owners of the former White Pine Sash property to ensure safe and compatible development." It reiterates that the neighbors are interested in meeting with industry representatives to discuss "adoption of pollution abatement standards and strategies for mitigating environmental health risks such as diesel fumes from idling engines, herbicide spraying, and particulate pollution."

In its April 11, 2014, letter, SSLLP points out that its intended development of its property as commercial/industrial "will coincide with the development of land from Scott Street to Reserve Street and compliment the fact that a platted and accepted rail easement exists across the City property to the [SSLLP property] thereby offering the opportunity for a commercial or industrial entity to utilize rail transportation" and that its property "is only one of two parcels in Missoula with such rail access to attract industrial commercial businesses in need of rail transport…."

DEQ also considered a January 31, 2011, letter from the MOPG, which states that "the most likely future use for the northern portion of [the facility] is less certain. However, the property:

1) Is adjacent to a park and a residential neighborhood;
2) Is convenient to Downtown and the Northside;

3) Is flanked to the north by recent residential development; and
4) Has been the subject of earnest residential development efforts.

This leads me to conclude the residential use is one of the most valuable and most viable potential future uses of the northern portion of [the Facility]" (MOPG, 2011).

In an email dated October 16, 2013, SSLLP explained that it had "only one serious inquiry to develop housing on [its property] in the 15 years" that SSLLP has owned the property and that the residential development failed (SSLLP, 2013). SSLLP also indicated that it had received approximately 100 other inquiries, all of which were non-residential. DEQ notes that it spent significant time working with a residential developer for the SSLLP property between 2003 and 2004 and that, after that time, SSLLP marketed the property as having potential residential use (Oaks, 2005).

<u>Summary of Reasonably Anticipated Future Use for SSLLP property</u>

Local land use regulations provide for commercial/industrial and residential use of the property. Restrictive covenants on the property allow for commercial/industrial use of the property, and restrict residential use unless specifically authorized by Huttig and DEQ. The historical uses of this property are commercial/industrial. With the exception of the existing residential neighborhood and the City park, the development in the immediate area of the SSLLP property has been commercial/industrial. The owner of the SSLLP property has indicated that the property will most likely be commercial/industrial in the future; the MOPG identified residential use as "one of the most valuable and most viable potential future uses" of the property.

The statutory analysis of the reasonably anticipated future uses of the WWW property and SSLLP property is similar: the zoning and restrictive covenants on the properties are the same; both properties were used as part of the historical MWPS operations; the patterns of development in the immediate area are generally the same; and both property owners have expressed their intent that their property be used as commercial/industrial property in the future. The primary differences between the two properties are (1) a local planning official has indicated his belief that residential use is "one of the most valuable and most viable potential future uses" of the SSLLP property; and (2) WWW has developed its property commercially, and SSLLP has only expressed intent for commercial development but the property remains vacant.

The statutory analysis of the reasonably anticipated future uses of the City property and SSLLP property is also similar: the restrictive covenants on the properties is the same; both properties were used as part of the historical MWPS operations; the patterns of development in the immediate area is the same; and both property owners have expressed their intent that their property be used as commercial/industrial property in the future (or, for the park property, as open space). The primary differences between the two properties are (1) a local planning official has indicated his belief that residential use is "one of the most valuable and most viable potential future uses" of the SSLLP property; (2) the City has developed its property commercially and SSLLP has only expressed an intent for commercial development but the property remains vacant; and (3) the City has been successful in having its property rezoned and SSLLP's request for rezoning has not been approved.

In the case of the SSLLP property, factors that point to future residential use include the current zoning and a 2011 letter from the MOPG indicating residential use is a potential future use. In addition, unlike the WWW and City properties which have been developed into commercial operations, the SSLLP property is vacant. DEQ also notes that SSLLP previously marketed the property as residential and DEQ worked with a residential developer in the past. The SSLLP property's unique location, adjacent to commercial/industrial operations on the west, the City Park to the south, and the residential neighborhood to the east, provides additional future use opportunities not necessarily available on the WWW and City properties, which have already been developed commercially. DEQ recognizes the desire by the local community and local government to not foreclose the possibility of future residential use on the SSLLP property. At the same time, however, DEQ recognizes that the owner of the SSLLP property has expressed an interest in commercial use of the property; that the property has existing restrictions that prohibit residential use unless approved by Huttig and DEQ; that the property has historically been used for commercial/industrial purposes; and that a platted rail easement exists to this property which offers a commercial/industrial business the ability to utilize rail transportation.

Section 75-10-701, MCA, identifies the factors DEQ must evaluate to determine the reasonably anticipated future use of the Facility. Evaluation of some of the factors pointed to future residential use and some of the factors pointed to future commercial/industrial use, and neither was particularly more compelling than the other. Therefore, DEQ further considered Section 75-10-721(3), MCA, which directs DEQ to "consider the acceptability of the [remedial] actions to the affected community, as indicated by community members and the local government." There were commenters who indicated the SSLLP property should have commercial use in the future; however, there were many more commenters who indicated a desire for future residential use.

DEQ has balanced the statutory analysis of "reasonably anticipated future use" as well as the competing interests expressed during the public comment period. After carefully weighing the relevant information in the administrative record, and using the factors in Section 75-10-701(18), MCA, as well as a consideration of Section 75-10-721(3), MCA, DEQ has determined that the reasonably anticipated future use of the western portion (approximately 9.3 acres) of the SSLLP property at the MWPS Facility is commercial/industrial. This is the portion of the SSLLP property that is closer to the operating railyard and the platted rail easement across the City's property to the SSLLP property. DEQ has carefully weighed the relevant information in the administrative record, and using the factors in Section 75-10-701(18), MCA, as well as a consideration of Section 75-10-721(3), MCA, and has determined that the reasonably anticipated future use of the eastern portion (approximately 9.7 acres) of the SSLLP property at the MWPS Facility is residential.

DEQ will require that the eastern portion of the SSLLP property (which is adjacent to the City park and the residential area) be remediated to meet residential-based SSCLs. This blending of property uses for the SSLLP property is consistent with the Plan; balances the competing interests expressed by the property owner, the local community, and local government; and is consistent with the analysis of Section 75-10-701(18), MCA. Remediation of the eastern portion of the SSLLP property to meet residential SSCLs will result in approximately 9.7 acres of the 19-acre SSLLP property meeting residential SSCLs (see Figure 9). This does not require that the future development and use of the property be residential, but such a use would be a potential future option because residential SSCLs will be met.

4. Property East of Scott Street

Currently, a small portion of the existing residential neighborhood to the east of Scott Street is within the MWPS Facility due to dioxin in one residential yard (1028½ Stoddard Street) exceeding the SSCL and groundwater exceeding SSCLs. This area was not part of the historical MWPS operations. However, because it is within the Facility, DEQ conducted a reasonably anticipated future use analysis for this property as a whole.

a) local land and resource use regulations, ordinances, restrictions, or covenants

The property east of Scott Street is currently zoned RM1-45 (MOPG, 2011). Missoula Zoning Ordinance 20.05.010 (as updated on January 17, 2014) indicates that "Missoula's residential (R) zoning districts are primarily intended to create, maintain and promote a variety of housing opportunities for individual households and to maintain and promote the desired physical character of existing and developing neighborhoods. While the districts primarily accommodate residential use types, some nonresidential uses are also allowed."

(b) historical and anticipated uses of the Facility

Based upon a review of historical and current aerial photographs taken from 1948 through 2014, the property east of Scott Street has historically been used for residential property (UM, 2014). DEQ is not aware of any information that would suggest the anticipated use of this property will change.

(c) patterns of development in the immediate area

The eastern, northern, and southern boundary of the property east of Scott Street is a continuation of the residential neighborhood. The western boundary of the residential property (across Scott Street) is SSLLP, which is vacant; the City property, which has been developed as commercial/industrial property and City park; and the WWW property, which has been developed as commercial/industrial property.

(e) relevant indications of anticipated land use from the owner of the facility and local planning officials.

To evaluate anticipated land use of the property east of Scott Street by local planning officials, DEQ considered a number of sources. First, the Plan (City, 2000) references the "adjacent residential areas" with no suggestion that these areas will be changing in the future. The Plan also discusses environmental health issues in the Northside and identifies concerns associated with "the presence of diesel fumes blowing into the neighborhoods and trains idling all day." The Plan was updated in the 2006 Limited Scope Update to the Northside/Westside Neighborhood Plan (City, 2008). The updated Plan indicates that "[e]nvironmental health issues continue to trouble residents" and that they "would like to work with current owners of the former White Pine Sash property to ensure safe and compatible development." It reiterates that the neighbors are interested in meeting with industry representatives to discuss "adoption of pollution abatement standards and strategies for mitigating environmental health risks such as diesel fumes from idling engines, herbicide spraying, and particulate pollution." There is no suggestion in the update that the residential area will be converted to a different use in the future.

DEQ also considered that the area east of Scott Street has been primarily residential for many years and that it is zoned residential. DEQ did not get any comments on the Proposed Plan indicating that other uses might be preferred for this area. In fact, a number of commenters identified the amount of redevelopment and resale of residential property in the area, which further supports that the anticipated future use of this area is residential.

DEQ also considered a January 31, 2011, letter from the MOPG, which states that the "area to the east of White Pine Sash is immutably residential" (MOPG, 2011).

Summary of Reasonably Anticipated Future Use for property east of Scott Street

Local land use regulations provide for residential use of the property. The historical and anticipated uses of this property are residential. Patterns of development in the immediate area have been commercial/industrial and recreational (on the west) and primarily residential on the other three sides. Local planning officials have indicated that the property is "immutably residential" and a number of commenters confirmed their current and intended future use of their property as residential. After carefully considering and weighing the relevant information in the administrative record, and using the factors in Section 75-10-701(18), MCA, DEQ has determined that the reasonably anticipated future use of the property east of Scott Street within the MWPS Facility is residential.

6.2 GROUNDWATER USES

In 1988, EPA designated the Missoula Aquifer as a Sole Source Aquifer (EPA, 1988). EPA defines a sole or principal source where the aquifer provides more than 50 percent of the drinking water consumed in the overlying area, and where there is no viable alternative drinking water source. The Sole Source Aquifer program was established under Section 1424(e) of the Safe Drinking Water Act. The aquifer yields approximately 9.7 billion gallons of water annually to production wells which supply municipal water to the City. The production wells are owned and operated by the Mountain Water Company (Douglass, 2015).

Huttig prepared a well inventory to identify private drinking water wells, irrigation wells, industrial water supply wells, and public water supply wells in the vicinity of the MWPS Facility. A one-half mile area around the former process area was examined. The well inventory for this defined area located 32 wells, including several that have been abandoned or are no longer used (closed), and two that are located within the historical operations area (Douglass, 2015) (see Figure 6).

The Mountain Water Company owns the municipal water supply wells in the City of Missoula, and the nearest well used for public water is the Dickens and Defoe well located approximately 1,000 feet southeast of the MWPS Facility. Due to the proximity of this well to the MWPS Facility, the well has been inactive since May of 2003; Mountain Water Company does not plan on using this well in the future and has installed additional waterlines to bypass this well and provide for the replacement of its capacity with other wells (Douglass, 2013c). Now, the nearest Mountain Water Company well is located on north Russell Street (identified as PUB12), just outside of the one-half mile area west of the MWPS former process area as shown on Figure 6.

The Missoula Valley Water Quality Ordinance prohibits the installation of community wells and non-community, non-transient wells in certain areas of the valley (MVWQD, 2008). New wells are prohibited within 1,000 feet of any known release to groundwater which has been reported to state or federal officia1s, and within 1,000 feet of the Yellowstone pipeline which runs along the rail yard (Figure 6).

6.3 SURFACE WATER USES

As discussed in more detail in Section 5.2.2, the MWPS Facility is situated outside of the Clark Fork River 100 and 500 year flood plains and general groundwater flow direction in the area is toward the Clark Fork River.

7.0 HUMAN HEALTH AND ECOLOGICAL RISK ANALYSIS

DEQ developed a BRA for the MWPS Facility in 2001 (CDM, 2001). The BRA process identifies COCs, exposure pathways, exposure assumptions, toxicity values, and calculates SSCLs protective of human health and the environment at the Facility for groundwater and soil in each exposure area. The exposure areas included WWW property, SSLLP property, 1028½ Stoddard Street, and City property. The intent of the BRA was to estimate human health and environmental risks associated with current and potential future conditions at the MWPS Facility assuming that no further remediation will occur. Since the BRA was completed in 2001, additional elevated concentrations of PCP have been detected in surface soils on the Facility. Further, new screening levels and toxicity information became available which altered the conditions upon which SSCLs were developed. Therefore, DEQ prepared the BRA Addendum (CDM, 2012) to evaluate the new analytical data and revise the SSCLs for soil at the MWPS Facility. In addition, based on advancements in the study of VI, DEQ determined that contaminant concentrations in groundwater were such that a complete VI investigation was necessary. A revised screening of groundwater COPCs is presented in the Addendum along with a summary of the resulting indoor air investigation. A site-specific fate and transport model to evaluate soil contamination leaching to groundwater was also conducted using site-specific data (CDM, 2011).

In the BRA, DEQ compared the COC concentrations at the MWPS Facility with the SSCLs and DEQ-7 standards (CDM, 2012; DEQ, 2012a). Based upon this evaluation, DEQ determined that the COC concentrations in surface and subsurface soil, and groundwater at the MWPS Facility represent unacceptable risks to human health and the environment, and that remediation is necessary. Unacceptable risks were identified for the Facility groundwater and soils associated with the WWW, SSLLP, City, and 1028½ Stoddard Street exposure areas.

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

7.1 HUMAN HEALTH RISKS

Populations that were evaluated for potential exposure to soil contamination at the MWPS Facility include current and future offsite residents, future onsite residents, future onsite recreators, current and future onsite commercial/industrial workers, current and future offsite commercial/industrial workers, current and future onsite trespassers, and future onsite construction workers (CDM, 2012). From the BRA, DEQ determined that the exposure pathways of 1) groundwater to onsite workers/visitors and 2) the exposure to volatiles released into the air from showering or bathing in contaminated groundwater to offsite residents and workers are not complete or do not need to be quantitatively evaluated. A SCEM is provided in Figure 4 (CDM, 2001). Additional details regarding the above pathways can be found in Section 4.0 and Figure 4-1 of the BRA, and Section 4 of the BRA Addendum (CDM, 2001; CDM, 2012).

In the BRA, DEQ estimated potential cancer risk and potential non-cancer effects for ingestion of surface soil, dermal contact with surface soil, inhalation of outdoor dust, ingestion of vegetables grown in contaminated soil, ingestion of groundwater, dermal contact with groundwater, inhalation of volatiles during use of groundwater, inhalation of volatiles released from the subsurface soil and groundwater into indoor air, and ingestion of breast milk (CDM, 2012). COPCs were identified by their detection frequency and exceedance of screening levels. COPCs were then separated based on their effect (i.e., cancer causing or non-cancer effects). Hazard quotients were calculated for non-carcinogenic effects based on target organs or critical effects to ensure that the total hazard index did not exceed 1 for any organ or effect. Cancer risks were calculated to ensure that the total excess lifetime cancer risk did not exceed a one in 100,000 individual excess lifetime cancer risk (1×10^{-5}). "Excess lifetime cancer risk" is additional risk that someone might have of getting cancer if that person is exposed to cancer-causing compounds. DEQ considers an additional or excess 1 in 100,000 chance (or 0.001% or 0.00001 or 1×10^{-5}) allowable. The most recent toxicity information available was used to calculate risk levels in the BRA Addendum. SSCLs are further discussed in Section 7.1.2.

7.1.1 Determination of COCs

DEQ determined which COPCs should be retained as COCs from the data presented in the RI and subsequent investigation reports (CDM, 2012). Tables 1, 2, and 3 identify the compounds and metals retained as COCs in groundwater, soil, and indoor air and their SSCLs. The COCs include but are not limited to PCP, dioxin, petroleum hydrocarbons, and cadmium. Methane gas in soils is also a COC. For purposes of the BRA, the offsite area consists of the residential area to the east of Scott Street to Waverly Street and north to Turner Street. For purposes of the BRA, the onsite area consists of the WWW, City, and SSLLP properties.

7.1.1.1 Health Effects and Hazards

Health effects of PCP, dioxin, petroleum hydrocarbons, and cadmium and risks associated with methane are discussed below:

> PCP: According to the Agency for Toxic Substances and Disease Registry (ATSDR), PCP is a manmade chemical that does not occur naturally (ATSDR, 2001). It was widely used as a pesticide and wood preservative, but the purchase and use of PCP has been restricted to certified applicators since 1984. Therefore, it is no longer available to the general public although it is still used industrially. PCP can be found in the air, water, and soil. Studies in workers show that exposure to high levels of PCP can cause the cells in the body to produce excess heat. When this occurs, a person may experience a very high fever, profuse sweating, and difficulty breathing. The body temperature can increase to dangerous levels, causing injury to various organs and tissues, and even death. Liver effects and damage to the immune system have also been observed in humans exposed to high levels of PCP for a long time. EPA has determined that PCP is a probable human carcinogen and the International Agency for Cancer Research (IARC) considers it possibly carcinogenic to humans (IRIS, 2010; IARC, 1999).

- Dioxin: According to ATSDR, dioxin is a family of 75 chemically related compounds commonly known as chlorinated dioxin (ATSDR, 2012a). These compounds are referred to as congeners and one congener, 2,3,7,8-TCDD, is the most toxic and therefore, is the most studied. Dioxin may exist naturally due to the incomplete combustion of organic material by forest fires or volcanic activity. Dioxin is not intentionally manufactured by industry, except in small amounts for research purposes; however, industrial, municipal, and domestic incineration and combustion processes can produce dioxin. The most noted health effect in people exposed to large amounts of 2,3,7,8-TCDD is chloracne. Chloracne is a severe skin disease with acne-like lesions that occur mainly on the face and upper body. Other skin effects noted in people exposed to high doses of 2,3,7,8-TCDD include skin rashes, discoloration, and excessive body hair. Liver damage and changes to metabolism and hormone levels are also seen in people. In certain animal species, 2,3,7,8-TCDD is especially harmful and can cause death after a single exposure. Exposure to lower levels can cause a variety of effects in animals, such as weight loss, liver damage, and disruption of the endocrine system, weakening of the immune system, reproductive damage and birth defects. EPA considers dioxin to be a probable human carcinogen, while the World Health Organization considers it to be a known human carcinogen (ATSDR, 2012a).

- Petroleum hydrocarbons: Health effects from exposure to petroleum hydrocarbons depend on many factors, including the type of chemical compounds in the petroleum hydrocarbons, how long the exposure lasts, and the amount of the chemicals contacted. Very little is known about the toxicity of many petroleum hydrocarbon compounds. Until more information is available, information about health effects of petroleum hydrocarbons is based on specific compounds or on data for petroleum products that have been studied. According to ATSDR, the compounds in some petroleum hydrocarbon fractions can affect the blood, immune system, liver, spleen, kidneys, developing fetus, and lungs. Certain petroleum hydrocarbon compounds can be irritating to the skin and eyes and can cause neurological affects consisting primarily of central nervous system depression. Other petroleum hydrocarbon compounds, such as some mineral oils, are not very toxic and are used in foods (ATSDR, 1999).

- Cadmium: ASTDR has indicated that cadmium used in the United States typically is extracted during the production of other metals like zinc, lead, and copper (ASTDR, 2012a). It is used in many different applications including batteries, pigments, metal coatings, and plastics. Breathing high levels of cadmium can severely damage lings. Eating food or drinking water with very high levels severely irritates the stomach, leading to vomiting and diarrhea. Long-term exposure to lower levels of cadmium in air, food, or water leads to a buildup of cadmium in the kidneys and possible kidney disease. Other long-term effects are lung damage and fragile bones. The U.S. Department of Health and Human Services and IARC have determined that cadmium and cadmium compounds are human carcinogens (DHHS, 2012 and IARC, 1997). EPA determined that cadmium is a probable human carcinogen (group B1). Cadmium affects the cardiovascular, gastrointestinal, renal, reproductive, and respiratory systems. It may also affect children during periods when organs are developing (ATSDR, 2012).

- Methane is a gas that is colorless and odorless. It is produced during bacterial decomposition of organic material in an anaerobic, or oxygen-depleted environment. Methane is lighter than air, colorless, odorless, non-carcinogenic, flammable, and potentially explosive when it is present at concentrations in excess of 50,000 parts per million by volume (ppmv) in the presence of oxygen in the breathing zone (DTSC, 2005). The concentration level at which a gas, like methane, has the potential to explode is called the explosive limit. The potential for a gas to explode is determined by its LEL and upper explosive limit (UEL). Methane is explosive between its LEL of 5% by volume (50,000 ppmv) and its UEL of 15% by volume (150,000 ppmv). At concentrations below its LEL and above its UEL, methane is not explosive. Methane can create explosive conditions if allowed to collect in confined spaces, such as utility rooms, in overlying buildings, or manholes (ATSDR, 2001a). At any site with methane, there is a potential for methane to accumulate within nearby structures, or migrate through utility trenches or the sand or gravel sub-base beneath paved roads or buildings (DTSC, 2005). If methane collects in a confined space, such as a manhole, a subsurface space, a utility room in a home, or a basement, it could potentially explode at certain concentrations.

7.1.2 Calculation of Site-Specific Cleanup Levels

The following sections provide a discussion of COCs for each media and a discussion of the calculation of SSCLs. These SSCLs establish acceptable levels that are protective of human health associated with soil, indoor air (if needed), and groundwater, and protective of the environment by minimizing the migration of contaminants from soil into the groundwater at levels that would exceed groundwater SSCLs.

7.1.2.1 Groundwater

The DEQ-7 standards are the applicable cleanup levels for groundwater (DEQ, 2012a). When evaluating public drinking water, use of the EPA maximum contaminant levels (MCLs) is appropriate, as those are the federal standards generally applied to drinking water. For COCs without a DEQ-7 standard or MCL available, the BRA Addendum evaluated and established SSCLs (CDM, 2012). The groundwater SSCLs are provided in Table 1.

7.1.2.2 Soils

DEQ developed SSCLs that are protective of DEQ-7 standards for surface and subsurface soil contaminants that may leach to groundwater at the MWPS Facility and direct contact SSCLs for residents, commercial/industrial workers, and construction workers (CDM, 2012). With the exception of the offsite residential property, the City park, and the eastern portion of the SSLLP property, soil concentrations have been compared to commercial/industrial SSCLs. The offsite residential property and the eastern portion of the SSLLP property have been compared to residential SSCLs. Through evaluation in the BRA Addendum, it was confirmed that there is no unacceptable risk for recreators on the City park property; therefore, SSCLs were not calculated (CDM, 2012). DEQ has determined the reasonably anticipated future use of the MWPS Facility (with the exception of the City park, the existing residential area, and the eastern portion of the SSLLP property) as commercial/industrial and cleanup of the Facility must meet those SSCLs.

For the one residential yard in the existing residential area and the eastern portion of the SSLLP property, cleanup must meet residential SSCLs. To ensure protection of human health and the environment, the more protective of the leaching to groundwater SSCLs or the direct contact SSCLs were used for compounds that have both. The COCs for each of these receptors are provided in Table 2 along with their corresponding SSCLs. Soil sample results indicate that soils on the SSLLP property, in the former treatment area, on WWW property, on City property, and at one offsite residential property had surface soil concentrations of dioxin greater than either the residential or commercial/industrial surface soil SSCLs, or both. Surface soil in the former treatment area also had concentrations of PCP greater than the surface soil SSCL. Surface soil samples at the SSLLP property had concentrations of cadmium greater than the SSCL. Soil contamination is still present in the saturated zone below the former treatment and AST areas on the WWW property. This soil contamination has the potential to leach and cause groundwater contamination exceeding DEQ-7 standards.

7.1.2.3 Soil Vapor

The VI investigation confirmed that COPCs for the VI pathway are present in deep and shallow soil vapor at concentrations that exceed SSSLs (CDM, 2012a). Concentrations of C9-C12 aliphatics were present in elevated concentrations beneath the five commercial buildings investigated and seven of the 10 residential buildings. DEQ required the installation of additional deep soil vapor monitoring points to allow continued evaluation of soil vapor concentrations, as well as to track trends through time. DEQ calculated SSSLs for inhalation of soil vapor for onsite and offsite construction workers using the same process identified for the indoor air SSCLs in the BRA Addendum (CDM, 2012). This process utilized equations developed by EPA and the DEQ-accepted construction worker assumptions for the amount of time a construction worker is expected to be exposed to contamination (124 days per year for one year. However, upon comparison of the soil vapor data collected from previous investigations, DEQ determined that the shallow soil vapor representative of the construction worker exposure scenario (surface to 10 feet bgs) did not include exceedances of the SSSLs. Although deep soil vapor concentrations exceed SSSLs, onsite and offsite construction workers are not expected to be exposed at this depth. Therefore, DEQ has not retained these SSSLs as SSCLs and has determined that, because the selected treatment alternative will address COC impacts to soil and groundwater and remediation of soil and groundwater will address future concerns regarding potential soil vapor and indoor impacts, SSCLs are not needed for soil vapor.

DEQ did not calculate SSCLs for methane. Instead, DEQ will use of 25% of the LEL (12,500 ppmv) as the methane level requiring action to be taken to reduce concentrations. Twenty-five percent of the LEL is based on ARM 17.50.1106(1)(a) and (b) that requires the owner or operator of a Class II landfill to ensure that the concentration of methane gas generated by the Facility does not exceed 25% of the LEL for methane.

7.1.2.4 Indoor Air

The indoor air contaminant concentrations were initially compared to EPA indoor air RSLs. The list of indoor air COCs was reduced further by evaluating them against known MWPS Facility contaminants or contaminants identified in soil vapor samples, but not in sub-slab vapor samples.

This approach is consistent with the evaluation of multiple lines of evidence to determine whether VI is occurring. This approach involves evaluating several independent factors that may impact VI, including, but not limited to, analytical data from indoor air, ambient outdoor air, soil vapor, and sub-slab vapor, building construction, and potential indoor sources (DEQ, 2011a). Using the identified COCs, DEQ derived residential and commercial SSSLs for the COCs. The derivation employed EPA's residential RSL indoor air risk equations for carcinogenic and non-carcinogenic compounds with DEQ-specific exposure factors (CDM, 2012). The more stringent of the carcinogenic or non-carcinogenic screening level was selected as the SSSL for each COC.

As discussed in more detail in the BRA Addendum, given that no additional site-specific data or information was obtained that would change the derived SSSLs, the SSSLs were retained as SSCLs for indoor air for both the residential and commercial worker exposure scenarios (CDM, 2012). Although investigation results indicated that the influence of contaminants in soil vapor on indoor air appears to be minimal and does not appear to present a continuous or immediate risk to building occupants (see Section 5.3.3 and CDM, 2012a for more information), DEQ has included the indoor air SSCLs to assist with verification of successful remediation in the future, should they be needed. Table 3 provides the SSCLs for each of these scenarios.

7.1.3 Evaluation of Uncertainties

This section evaluates uncertainties associated with the BRA (CDM, 2001) as updated by CDM (CDM, 2014) at DEQ's request after preparation of the BRA Addendum (CDM, 2012). The uncertainties are discussed below.

7.1.3.1 Uncertainties Associated with the Database and Concentration Estimates

- Using One Half Detection Limits for the Calculation of TEQ: Assuming one half the detection limit for non-detected concentrations for dioxin-like compounds (DLC) for the calculation of a total dioxin toxic equivalency (TEQ) value adds increased uncertainty. A non-detect result does not indicate whether the DLC is absent from the medium, present at a concentration just above zero, or present at a concentration just below the reporting limit. For DLCs that were infrequently detected, many of values used to estimate TEQs were based on reporting limits. In these cases, uncertainty may be high, but this uncertainty typically lies in a range of concentrations that are low compared to concentrations that might be of concern. Thus, the impact of this uncertainty on the results of the risk assessment is relatively low and the total TEQ concentrations are likely overestimated by the use of one half detection limits (CDM, 2014).

- Using Current Concentrations to Estimate Future Exposures: Use of current chemical concentrations for evaluation of future exposure scenarios is conservative, since there are no continuous contaminant sources onsite. Even though the primary contaminants do not degrade rapidly in the environment, some decrease of soil concentrations over time is expected. The degree to which such a decrease may take place is different for different COPCs. Dioxin is expected to be most persistent (CDM, 2001).

It is more difficult to estimate the result of this uncertainty for groundwater. Since soil is contaminated, chemical concentrations in groundwater could theoretically increase with time. Natural attenuation of chemicals may, however, result in a decrease of chemical concentrations. Current data seem to indicate that groundwater concentrations are either fluctuating or declining. The contaminant concentration trends in the Missoula Aquifer are down. Concentrations are fluctuating in the perched groundwater, which is expected since the source area has not been remediated. Using current concentrations to evaluate future exposures to groundwater is therefore likely conservative (CDM, 2014).

- Indoor Air Sampling: In 2012, indoor air samples were collected from five commercial buildings located in the former operational area and from ten residences located east of Scott Street. With all indoor air sampling programs there is inherent uncertainty associated with collecting indoor air samples. Factors that can lead to uncertainty include possible indoor air sources from household products and building materials; building factors such as inside air flow from heating systems, building type (e.g., slab-on-grade, basement), structural integrity (foundation cracks) and possible preferential pathways (e.g., points of entry for utilities); and the representativeness of collecting a 24 hour sample, which represents a small increment of time relative to the overall time that a receptor spends inside a building over an exposure period of months or years. The multiple lines of evidence approach that was employed at the Facility, however, mitigated some of the uncertainty associated with indoor air sampling. The collection of soil gas in subsurface soil and sub-slab soil vapor beneath the buildings characterized the subsurface vapor source and identified the petroleum hydrocarbon fraction C9-C12 aliphatics as elevated in the subsurface, which narrowed the focus of the indoor air investigation. The collection of ambient air samples helped to identify whether or not possible background sources unrelated to the subsurface vapor source were present. Conducting a building pre-investigation to remove possible indoor air sources before sampling also mitigated the potential of background sources that are unrelated to the subsurface. To reduce temporal uncertainty, indoor air samples were collected during the time of year when vapor intrusion is most likely to be greatest during the winter months (February and early March in 2012) ensuring that the highest levels that were likely to occur over the course of the year were sampled to be protective of building occupants (CDM, 2014).

7.1.3.2 Uncertainties Associated with Exposure Assessment

- Land Use: Land use assumptions used to evaluate the Facility are conservative in that all parcels were evaluated for residential use although certain parcels may not be used for residential purposes in the future. All parcels were evaluated for residential use because, at the time the BRA and BRA Addendum were completed, DEQ had not yet made the determination of reasonably anticipated future land use (CDM, 2014).

- Exposure Assumptions: Exposure assumptions are generally a source of uncertainty. Exposure parameters are selected using a combination of available guidance values and professional judgment. Both sources of information include considerable uncertainty. The exposure assumptions that are used in the BRA are generally conservative to assure that human health is adequately protected. Several exposure parameters (e.g., body weight) are average values; using average values in combination with reasonable maximum exposure (RME) values (e.g., exposure point concentrations) provides an exposure scenario that is considered conservative but still within the possible range. The combinations of exposure assumptions that are used to calculate RME are therefore likely to be conservative. The uncertainty associated with average exposure scenarios is also considered small, because the data used to derive these exposure parameters are considered adequate and representative of average exposure conditions (CDM, 2001).

- Concentration Estimates for the Vegetable Ingestion Pathway: Vegetable ingestion was evaluated using measured concentrations or one half of the detection limit of chemicals in produce. Since the vegetables were rinsed prior to the analyses, the measured concentrations do not include the contributions from dust that may settle on the surfaces of the vegetables. This approach could result in an underestimation of risks associated with the vegetable pathway. Since people typically wash their produce prior to eating it, the fact that dust on vegetables was not evaluated is not expected to be an important uncertainty for the Facility (CDM, 2001).

- Lack of quantitative evaluation for the indoor dust pathway for offsite residents: Inhalation of dust indoors is not evaluated quantitatively for current and future offsite residents, because appropriate indoor air dust data are not available. Conservative assumptions used for the surface soil ingestion and outdoor dust inhalation pathways are intended to account for any exposures that may occur via indoor dust. In addition, lack of evaluation of the indoor dust pathway is not expected to be associated with much uncertainty, because the dust inhalation pathway generally does not contribute much to overall exposure. Since the concentrations in the indoor dust dioxin samples reported in the Brownfields Site Assessment are of the same magnitude as the soil concentrations near the Facility, the results also suggest that the indoor dust inhalation pathway would not be significant compared to soil ingestion and dermal contact and would not significantly change the results of the BRA (CDM, 2001).

7.1.3.3 Uncertainties Associated with Toxicity Assessment

- Cancer Toxicity Criteria for Dioxin: The EPA has not finalized an oral cancer slope (CSF) for dioxin, but the California Environmental Protection Agency (CalEPA) derived a CSF of 1.3E+05 mg/kg-day in 2009, available in the Office of Environmental Health Hazard Assessment Criteria Database. CalEPA is recognized as a Tier 3 source for toxicity values in the EPA hierarchy as presented in Human Health Toxicity Values in Superfund Risk Assessments, OSWER Directive 9285.7-53. CalEPA values are peer reviewed and used in human health risk assessments nationally; however, the values do not undergo the same level of review as EPA Integrated Risk Information System values. The CSF is based on the incidence of tumors in male mice in a 1982 National Toxicology Program study using a linear dose-response model. There is uncertainty associated with the use of this toxicity value based on a linear dose-response model in that the National Academy of Sciences (NAS) in its 2006 review of an EPA draft reassessment of dioxin contends that there may be a threshold for dioxin's carcinogenicity. NAS recommended that dioxin be evaluated using both a linear and a nonlinear threshold approach for low dose cancer risk estimates to account for the uncertainty of the dose-response relationship below the effective dose eliciting response.

EPA subsequently followed up on the non-linear recommendation, however, with additional study and in a 2010 response to NAS comments EPA identified a number of limitations that prevent making a strong conclusion based on the non-linear dose-response model exercises.

Additional uncertainty related to dioxin cancer toxicity is the use of toxicity equivalency factors (TEFs) to measure the potency of dioxin and furan mixtures. Dioxin is a complex mixture of a large number of different congeners with varying degrees and positions of chlorine substitution. These congeners have different carcinogenic potencies. In order to calculate the potency of these complex mixtures, the TEF approach was developed to express estimates of congener potency relative to dioxin. Thus a TEF indicates an order of magnitude estimate of toxicity relative to dioxin.

There are uncertainties associated with the use of the TEF approach. These are due largely to several simplifying assumptions used in developing the TEFs, including:

- The assumption that the dose response curves for different congeners and endpoints are parallel.
- The assumption that the effects of multiple dioxin congeners are additive.
- The assumption that humans are as sensitive as laboratory animals to the effects of dioxin.
- The assumption that noncancer endpoints and in vitro studies can be used to predict the carcinogenic potential of the individual dioxin congeners.

Despite these limitations, EPA uses TEFs to evaluate the risks due to mixtures of dioxin, regardless of the medium of exposure. The NAS, in its review of the TEF methodology, stated: “Even with the inherent uncertainties, the committee concludes that the toxicity equivalency factor methodology provides a reasonable, scientifically justifiable, and widely accepted method to estimate the relative potency of DLCs [dioxin-like compounds]” (NAS, 2006). Further, based on information provided by EPA, this TEF approach will continue in the future and may be expanded to include more compounds such as polybrominated dioxin, polybrominated dibenzofurans, polychlorinated naphthalenes, and polybrominated naphthalenes as research continues with regard to the evaluation of new toxicity data for dioxin-like compounds and the mechanistic actions triggering toxicity effects (EPA, 2010a; CDM, 2014).

- Bioavailability of Dioxin: Currently, bioavailability is not incorporated into dioxin toxicity assessments in accordance with information provided by EPA (EPA, 2010). While EPA acknowledges in this report that currently available information suggests that bioavailability of dioxins in soil can be expected to be less than 100%, available estimates of dioxin bioavailability are not adequate and sufficient to estimate a value for use in risk assessment as an alternative to the default of 100% or site-specific values. A preferred animal model or bioassay protocol has not been established for predicting soil bioavailability in humans. Therefore, a default bioavailability factor of 100 percent was used for dioxin in soil even though actual bioavailability may be lower. Since tests to evaluate site-specific bioavailability for dioxin has not been conducted for the MWPS Facility per EPA guidance, DEQ used the conservative default bioavailability of 100 percent in the BRA (CDM, 2014).

- Use of Chronic reference doses (RfDs) for Subchronic Exposure: Construction worker exposure scenarios were used to evaluate exposure to subsurface soils in various areas of the Facility. A construction worker scenario assumes worker exposure to soil for one year and is considered a subchronic exposure (e.g., less than seven years of exposure). Typically a subchronic exposure scenario is evaluated using subchronic RfDs. DEQ requires the use of chronic RfDs for subchronic scenarios because subchronic RfDs are only available for a limited number of compounds and use of chronic RfDs helps ensure protectiveness. Therefore, chronic RfDs were used. Dioxin was the only COC identified for construction workers. As a result, the noncancer hazard calculated for construction workers exposed to dioxin in soil may be overestimated (CDM, 2014).

- Lack of Evaluation of Potential Synergistic Effects Associated with COPCs: Multiple COPCs may have synergistic or antagonistic effected (i.e., they increase or decrease the toxicity of other chemicals) or they may have no effect on the toxicity of other chemicals. The potential for synergism or antagonism of chemicals was not evaluated in the BRA, because there is little information regarding such effects. DEQ conducted literature searches to obtain information regarding synergistic and antagonistic effects of COPCs, but did not find any relevant information. For media for which PCP and dioxin are the only COPCs, potential additive effects are already taken into account. Since dioxin is an impurity in PCP, toxicity criteria for PCP should already incorporate synergistic effects that may be associated with the impurities (CDM, 2001).

7.2 ECOLOGICAL RISK EVALUATION

The MWPS Facility is largely within a commercial/residential land use area and no significant ecological resources have been identified at the Facility. No animal species of special concern have been identified within a four-mile radius of the MWPS Facility. There is nothing particularly attractive about the former treatment area, where the most heavily contaminated soils exist, the remaining property or surrounding areas, which would cause birds or rodents to visit the area preferentially. With closure of the log and drain ponds, the Facility is not attractive to migratory waterfowl. The level of human activity near the Facility is likely to discourage significant usage by wildlife, although an occasional deer or other large mammal may cross the Facility. The level of human activity is likely to increase as development of the SSLLP property occurs in the future. In addition, no designated wetlands exist on or within a mile of the Facility. No populations of designated federal or Montana species exist primarily within four miles of the Facility. No surface water bodies are impacted by contamination from the Facility. Since there are no significant ecological resources at the Facility, conducting an ecological risk assessment was not warranted.

8.0 REMEDIAL ACTION OBJECTIVES

DEQ has selected Remedial Action Objectives (RAOs) for each contaminated medium. RAOs are general descriptions of what the remediation must accomplish in order to protect public health, safety, and welfare and the environment against unacceptable risk identified in the BRA and BRA Addendum, consistent with reasonably anticipated land use and beneficial use of groundwater. As discussed in Section 7.0, the BRA and the BRA Addendum identified unacceptable risks to onsite residents (WWW, SSLLP, and City properties), commercial/industrial workers (WWW property) and construction workers (WWW property), and one offsite residence. SSCLs were not developed for the following populations as calculated cancer and noncancer risk levels are below allowable limits: recreational users of the Park property, commercial/industrial workers on the City and SSLLP properties, and construction workers on the combined City/Park and SSLLP properties. SSCLs were not developed for trespassers as the properties are evaluated for residential and commercial/industrial exposure, scenarios which are protective of a trespasser (CDM, 2012). In addition, the BRA Addendum included SSCLs for onsite commercial and offsite residential indoor air although investigation results indicated that the influence of contaminants in soil vapor on indoor air appears to be minimal and does not appear to present a continuous or immediate risk to building occupants (CDM, 2012a), as well as SSCLs for soil that are protective of leaching to groundwater. Groundwater SSCLs are the DEQ-7 standards or MCLs; for COCs without a DEQ-7 standard or MCL available, SSCLs were calculated in the BRA Addendum. Using the RAOs, DEQ selected remedial alternatives that will achieve protection of public health, safety, and welfare and the environment consistent with reasonably anticipated future land use and beneficial use of groundwater.

RAOs were not developed for ecological receptors because there are relatively few ecological receptors at the MWPS Facility, and the cleanup levels protective of human health will also reduce any limited ecological exposure that may occur.

8.1 GROUNDWATER

The following RAOs are defined for groundwater at the MWPS Facility:

- Meet groundwater SSCLs for COCs in groundwater throughout the MWPS Facility.
- Comply with applicable or relevant state and federal ERCLs for COCs in groundwater.
- Reduce potential future migration of contaminated groundwater plume.
- Prevent exposure of humans to COCs in groundwater at concentrations greater than SSCLs.

8.2 SOIL

The following RAOs are defined for soil at the MWPS Facility:

- Prevent exposure of humans to COCs in soil at concentrations greater than SSCLs.
- Prevent methane vapors from accumulating beneath future buildings at concentrations that would pose a threat of explosion during or after construction of future buildings.

- Prevent migration of COCs from soil to groundwater that would result in exceedances of SSCLs in groundwater.
- Meet SSCLs for COCs in soil.

8.3 SOIL VAPOR

The following RAOs are defined for soil vapor at the MWPS Facility:

- Reduce the potential for exposure of humans to COCs in soil vapor at concentrations that may pose an inhalation risk.

8.4 INDOOR AIR

The following RAOs are defined for indoor air at the MWPS Facility:

- Prevent exposure of humans to COCs in indoor air at concentrations greater than SSCLs.

9.0 DESCRIPTION OF ALTERNATIVES

A brief description of the cleanup alternatives presented in the FS (Douglas, 2015) and evaluated by DEQ are set forth below.

As described in the FS (Douglass, 2015), monitored natural attenuation (MNA), which is the reduction of contaminant concentrations in environmental media through naturally occurring processes like biodegradation, sorption, etc., was also evaluated as a potential remedial technology for groundwater in conjunction with source removal. However, MNA alone may not achieve RAOs within a reasonable timeframe compared to other treatment alternatives. Therefore, MNA for groundwater was only retained as a follow-up to active remediation efforts (i.e., remediation of source soils beneath the former treating and AST areas and in the smear zone) and may be considered in conjunction with other options to form alternatives. Cost estimates for MNA are included in the long-term monitoring costs.

No alternatives were independently evaluated for soil vapor and indoor air. Remediation of contaminated soil and groundwater from the Facility, which are the sources of soil vapor and indoor air impacts, will also address the vapor-phase contamination. However, DEQ has retained the indoor air SSCLs (Table 3), which can be used to verify successful remediation of soil vapor and indoor air impacts associated with the Facility.

9.1 COMPONENTS OF ALTERNATIVES

All remedial alternatives, except No Action, have common elements. These common elements are described here and are not repeated in the description of alternatives that follow. These elements include institutional controls, engineering controls, and long-term monitoring. The following assumptions are provided for the common elements.

Institutional controls. Institutional controls are defined in Section 75-10-701(11), MCA as "a restriction on the use of real property that mitigates the risk posed to public health, safety, and welfare and the environment…." Although institutional controls do not remediate the contamination, they can be effective for managing human exposure to contaminants. The effectiveness of institutional controls depends on the mechanisms used and the durability of the institutional control. Institutional controls may be layered to improve effectiveness. Institutional controls are considered easy to implement and inexpensive to implement and maintain, although long-term enforcement may increase costs. Specific institutional controls that may be used at the MWPS Facility are listed below.

Land Use Controls: As described above, DEQ has identified that the reasonably anticipated future use of the Facility is commercial/industrial, with the exception of the property east of Scott Street that is currently used as residential, the City park, and the eastern portion of the SSLLP property. Institutional controls, such as restrictive covenants or zoning, could be used to prohibit or limit future residential use. Institutional controls can be used to limit groundwater use at the Facility until SSCLs are met, if needed, or to limit property use during the time of active remediation or to otherwise protect the integrity of the remedy.

Groundwater Use Restrictions: The Missoula Valley Water Quality District implemented an ordinance, codified as Chapter 13.26 of the Missoula Municipal Code, which restricts the construction and operation of new water supply wells in the vicinity of the Facility. Specifically, the provisions of Section 13.26.090, which prohibit the installation of new private drinking water supply wells and new community and non-community non-transient water system wells in certain areas, makes the installation of a new drinking water supply well in an area of the Facility where contaminated groundwater is present unlikely. While the Missoula Valley Water Quality Ordinance may prohibit the installation of new drinking water wells in the area of the Facility, this does not provide fully reliable protection against exposure to impacted groundwater (MVWQD, 2008). There is no permitting system in existence that requires well installation be approved by any authority, and private irrigation wells are allowed under the ordinance, which could potentially be converted (illegally) to provide drinking water. Furthermore, Section 13.26.090(A)(4) of the ordinance states "The siting requirements of subsections 13.26.090(A)(2) shall not be considered by any state or federal agency to provide an institutional control which would protect public health from contaminants at a site described in subsections 13.26.090(A)(2)(a-d) in order to justify a decision not to clean up the contamination at such sites . . . . " DEQ has considered the existence of this local regulation as it may help ensure the effectiveness of any institutional controls in terms of the durability and layering discussed above, but is not relying on this groundwater ordinance as part of the remedy. DEQ will require an additional groundwater use restriction, such as restrictive covenants or a controlled groundwater area (or both), to limit groundwater use until it meets SSCLs. (A controlled groundwater prevents or limits groundwater use. The Montana Department of Natural Resources and Conservation administers those areas under Sections 85-2-501, et seq., MCA).

Engineering Controls. Engineering controls are measures that help manage environmental and health risks or limiting exposure pathways. Engineering controls encompass a variety of engineered remedies such as fencing to contain and/or reduce exposure to contamination and/or physical barriers intended to limit access to property. Although engineering controls typically do not remediate the contamination at the Facility, they can be effective for managing exposure to contaminants. The effectiveness of engineering controls depends on the mechanisms used and the durability of the engineering control. The initial cost of some engineering controls can be high, and generally engineering controls require some long-term maintenance. Examples of engineering controls that may be used at the Facility include fencing or other security measures.

Long-term Monitoring. Monitoring is a common element to all remedial alternatives except No Action. However, the monitoring requirements may vary for each remedial alternative. The general objective of monitoring is to evaluate the effectiveness of the remedy, to determine when SSCLs are achieved, and to ensure the ongoing protection of public health, safety and welfare and of the environment.

Long-term monitoring has two key components: long-term monitoring and performance monitoring. Long-term monitoring is independent of remedial alternatives and is used to evaluate changes in the nature and extent of the groundwater plume. Performance monitoring is specific to individual remedial alternatives and is used to evaluate the effectiveness of the remedy, including MNA. Details of the required long-term monitoring will be developed after the ROD is issued. The total cost estimate includes implementing long-term monitoring at the MWPS Facility over a 30-year period to be consistent with assumptions used for estimating costs associated with Groundwater Alternative 4, Pumping and Ex-Situ Treatment, which provides the longest timeframe for treatment and monitoring of all of the alternatives.

9.1.1 Soil Alternative 1 – No Action

Alternatives for soil remediation are compared to the baseline No Action alternative. This alternative describes what would occur if no further cleanup is implemented. This alternative assumes no remediation work would be conducted, no new institutional controls implemented, and no engineering controls put in place. Existing institutional controls would not be monitored or enforced. Contaminated soil would remain in place. Surface soil at the MWPS Facility would present an exposure risk to future residents because zoning allows residential use is allowed on WWW and SSLLP property and residential SSCLs are exceeded on some of the property. Ash on the SSLLP property would continue to present a potential risk of leaching cadmium to groundwater and methane-containing soil would present a potential threat to future buildings and their occupants. Surface and subsurface soil at the former treating and AST areas, which are contaminated with PCP, dioxin and other COCs, would continue to present a threat to current workers, future residents and construction workers, as well as continue to present a threat to groundwater.

This alternative is not protective of human health and the environment in the short-term or long-term because there are exceedances of SSCLs that would not be addressed. There are exceedances of DEQ-7 standards and therefore, the No Action alternative does not meet ERCLs. Unacceptable risks would remain and risks would not be mitigated. This alternative would not be effective and reliable in the short-term and long-term because unacceptable levels of contamination would remain and contaminants would continue to be released to the environment. This alternative is implementable but does not use treatment or resource recovery technologies (Douglass, 2015).

9.1.2 Soil Alternative 2 – Excavation of Offsite Disposal

This alternative consists of the excavation of as much soil as possible exceeding SSCLs combined with transportation of the soil to a licensed and permitted treatment or disposal Facility. This technology is potentially applicable to contaminated soil on the MWPS Facility. For purposes of evaluating this alternative in the FS, it was assumed that shallow (less than 15 feet bgs and not near buildings or structures) contaminated soils would be excavated using conventional earth-moving equipment such as front-end loaders and hydraulic excavators. Sheet piling with tiebacks may be necessary to excavate deeper soil (greater than 15 feet bgs) and near buildings or other structures. Excavation below groundwater or to depths below the reach of conventional excavators (approximately 15 feet) would require specialized equipment such as a crane using a clamshell. Deep subsurface soil (greater than 30 feet bgs) may not be able to be excavated due to equipment or other limitations. Containment and treatment of water encountered as well as dust and odor suppression during excavation may be necessary. Removed material would be transported to offsite disposal facilities in trucks or railcars. Soil impacted by PCP would be disposed of at a licensed RCRA hazardous waste facility and may require incineration as offsite incineration at a RCRA permitted hazardous waste incineration facility is a standard disposal option for high concentration F032 listed hazardous waste. Soil not containing PCP but impacted by dioxin, petroleum, metal-impacted ash, or other COCs as well as methane-containing soil could be disposed of at a local solid waste landfill. Methane-containing soil, which is primarily composed of wood waste, may also be recycled at a local composting company if it is determined through sampling not to contain contamination and is accepted by the composting company. An issue with excavation is the ability to excavate deep subsurface soil without threatening the stability of surrounding structures and utilities. This excavation could occur through additional shoring and other practices, but could significantly increase the cost.

Installation of sheet piling and tiebacks around the excavation areas would minimize the amount of impacts to structures and surface improvements and improve safety for workers. Although the area potentially accessible for excavation may not allow removal of all soil above SSCLs, it may also be possible to treat contaminated soils remaining at depth in-situ from within the excavation itself.

This alternative would remove soil contamination exceeding SSCLs; however, groundwater contamination would remain in place at concentrations exceeding SSCLs. In addition, deep subsurface soil (soil at depths greater than 30 feet bgs) exceeding SSCLs may remain. Therefore, Alternative 2 is not protective of human health and the environment in the short-term and long-term on its own, but could be used in conjunction with other alternatives that address contaminants leaching to groundwater and groundwater contamination to meet the protectiveness criteria. Contaminated soil would be placed in an offsite permitted solid waste landfill or offsite hazardous waste disposal facility; however, groundwater contamination would remain at concentrations in excess of SSCLs. This alternative does not meet ERCLs (e.g. subsurface soil with concentrations that exceed SSCLs remain in place with the potential to cause groundwater to exceed DEQ-7 standards) on its own, but could be combined with other alternatives to meet ERCLs. Excavation would only remove contaminants in the soil to the limits of excavation that exceed acceptable levels; therefore, there would be some mitigation of risk, although groundwater contamination would remain. This alternative is considered highly effective and reliable in the long and short terms for removing contaminated soil in the unsaturated zone up to 30 feet bgs. Since waste would be disposed of at licensed engineered disposal facilities (or potentially a recycling facility, if that option is chosen for the methane-containing soil), regulatory requirements for the offsite disposal facilities would effectively control the contamination. Excavation and offsite disposal is technically implementable at the MWPS Facility. The equipment and services to remove and transport the contaminated soil are commercially available. This alternative is not a treatment or resource recovery technology (Douglass, 2015).

9.1.3 Soil Alternative 3 – Excavation and Ex-Situ Enhanced Bioremediation

Under this alternative, soil impacted above SSCLs would be excavated and treated onsite. Ex-situ treatment consists of actions that treat contaminants after they have been removed from the subsurface. Ex-situ bioremediation involves adding nutrients or an oxygen source into the soil to enhance biodegradation of contaminants. During evaluation of alternatives in the FS, other ex-situ treatment options were evaluated and not retained due to prohibitive technical and disposal issues identified for each alternative.

Excavation of contaminated soil in this alternative is the same as in Soil Alternative 2; the major difference between these alternatives is the soil handling and treatment after excavation. Discussion and costs assumptions associated with excavation are discussed in the excavation and offsite disposal alternative above and are not repeated here. However, for this discussion, it is assumed that, after excavation, soils will be treated using bioremediation onsite rather than being disposed of offsite.

Bioremediation is the breakdown of contamination by naturally occurring organisms present in or added to groundwater and soil. Bioremediation is a presumptive remedy for organics associated with wood treating sites in soil (EPA, 1995). This technology includes enhancement of biological activity using one of several different methods to encourage degradation of organic compounds. Ex-situ bioremediation would include excavation of contaminated soil greater than SSCLs and ex-situ treatment using biopiles or composting/landfarming. Ex-situ bioremediation is typically effective due to the homogeneous nature of the soil after excavation and mixing.

The PCP-contaminated soil on the southern portion of the MWPS Facility has been classified as an F032 listed hazardous waste, which is a RCRA hazardous waste designation for wastes from some wood preserving processes (40 CFR 261.31) and is generally precluded from land disposal. However, under 40 CFR 264.552, DEQ can designate a Corrective Action Management Unit (CAMU) at the Facility where the wastes originated and allow otherwise-land banned hazardous waste to be excavated and treated onsite. Excavated soils can be mixed with soil amendments and spread in a lined treatment cell (known as an LTU) that includes a leachate collection system and some form of aeration. Moisture, heat, nutrients, oxygen, and pH can be controlled to enhance biodegradation. A large amount of space would be required for an LTU, and the treatment area would need to be contained with an impermeable liner and leachate collection system to minimize leaching. Leachate collected can be reapplied to the LTU or treated and disposed. Treatment thickness is limited by tilling depth. Escaping odors may also need to be controlled. Details of LTU optimization and design are addressed during remedial design.

Bioremediation has been shown to be effective at remediating PCP and petroleum hydrocarbons (EPA, 1993). Therefore, this technology is applicable to soil located in the former treating and AST areas where PCP and petroleum hydrocarbons are present in soils at concentrations greater than SSCLs. It may also be possible to address the soil/wood waste that contains methane in this manner. However, there is an uncertainty regarding ex-situ bioremediation and whether it is capable of reducing dioxin to concentrations less than the SSCLs. Experience with this technology at other sites indicates that it is capable of degrading dioxin, but it may not reach SSCLs (AECOM, 2009). Ex-situ bioremediation may not reduce cadmium concentrations in ash to SSCLs. Therefore, dioxin-contaminated soil co-located with PCP that is not treated to SSCLs through bioremediation and ash/soil containing cadmium would need to be addressed in another manner. Treatability testing to optimize enhanced bioremediation may be needed during remedial design.

While this alternative would significantly reduce the amount of contamination in soil, it will likely not fully address dioxin contamination in soils or ash containing cadmium. In addition, groundwater contamination would remain at concentrations above SSCLs. Therefore, this alternative by itself is not protective of human health and the environment in the short-term and long-term, but could be combined with other alternatives to meet the protectiveness criteria. Some soil contains a RCRA listed hazardous waste that would require special handling for onsite treatment. This alternative does not meet ERCLs (e.g. subsurface soil with concentrations that exceed SSCLs will remain in place with the potential to cause groundwater to exceed DEQ-7 standards) on its own, but could be combined with other alternatives to meet ERCLs. Treatment of contaminated soils would reduce the toxicity of and volume of some contaminants in soil, but may not reduce dioxin concentrations or concentrations of cadmium in ash to acceptable levels. Therefore, while there will be some mitigation of risk, some soil contamination may remain and groundwater contamination would remain. This alternative is considered highly effective at removing contaminated soil in the unsaturated zone up to 30 feet bgs. However, the effectiveness of ex-situ treatment on dioxin and cadmium is uncertain. This alternative may need to be combined with other alternatives. Excavation and ex-situ treatment using bioremediation is technically implementable at the MWPS Facility. The equipment and services needed to remove and treat the contaminated soil are commercially available. The use of ex-situ treatment is a proven treatment technology (Douglass, 2015).

9.1.4 Soil Alternative 4 – Excavation and Onsite Spreading of Methane Soils

Under this alternative, soils containing wood waste capable of generating methane (but not containing other COCs) on the SSLLP property would be excavated and spread on the ground surface on the SSLLP property. Under this alternative, either prior to or after excavation, the methane-containing soil from the SSLLP property would be sampled and analyzed for COCs. If the soil does not contain COCs greater than the SSCLs, the soil would be spread on the ground surface of the SSLLP property to dissipate the methane and oxygenate the soil sufficiently to stop the anaerobic degradation of the wood waste that produces the methane. However, care would have to be taken to ensure that during future development activities the soil/wood waste capable of generating methane is not reburied, thereby allowing it to begin generating methane again. In addition, spreading the soil on the ground surface of the SSLLP property would limit redevelopment and would potentially need an institutional control to address any limitations on reburying or redevelopment.

This alternative would reduce the amount of methane contamination in soil. However, non-methane soil contamination would remain and groundwater contamination would remain. Therefore, this alternative by itself is not protective of human health and the environment in the short term and long term, but could be combined with other alternatives to meet the protectiveness criteria. This alternative would not comply with ERCLs as soil and groundwater contamination would remain in place, and would not mitigate unacceptable risk from other soil or groundwater contamination to acceptable levels. While this alternative would be effective and reliable in the long and short terms for methane-containing soils, other soil and groundwater contamination would remain in place. Alternative 4 is straightforward to implement and is a reliable technology, but would leave other soil and groundwater contamination in place at unacceptable levels. This alternative is practicable and implementable so long as there are no immediate plans to build on the SSLLP property where methane-containing soils/wood waste would be spread. Alternative 4 does not include treatment or recovery technologies (Douglass, 2015).

9.1.5 Soil Alternative 5 – In-Situ Chemical Oxidation (ISCO)

ISCO consists of delivering a chemical oxidant to subsurface soil. Chemical oxidants are intended to destroy COCs and some oxidants are generally accepted as being effective in oxidizing organic chemicals such as PCP and petroleum hydrocarbons. However, the ability of chemical oxidants to oxidize dioxin is less certain. This technology is most likely to be applicable in the former treating and AST areas because contaminant concentrations are highest and most localized in those areas.

The primary considerations for application of ISCO are the interference of other oxidizable materials in the soil matrix, the ability to deliver chemical oxidants to COCs in the subsurface matrix, and the ability of the oxidant to reduce COCs to concentrations equal to or less than SSCLs. Because chemical oxidants are non-selective, any oxidizable materials in the soil will consume the oxidant, which can limit or eliminate the effect on remaining COCs in the subsurface and decrease the overall efficiency of the treatment. In-situ delivery of chemical oxidants to the necessary locations in subsurface soil also presents difficulties due to the coarse and heterogeneous soils and complex geology/hydrogeology at the MWPS Facility. However, this alternative could be combined with excavation, which may allow alternative delivery strategies to typical injection (e.g., soil blending) and may address some of the difficulties with the geology at the Facility.

This alternative would not be protective of human health and the environment because it is unlikely that all SSCLs could be achieved in soil, and groundwater contamination would remain. However, it is possible that COCs could be reduced sufficiently to reach SSCLs in shallow soil for direct contact and in deeper soil for a groundwater remedy to succeed. This technology has the benefit of being applicable to soil that is not accessible for excavation. This alternative would not comply with ERCLs if SSCLs cannot be met. This alternative will decrease concentrations of COCs in soil, which mitigates some risk, but may not be capable of mitigating risks from all COCs in soil in these areas. The technology is not likely to achieve all SSCLs based on the results of the treatability testing described in the FS, so it would not be effective and reliable in the short and long terms. The technology is practicable, but may not be implementable due to questions regarding the achievable COC concentrations. There are increased hazards related to handling of chemical oxidants, but the technology is commonly used in remediation so the hazards can be mitigated with proper equipment, training, and procedures. It includes treatment, but not recovery technologies (Douglass, 2015).

9.1.6 Soil Alternative 6 – Containment (Dioxin Soil Only)

Soil barriers, such as a horizontal cap constructed above the dioxin-containing soils, can be used to minimize exposure, prevent vertical infiltration of water and leachate, contain waste while treatment is being applied, control vapor and odor emissions, or to create a land surface that is suitable for the intended reuse of the property. Capping is the most common form of barrier remediation because it is generally less expensive than other technologies and may effectively manage the human health risk.

Containment may consist of covering soil that contains dioxin greater than SSCLs with a soil cap, a concrete/asphalt cap, and/or a clay/geosynthetic membrane. The purpose of the cap would be to eliminate the direct contact exposure pathway as well as to eliminate leaching of COCs through subsurface soil to groundwater as a result of precipitation infiltration. However, capping of the dioxin-contaminated soils would not address continued leaching from other COC-contaminated soils that periodically come in contact with perched groundwater, nor would it prevent leaching from the smear zone. Due to these factors, a cap is not considered a stand-alone technology. Instead, the contaminated soil would be excavated and placed into an engineered repository at the Facility. However, excavating and placing the PCP-contaminated soil that has been characterized as an F032 listed hazardous waste into an engineered repository would not comply with RCRA ERCLs. Therefore, this alternative is only retained to address soil impacted by only dioxin greater than the SSCLs as well as soil treated in the LTU that meets SSCLs for all COCs except dioxin. In order to accommodate future development of the property, the repository could be constructed below grade. For purposes of estimating costs, use of a geosynethic liner with a two foot cap of clean soil and sod was assumed. Any cap must be monitored and maintained to ensure integrity of the remedy; therefore, this technology would require placement of institutional controls as well as a long-term operation and maintenance plan.

While this alternative would significantly reduce direct exposure to contamination and would reduce to some extent the leaching of contamination through the unsaturated zone, it may not be protective of human health and the environment in the short-term and long-term. By itself this alternative would leave contamination in soil and groundwater. In addition, it is unknown if this alternative would reduce the leaching to groundwater of other COCs in soil enough to allow groundwater to naturally attenuate. People could still be exposed to contaminated soil and groundwater. Institutional controls and long-term maintenance would be needed to ensure the integrity of the cap and prevent direct contact with contamination. However, this alternative could be combined with other alternatives to meet the protectiveness criteria. Alternative 6 alone may not reach groundwater SSCLs in a reasonable timeframe compared with other, more aggressive, alternatives. Soil contamination would remain in place to serve as a continuing source for groundwater contamination, particularly for contamination at or near the water table that is a source of COCs to the perched zones. Therefore, this alternative does not meet ERCLs on its own, but could be combined with other alternatives to meet ERCLs. This alternative would mitigate direct exposure to contaminated soils, but contamination, specifically PCP contamination co-located with dioxin in the former treating and AST areas, would remain in soil and may continue to impact groundwater. Given that soil containing high concentrations of COCs located at or near the perched groundwater could continue to mobilize contaminants into the perched groundwater that then has the potential to migrate to the Missoula Aquifer, this alternative may only be partially effective. In addition, caps are susceptible to long-term weathering and may crack and reduce the effectiveness of the barrier. Maintenance of the barrier in perpetuity would be required. Containment caps are technically implementable at the MWPS Facility and are a standard construction practice. Containment caps provide no form of treatment or resource recovery (Douglass, 2015).

9.1.7 Groundwater Alternative 1 – No Action

Alternatives for groundwater remediation are compared to the baseline No Action alternative. This alternative describes what would occur if no further cleanup is implemented. This alternative assumes no remediation work would be conducted, no new institutional controls implemented, and no engineering controls put in place. Existing institutional controls would not be monitored or enforced.

This alternative is not protective of human health and the environment in the short-term or long-term because there are exceedances of SSCLs that would not be addressed. There are exceedances of DEQ-7 standards and therefore, the No Action alternative does not meet ERCLs. Unacceptable risks would remain and risks would not be mitigated. This alternative would not be effective and reliable in the short-term and long-term because unacceptable levels of contamination would remain and contaminants would continue to be released to the environment. This alternative is implementable, but does not use treatment or resource recovery technologies (Douglass, 2015).

9.1.8 Groundwater Alternative 2 – In-Situ Enhanced Bioremediation

In-situ enhanced bioremediation of groundwater consists of the enhancement of natural biological processes by the addition of oxygen, nutrients, and/or bacteria. This technology may be limited by the inability of naturally occurring bacteria to degrade certain COCs, particularly dioxin; the likelihood of continued recharge/leaching of COCs to the perched groundwater from the unsaturated or smear zones; and/or the ability to deliver amendments to contaminated groundwater throughout the perched groundwater. Biological treatment of groundwater was identified early in the FS process as a potentially promising remedial alternative for groundwater at the MWPS Facility. Bench-scale treatability studies were completed for the Facility and the results are described in the FS (Douglass, 2015). The treatability studies indicated that biologic activity was enhanced in aerobic and nutrient enriched environments. Based on the results of the bench-scale study, a field-scale pilot test was completed that included the injection of oxygenated and nutrient amended water into the subsurface in the source area (Douglass, 2006a). While the results were mixed, the tests indicated that in-situ bioremediation of PCP in groundwater can be effective at remediating COCs to less than SSCLs, with the possible exception of dioxin (reduction in dioxin concentrations through biodegradation is limited). Bioremediation in groundwater is considered a presumptive remedy for the treatment of PCP-contaminated groundwater (EPA, 1995). While PCP concentrations were not reduced to less than SSCLs, it was hypothesized that the concentrations of PCP in groundwater may have been replenished through leaching from the source zone material or from the smear zone. Removal or treatment of the source zone material and the smear zone will assist in improving the results of this technology. The bench-scale and pilot-scale bioremediation testing did not evaluate each of the current COCs because several were identified after completion of the tests; however, available information indicates that each of the COCs are amenable to biodegradation with the exception of dioxin (EPA, 1993).

When used in conjunction with other remedies, this alternative would be protective of human health and the environment, although it does not meet the protectiveness criteria alone because it may not address dioxin and metals contamination in groundwater and soil contamination would remain at concentrations exceeding SSCLs. Therefore, contamination will remain at unacceptable concentrations. This alternative would reduce groundwater concentrations of some contaminants to SSCLs, thus meeting DEQ-7 standards, but may not meet SSCLs and DEQ-7 standards for dioxin and metals given their resistance to biological treatment. Therefore, by itself, this alternative does not comply with ERCLs. In-situ bioremediation uses biological processes to degrade contaminants in groundwater into less harmful ones. Therefore, there would be some mitigation of risk for some of the COCs, but dioxin and metals contamination would remain in groundwater. Bioremediation has been demonstrated to be effective on PCP and petroleum hydrocarbons, but is not expected to be effective on dioxin or metals. This technology is technically implementable at the MWPS Facility. The equipment and services to install and operate the treatment injection system is commercially available. The use of bioremediation via oxygen enhancement is a proven treatment technology. The 10 year term of treatment and monitoring is an estimate, but is reasonable if contaminated soil in the unsaturated zone can be successfully remediated (Douglass, 2015).

9.1.9 Groundwater Alternative 3 – In-Situ Chemical Oxidation

ISCO consists of delivering a chemical oxidant to groundwater. The oxidants are intended to destroy COCs and are generally considered to be effective in oxidizing certain organic chemicals such as the COCs at the MWPS Facility. The primary considerations for application of chemical oxidation are the interference of other oxidizable materials in groundwater, the ability to deliver oxidants throughout the complex perched groundwater system, and the ability of the oxidant to destroy COCs without producing undesirable degradation products. Depending on the oxidant selected, undesirable degradation products may be produced, (e.g., insoluble sulfate, hydrogen sulfide gas, precipitate manganese dioxide, heavy metals, and breakdown products of COCs). Because oxidants are non-selective, other oxidizable materials in the groundwater or aquifer matrix will consume the oxidant, limiting or eliminating the effect on the target compounds (ITRC, 2005). An additional consideration is the concern for flushing COCs into the Missoula Aquifer by injection of oxidants in the perched groundwater. The chemical oxidation testing conducted on soil (see the FS for more detail) included testing of chemical oxidation in groundwater.

Depending on the application approach and oxidant selected, the potential impact from flushing of contamination from soil to groundwater may be reduced. Additionally, while concerns remain regarding generation of byproducts of oxidation, the impacts of these byproducts would likely be temporary and they could be reduced depending on the oxidant selected or by pumping groundwater from surrounding wells during injection to maintain hydraulic control. An oxidant without the byproducts could also be used. These concerns can be addressed during remedial design.

It is assumed that ISCO treatment of groundwater could be accomplished in several months of injections (possibly covering multiple injection events). Groundwater monitoring would be required to determine whether RAOs were achieved and to monitor the Missoula Aquifer (this cost is included as part of the site-wide elements evaluation). For purposes of estimating costs, groundwater monitoring is included with site-wide elements. With successful remediation of contaminated soil in the unsaturated zone, active treatment of groundwater will be successful in a short period of time.

In-situ chemical treatment of groundwater would significantly reduce contaminant concentrations of PCP and petroleum hydrocarbons in groundwater. Based on information from bench-scale tests and pilot tests from this and other similar sites in Montana, dioxin concentrations are likely to decrease in groundwater. However, this alternative's ability to treat dioxin to SSCLs is uncertain and it is unlikely that metals contamination would be addressed. Additionally, soil contamination would remain at concentrations exceeding SSCLs. Therefore, this alternative by itself is not protective of human health and the environment in the short-term or the long-term. However, this alternative may be combined with other alternatives to meet the protectiveness criteria. Therefore, this alternative does not comply with ERCLs on its own, but may be combined with alternatives to comply with ERCLs. Chemical treatment destroys contaminants in groundwater. Therefore, there would be some mitigation of risk although residual dioxin and metals contamination may remain in groundwater and all contamination will remain in soil. ISCO has been shown to be effective on PCP and petroleum hydrocarbons at the MWPS Facility and other similar sites in Montana (Douglass, 2006). The amount of oxidant required is directly related to contaminant concentrations plus naturally occurring organic material. Excess amounts of oxidant would not be necessary or provide incremental benefits, but would likely be consumed by naturally occurring organics in the saturated intervals, and may hinder biological activity. ISCO may not be effective on metals contamination present in groundwater at the MWPS Facility. ISCO is technically implementable and is a well-established technology used to treat certain contaminants in groundwater. For cost estimate purposes, this alternative was estimated to take two ISCO treatments over the course of one year with groundwater monitoring occurring semi-annually for 10 years (Douglass, 2015).

9.1.10 Groundwater Alternative 4 – Pumping and Ex-Situ Treatment

The perched groundwater system consists of several discontinuous, silt and clay layers that are acting locally as aquitards. Aquitards are low-permeability layers that can perch or store groundwater and also transmit it slowly from one aquifer to another. These layers can intercept precipitation and create perched groundwater zones. At least three silt and clay layers appear to be of primary importance in controlling the distribution of contaminants that infiltrated from the former treatment and AST areas. Hydrogeologic evaluations of the perched groundwater indicate that while there is some connectivity within individual perched zones (e.g. there are similar responses to pumping in wells screened within a single perched zone), wells screened in perched zones at different elevations do not respond to pumping in other zones. Connectivity between zones is the result of groundwater migrating from perched zones at higher elevations to perched zones at lower elevations during periods of higher infiltration as evidenced by the distribution of COCs away from the source area (Envirocon, 1998).

Groundwater pumping consists of the removal of contaminated groundwater from the perched groundwater using wells and one or more types of pumping or recovery technologies. The recovered water is then treated by an ex-situ technology such as ultraviolet (UV) oxidation or granular activated carbon (GAC) adsorption. Pump-and-treat is a presumptive remedy for contaminated groundwater (EPA, 1996). As described in the FS, this technology is likely to be directly beneficial to the perched groundwater at and near the former treating area and would be indirectly beneficial to the Missoula Aquifer.

Groundwater has been successfully pumped from the perched groundwater at the MWPS Facility, using the existing vacuum-enhanced TFR system, beginning in 1996. This method is one option for groundwater recovery and uses a positive-displacement rotary vane vacuum pump to impart a high vacuum to extraction piping connected to selected wells. The depth to water is too great to allow vacuum removal of water alone, so air is intentionally entrained in the water to reduce its density and allow it to be lifted by the imparted vacuum. The air-water mixture is light enough to be drawn up a drop pipe and into a separation vessel. As the liquid-air mixture enters the separation vessel, the velocity of the air-water mixture decreases, which causes the liquid to drop out of the mixture and accumulate in the bottom of the tank. The air continues out the top of the tank to the vacuum pump and is treated prior to discharge to the atmosphere. The water accumulates in the separator until it is full, and then it is transferred to a storage tank for treatment and discharge.

It is also possible that individual down hole pumps may recover groundwater more efficiently from the perched groundwater system. It is possible that both vacuum and pumping methods could be used to recover groundwater from different locations on the Facility.

Total fluid recovery or other pump and treat options were considered in conjunction with treatment technologies (i.e., UV or GAC treatment) as well as those that might require pumping to optimize their impact (i.e., in-situ bioremediation or ISCO). Though UV oxidation is commonly used for destroying organic compounds and would likely be effective in oxidizing PCP and dioxin, it would require pilot testing or treatability studies to determine its effectiveness and optimization. Therefore, while the technology was retained for consideration at the Facility, cost assumptions were not developed and ex-situ treatment using GAC was carried forward as the representative treatment technology for recovered groundwater.

Groundwater recovered using this system would be filtered and treated with GAC before being discharged to the City sewer system under an industrial discharge permit. GAC treatment consists of passing contaminated perched groundwater through a bed of GAC, which adsorbs certain chemicals and retains them until the carbon is disposed of or regenerated. Typically, two beds of GAC are placed in series to provide redundancy for the primary bed. GAC adsorption has been successfully used at the MWPS Facility for treating recovered groundwater since 1996. The GAC units have effectively reduced concentrations of PCP and dioxin to the discharge limits required by the City, specifically 32.9 ug/L for PCP and 50 picograms per liter (or parts per quadrillion) for dioxin (Industrial Discharge Permit No. 06-001).

For the purpose of the FS evaluation, it was assumed that groundwater pumping would consist of removing of groundwater at approximately twice the rate that has been removed in the past, and that ex-situ treatment would consist of GAC adsorption. The assumptions and cost estimate for this technology are described in Table 9 of Appendix A. The duration of groundwater pumping and treatment is assumed to be 30 years, accompanied by monitoring of the perched groundwater and Missoula Aquifer to monitor effectiveness. The actual amount of GAC consumed would depend on actual COC concentrations, which can be expected to decrease over time.

Extraction and ex-situ GAC treatment of groundwater would significantly reduce the amount of contaminated groundwater at the MWPS Facility. This alternative would need to be coupled with soil removal or treatment. This alternative by itself is not likely to be protective of human health and the environment in the short-term or long-term because soil contaminated with high concentrations of COCs is located in the source area and at or near the perched groundwater water table. This contaminated soil would remain and would likely continue to leach to groundwater causing exceedances of DEQ-7 standards; therefore, this alternative does not meet ERCLs on its own, but could be combined with other alternatives to meet ERCLs. This alternative may be capable of reducing COCs in groundwater to concentrations below SSCLs; therefore, there may be some mitigation of risk. Pump and treat is a presumptive remedy and GAC has been shown to work at reducing contaminant concentrations in groundwater at this Facility; therefore, it is effective and reliable. The technology is practicable and implementable, being commonly used at other sites and at this Facility. It includes treatment, but not recovery technologies (Douglass, 2015).

9.2 SHARED AND DISTINGUISHING FEATURES

9.2.1 ERCLs

Appendix A contains the final list of ERCLs DEQ has identified for the MWPS Facility which must be met during implementation of the final remedy. DEQ identified the preliminary ERCLs to assist in preparation of the FS, and those preliminary ERCLs are an appendix in that document (Douglass, 2015). None of the individual alternatives are expected to meet all applicable or relevant federal and state ERCLs individually. However, various combinations of the alternatives will comply with all ERCLs.

9.2.2 Long-Term Reliability of Remedy

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

9.2.3 Estimated Time for Design and Construction

Each component within each alternative could be designed within one year or less and could be constructed within two years or less. The exception would be if additional injection points are needed for multiple applications for the enhanced bioremediation or the ISCO alternatives.

9.2.4 Estimated Time to Reach Cleanup Levels

Cleanup levels will not be met in the short-term or long-term for either soil or groundwater under any of the alternatives individually. However, in various combinations, it is possible to meet cleanup levels for both soil and groundwater in the long-term at the MWPS Facility. Please see Section 5.4.2 for additional discussion on the timeframe for groundwater to reach SSCLs.

9.2.5 Cost

The cost estimate for each alternative is based on estimates of capital costs as well as operation and maintenance costs. These are initial cost estimates only and are subject to further refinement once remedial design is complete. Section 10.7 details the comparison of alternative costs. Table 4 details the estimated costs associated with each alternative. A three percent discount rate is used in the cost estimates (Douglass, 2015).

9.2.6 Use of Presumptive Remedies

A presumptive remedy is a technology that EPA has determined, based upon its experience, generally will be an appropriate remedy for a specified type of site. EPA establishes presumptive remedies to accelerate site-specific analysis of remedies by focusing FS efforts (EPA, 1993; EPA, 1995). Use of presumptive remedies can reduce the need for site-specific pilot or treatability testing as EPA's identification of presumptive remedies for types of contaminants or sites is based on performance data for other similar sites where the technology was used with successful results. Although the MWPS Facility is being addressed by DEQ under CECRA, DEQ considered the presumptive remedy guidance during the alternatives analysis.

Incineration is a presumptive remedy for remediation of organics associated with wood treating sites (PCP, dioxin, PAHs, and petroleum compounds) in soil and is a component of Soil Alternative 2 (EPA, 1995). Bioremediation is a presumptive remedy for organics associated with wood treating sites in soil and is a component of Soil Alternative 3 (EPA, 1995). Pump-and-treat is a presumptive remedy for contaminated groundwater and is a component of Groundwater Alternative 4 (EPA, 1996). Soil Alternatives 1, 4, 5, and 6, and Groundwater Alternatives 1, 2, and 3 do not include a presumptive remedy.

9.3 EXPECTED OUTCOMES

Currently, direct contact with contaminated soils exceeding SSCLs is considered a risk to human health. Risk-based SSCLs developed for surface soils are based on a commercial/industrial use scenario for the City, WWW, and western portion of the SSLLP properties; a recreational use scenario for the Park property; and a residential use scenario for the current residential area and eastern portion of the SSLLP property. Risk-based SSCLs developed for subsurface soils at the MWPS Facility are based on a construction worker scenario. Therefore, under all alternatives except the No Action Alternatives, land use for some of the properties (except for the current residential area, the City park, and the eastern portion of the SSLLP property) that make up the MWPS Facility will not be available for residential use in the future. In addition to direct contact, DEQ also evaluated soils to ensure that the concentrations in soil are protective of the soil leaching to groundwater pathway. The most protective SSCL of either the direct contact or protection of groundwater pathways for each contaminant was chosen as the SSCL used to determine areas requiring cleanup. As a result, cleanup to the soil SSCLs identified in this ROD will be protective of both the direct contact and contaminants in soil leaching to groundwater.

Ingestion and direct contact with contaminated groundwater pose current and future risks to human health. Groundwater SSCLs (including those based on DEQ-7 standards) were identified based on assumptions equal to that used for evaluation of a residential exposure scenario. None of the alternatives will allow groundwater to be restored to SSCLs for the COCs immediately. However, groundwater use will be regulated through the establishment of institutional controls in the form of a restrictive covenant or a controlled groundwater area (or both) to prohibit installation of wells, except for those used for remediation or monitoring purposes, at the Facility until groundwater is remediated to SSCLs for all COCs. Once DEQ determines SSCLs have been met for groundwater, the institutional controls associated with groundwater may be modified or removed.

Currently, deep soil vapor contains petroleum concentrations that may pose a risk to human health although there is no exposure anticipated at the depth of the contamination. Treatment alternatives considered for soil and groundwater will address COC impacts in soil and groundwater and will address future concerns regarding potential soil vapor impacts. Excavation and offsite disposal or recycling of buried wood waste will eliminate the generation of potentially explosive levels of methane in soils on the SSLLP property.

10.0 COMPARATIVE ANALYSIS OF ALTERNATIVES

The alternatives were evaluated and compared against the seven cleanup criteria identified in Section 75-10-721(2), MCA (see Table 4). Protectiveness of public health, safety, and welfare and the environment and compliance with ERCLs are threshold criteria that must be met for any remedy to be further considered or selected. In the comparative analysis, DEQ evaluates the remaining criteria to select the best overall alternatives for each media. This evaluation includes considerations of present and reasonably anticipated future uses of the Facility and the use of institutional controls. Each criterion is listed individually below. A list of the alternatives and their corresponding numbers is also provided to aid in this analysis.

<u>Soil</u>

- Alternative 1 - No Action
- Alternative 2 – Excavation and Offsite Disposal
- Alternative 3 – Excavation and Onsite Ex-Situ Enhanced Bioremediation
- Alternative 4 – Excavation and Onsite Spreading of Methane Containing Soils
- Alternative 5 – ISCO
- Alternative 6 – Containment of Dioxin Soil Only

<u>Groundwater</u>

- Alternative 1 – No Action
- Alternative 2 – In-Situ Enhanced Bioremediation
- Alternative 3 – ISCO
- Alternative 4 – Pumping and Ex-Situ Treatment

None of these alternatives alone can be used to remediate the entire MWPS Facility. Due to the size of the MWPS Facility, the extent of contamination, and the affected media, some of the remedial alternatives listed above are specific to affected material and areas, such as methane producing soils and the groundwater plume. Additionally, as described in Section 9.0, while not retained as a stand-alone alternative, MNA for groundwater was retained as a follow-up to active remediation efforts (i.e., remediation of source soils beneath the former treating area and in the smear zone and ISCO) and may be considered in conjunction with other options to form alternatives. Lastly, although there were no alternatives evaluated for soil vapor and indoor air, remediation of contaminated soil and groundwater from the Facility, which are the sources of soil vapor and indoor air impacts, will also address the vapor-phase contamination.

10.1 PROTECTIVENESS

The criterion requiring overall protection of public health, safety, and welfare and the environment addresses whether an alternative provides adequate short-term and long-term protection from unacceptable risks. Protection may be achieved by eliminating, reducing, or controlling exposure to unprotective levels of hazardous or deleterious substances present at the MWPS Facility. None of the alternatives alone provides adequate protection of public health, safety, and welfare and the environment over the short or long term as the public could be exposed to unacceptable concentrations of and exposures to COCs in soil and groundwater, and the onsite residual source would continue to contribute contamination to the groundwater. Alternatives can be combined to ensure protectiveness.

Soil alternatives 1, 3, 4, 5, and 6 would not provide adequate protection of public health, safety, and welfare or the environment in the short-term or long-term because they would leave contaminated soil in place and/or be incapable of reaching SSCLs, and because they do not reduce groundwater contaminant concentration to less than SSCLs, thereby leaving people potentially exposed to unacceptable levels of contamination. Soil alternative 2 would remove contaminated soil greater than SSCLs, but would leave groundwater contamination in place at concentrations greater than SSCLs. None of the groundwater alternatives (1 through 4) would provide adequate protection of public health, safety, and welfare or the environment in the short-term or long-term because they would leave soil contamination in place and/or be incapable of reaching SSCLs. Additionally, groundwater alternatives 1 through 4 would allow people to continue to be exposed to unacceptable levels of contamination in soil and contaminants would continue to leach to groundwater. It is possible to combine soil alternatives with one of the groundwater alternatives 2 through 4 to ensure protectiveness. However, only soil alternative 2 adequately addresses each type of soil contamination by itself, and the groundwater alternatives 2 through 4 have varied estimates for the timeframes (ranging from 10 to 30 years) to ensure adequate protection, although these timeframes assumes a soil alternative that adequately addresses soil contamination is also implemented (Douglass, 2015).

10.2 COMPLIANCE WITH ERCLs

This criterion evaluates whether each alternative will meet applicable or relevant state and federal ERCLs identified for the MWPS Facility. None of the alternatives attains ERCLs individually. However, these alternatives can be combined to achieve ERCLs.

Soil alternative 1 and groundwater alternative 1 are not expected to reach groundwater SSCLs for significantly longer compared to other alternatives because contamination would remain in place and not be addressed. Soil alternatives 1 through 6 and groundwater alternatives 1 through 4 do not comply with the ERCLs described in Appendix A because individually they do not address all the different types of impacted media exceeding SSCLs, reduce COC concentrations to less than SSCLs, or eliminate pathways of exposure. However, soil alternatives 2 through 6, when used in combination with each other and with groundwater alternatives 2 through 4, will comply with ERCLs. A combination of alternatives that would reduce concentrations of groundwater COCs to levels that meet DEQ-7 standards and treat or otherwise remove COCs in soils that may leach to groundwater would comply with ERCLs. The timeframe for meeting ERCLs will be significantly reduced over that achievable with soil or groundwater alternative 1 if alternatives for soil and groundwater are combined to address impacted media.

10.3 MITIGATION OF RISK

This criterion evaluates mitigation of exposure to risks to public health, safety, and welfare and the environment to acceptable levels. None of the active alternatives mitigate all of the identified risks.

Under soil or groundwater alternative 1, contaminated soils and groundwater would remain at the MWPS Facility. Unacceptable risk would exist and would not be mitigated and SSCLs would not be met. Under soil alternative 2, some risk would be mitigated because some contaminated soil would be removed, but contaminated groundwater would remain, as would the associated risks to human health and the environment. Soil alternative 3 would mitigate some risk because contaminants in some of the soil would be removed and treated, and the treatment is particularly effective on PCP; however, it is uncertain if this alternative will reduce dioxin or metals concentrations to acceptable levels. Soil alternative 4 would mitigate risks associated with methane-containing soils; however, non-methane soil and groundwater contamination, and their associated risks would remain. Soil alternative 5 mitigates some risk because it would treat PCP, petroleum hydrocarbons, and may treat dioxin; however, it will not treat metals. Soil alternative 6 mitigates some direct exposure to dioxin-contaminated soils, but other contamination would remain in soil and contamination in contact with groundwater in the perched groundwater may continue to mobilize contaminants from soil. Institutional controls and long-term maintenance would be needed to ensure the integrity of the repository cap and prevent direct contact with contamination. Groundwater alternative 2 would mitigate some risk because it treats PCP and petroleum contamination in groundwater; however, as with soil alternative 3, it is unlikely that this alternative would be effective at treating dioxin or metals and therefore would not mitigate risks associated with these contaminants. Groundwater alternative 3 mitigates some risk because it would treat PCP, petroleum hydrocarbons, and may treat dioxin; however, it will not treat metals and therefore would not mitigate the associated risks. Groundwater alternative 4 mitigates some risks posed by groundwater contamination because it treats contaminated groundwater. However, it does not mitigate risks associated with soil contamination. Soil alternatives 2 through 6 and groundwater alternatives 2 through 4 have the potential to mitigate risks when combined with other alternatives in the right combinations.

10.4 EFFECTIVENESS AND RELIABILITY

Each alternative is evaluated, in the short-term and the long-term, based on whether acceptable risk levels are maintained and further releases are prevented. None of the alternatives alone are effective and reliable at addressing the contaminated media that exceeds SSCLs across the entire Facility, but are effective and reliable on particular areas or media. When multiple alternatives are implemented together, the combined result is effective and reliable across the entire MWPS Facility.

Soil and groundwater alternative 1 are not effective and reliable in the short-term and long-term because unacceptable levels of contamination would remain and contaminants would continue to be released to the environment. Soil alternative 2 is effective and reliable for removing some soil contamination, but other alternatives would be needed to address groundwater contamination. Soil alternative 3 is a presumptive remedy and would be effective for PCP and petroleum hydrocarbons, but is not expected to be effective for dioxin or metals. Soil alternative 4 would be effective and reliable in the short-term and long-term for methane-containing soils, but would not address other COCs in soil or groundwater. Soil alternative 5 would be effective at treating PCP, petroleum hydrocarbons, and may be effective at treating dioxin. However, soil alternative 5 will not be effective at treating metals contamination at the MWPS Facility. Soil alternative 6 would be somewhat effective at preventing people from directly contacting dioxin-contaminated soils. However, caps are susceptible to weathering and may crack, reducing the effectiveness in the long-term. Maintenance of the cap in perpetuity would be required, which may be difficult given that Huttig does not currently own the property, and the current property owners have stated a desire to develop the currently vacant portions of the MWPS Facility. However, in the Grant Deed between Huttig and SSLLP, Huttig retained the right to use the property for remedial actions (Grant Deed, 1999a). Additionally, because other contamination would remain in place that may continue to provide a source of contamination as a result of mobilization from the perched groundwater, this alternative is not effective on its own for site-wide groundwater contamination. For the capped soil in an engineered repository, the leaching potential and potential interaction with perched groundwater could be addressed with engineering controls to effectively comply with ERCLs. Groundwater alternative 2, like soil alternative 3, would be effective for PCP and petroleum hydrocarbons, but is not expected to be effective for dioxin or metals. Groundwater alternative 3 would be effective at treating PCP, petroleum hydrocarbons, and may be effective at treating dioxin, but would not be effective at treating metals contamination at the MWPS Facility. Groundwater alternative 4 is designated as a presumptive remedy by EPA and has been shown to be effective at reducing COC concentrations in treated extracted groundwater to SSCLs prior to discharge to the City sewer; therefore, it is effective and reliable. Any alternative that requires onsite treatment will likely require fencing or other access control measures for portions of the MWPS Facility to ensure protection of human health in the short-term.

10.5 PRACTICABILITY AND IMPLEMENTABILITY

Under this criterion, alternatives are evaluated with respect to whether this technology and approach could be applied at the Facility.

Soil alternatives 2 through 6 and groundwater alternatives 2 through 4 would be implementable and practicable. Soil alternatives that involve excavation of soil beneath Scott Street and/or buildings, and soil alternative 5 would be more difficult to implement due to the difficulty of accessing subsurface soil.

10.6 TREATMENT OR RESOURCE RECOVERY TECHNOLOGIES

This criterion addresses use of treatment technologies or resource recovery technologies, if practicable, giving due consideration to engineering controls. These technologies are generally preferred to simple disposal options (see Section 75-10-721(2)(c)(iv), MCA).

Soil alternatives 2 (if recycling of methane-containing (wood waste) soils is selected over disposal), 3 and 5 and groundwater alternatives 2, 3, and 4 include some form of treatment or resource recovery technology. The other alternatives do not.

10.7 COST EFFECTIVENESS

Under Section 75-10-721, MCA, cost-effectiveness is determined through an analysis of incremental costs and incremental risk reduction, and other benefits of alternatives considered, taking into account the total anticipated short-term and long-term costs of remedial action alternatives considered, including the total anticipated cost of operation and maintenance activities.

Costs are estimated and actual costs may vary. Estimates are refined once DEQ issues the ROD and remedial design is completed. Soil and groundwater alternative 1 have the lowest costs but offer no risk reduction. The other alternatives reduce some risk, but need to be combined to result in an effective overall remedy that provides adequate risk reduction for soil and groundwater.

Soil alternatives 3, 4, 5, and 6 are less costly than soil alternative 2. However, soil alternatives 3, 4, 5, and 6 by themselves do not sufficiently reduce risks associated with contaminated soils as none of them addresses all COCs. Soil alternative 6 provides for risk reduction by preventing direct contact with dioxin-contaminated soils, and is the least costly soil alternative next to soil alternative 1. However, with the exception of soil alternative 1, soil alternative 6 provides the least amount of risk reduction as contamination remains, and is only capped and consolidated to prevent contact. None of the soil alternatives reduce risk associated with contaminated groundwater.

Groundwater alternative 2 is substantially less costly than groundwater alternatives 3 and 4. However, groundwater alternatives 2 and 3 will only partially reduce risk associated with contaminated groundwater and will not address all COCs in groundwater at the MWPS Facility. Groundwater alternative 4 has been demonstrated effective at the MWPS Facility at treating contaminated groundwater to acceptable levels for discharge to the city sewer system. However, none of the groundwater alternatives reduce risk associated with soil contamination.

11.0 SELECTED REMEDY

11.1 SUMMARY OF THE RATIONALE FOR THE SELECTED REMEDY

DEQ's selected remedy for the MWPS Facility is a combination of:

- Excavation and offsite disposal (Soil Alternative 2): Excavation and offsite disposal is the selected remedy for surface and subsurface soils exceeding commercial/industrial SSCLs for COCs other than PCP (or PCP co-located with other COCs) throughout the MWPS Facility, except for those on the eastern portion of the SSLLP property and the 1028½ Stoddard Street property, which must meet residential SSCLs. Methane-containing soil (wood waste) may also be recycled at a local composting company if it is determined through sampling not to contain contamination and is accepted by the composting company;
- Excavation and ex-situ enhanced bioremediation (Soil Alternative 3): The selected remedy for surface and subsurface soil (as much as can be excavated using standard excavation equipment) exceeding commercial/industrial SSCLs (except for the eastern portion of the SSLLP property and the 1028½ Stoddard Street property, which must meet residential SSCLs) for PCP and petroleum hydrocarbons (or COCs co-located with PCP) is excavation followed by bioremediation in an onsite LTU. The LTU will be constructed on the western portion of the SSLLP property and must meet RCRA requirements for an LTU within a CAMU, including but not limited to a liner and leachate collection system. Upon excavation, PCP-contaminated soils from the WWW property must be handled as RCRA F032 listed waste. Once treated, soils that meet SSCLs for all COC other than dioxin will require disposal offsite. Bench scale testing or pilot testing may be conducted during remedial design to optimize system design. Optimization may include, but is not limited to, determining appropriate amendments, the rate and frequency of adding amendments, and calculating treatment time frames;
- ISCO of Deep Contaminated Soils (Soil Alternative 5): ISCO will be used to address deeper subsurface soils (below the depths that can be reached using standard excavation equipment) in the former treatment and AST areas which exceed SSCLs for PCP (or COCs co-located with PCP) that are difficult to excavate;
- ISCO of Groundwater (Groundwater Alternative 3): The selected remedy for PCP, 2-methylnaphthalene, petroleum hydrocarbons, 1,2,4-trimethylbenzene, (which exists in the same area of the perched groundwater as the other COCs), and dioxin exceeding SSCLs in groundwater is ISCO. Treatment of perched groundwater is expected to eliminate the continuing source or potential source of contamination to the Missoula Aquifer. However, ISCO may be used to treat the Missoula Aquifer contamination, if needed. It is expected that ISCO will be effective at destroying PCP, petroleum hydrocarbons, 2-methylnaphthalene, and 1, 2, 4-trimethylbenzene exceeding SSCLs, but may be less effective on dioxin and metals. Pilot testing may be conducted to optimize system design and may include, but is not limited to, an evaluation of oxidant concentration, injection rate and frequency, and spacing of injection points. If the ISCO treatment is unable to reduce dioxin and metals concentrations to the SSCLs and the plume is not expanding, then continued monitoring for MNA parameters, metals, and dioxin will be conducted to

confirm the metals and dioxin concentrations are being reduced to eventually meet the SSCL. MNA parameters as well as monitoring for other COCs will continue to be sampled as part of the long-term monitoring plan; and

- Institutional controls: The selected remedy relies on institutional controls in the form of land use and groundwater use restrictions (restrictive covenants or controlled groundwater area (or both)). The following property must be restricted to commercial/industrial use with a DEQ-approved restrictive covenant in substantially the same form as the models included in Appendix B: WWW property, City property (except the park), and the western portion of the SSLLP property. The City park property must be restricted to open space. In addition, on the property within the MWPS Facility located west of Scott Street, no additional wells, with the exception of those installed for remediation, will be allowed until SSCLs in groundwater are met. On the WWW property with subsurface soil contamination that will be treated over time, irrigation is also prohibited until SSCLs are met (or DEQ otherwise approves it) to ensure that the addition of irrigation water does not disrupt or otherwise change conditions during treatment. Finally, once the LTU is constructed on the western portion of the SSLLP property, it must be surveyed and no use of that surveyed property will be allowed until remediation is complete and the LTU is closed. To address groundwater use restrictions at the MWPS Facility, including the property east of Scott Street, DEQ may also elect to petition for a controlled groundwater area.
- Engineering controls: Engineering controls such as fencing will be necessary during implementation of the remedy, in order to protect workers from onsite businesses from open excavations and heavy equipment, as well as to restrict access to the LTUs and stockpiled soils. Dust suppression activities will also be utilized during implementation of the remedy and will be further identified during remedial design.
- Long-term monitoring. Monitoring is necessary to evaluate the effectiveness of the remedy, to determine when SSCLs are achieved, and to ensure the ongoing protection of public health, safety and welfare and of the environment. It will include monitoring soil vapor and groundwater, and will be further identified during remedial design and ROD implementation.

Costs and assumptions used in calculating the total present value of the selected remedy are provided in Appendix C and are based upon the estimates in the FS (Douglass, 2015). In compliance with CECRA requirements, and considering public comment received, DEQ has determined that the selected alternatives set forth herein comprise the appropriate remedy for the MWPS Facility.

The selected remedy will reduce risks to public health, safety, and welfare and the environment through the following:

- The selected remedy will meet both threshold criteria: overall protection of public health, safety, and welfare and the environment, and compliance with ERCLs. The remedy accomplishes overall protection through removal and destruction of contaminants in soils, in-situ destruction and attenuation of contaminants in groundwater, and implementation of institutional controls.

- The selected remedy mitigates risk to public health, safety, and welfare and the environment to an acceptable level because contaminated soils, groundwater, and soil vapor will be removed, disposed of, or treated, thereby reducing the potential for exposure or impact.

- The selected remedy provides short-term and long-term effectiveness and reliability because accessible contaminated soil will be excavated and disposed of offsite or treated ex-situ through bioremediation; contaminants in deep subsurface soils will be treated in-situ through ISCO; and contaminated groundwater will be treated in-situ through ISCO. Contaminated groundwater will be reduced in magnitude and extent through source removal and treatment using ISCO and, for metals and dioxin, through MNA following ISCO.

- The selected remedy is technically practicable and readily implementable. The selected cleanup technologies have been successfully implemented at other Superfund facilities. Pilot tests and/or treatability studies will be conducted to optimize the selected technologies during remedial design, as appropriate.

- The selected remedy uses treatment as a principal element of the remedy; it reduces the toxicity, mobility, or volume of hazardous or deleterious substances through treatment. The selected remedy also proposes resource recovery technologies, if practicable, for methane-containing soils (wood waste). The use of engineering controls such as fencing or other security measures is also included in the selected remedy.

- The selected remedy is cost-effective and balances incremental costs and incremental risk reduction, focusing on onsite treatment (ex-situ and in-situ) of PCP-contaminated soil and groundwater (RCRA F032 listed waste) as opposed to offsite disposal, which is more expensive and does not achieve greater risk reduction.

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

11.2 DETAILED DESCRIPTION OF THE SELECTED REMEDY

DEQ selected a combination of alternatives to cleanup soil and groundwater. These include excavation and offsite disposal for soils exceeding SSCLs for COCs other than PCP (or PCP co-located with other COCs); excavation and ex-situ enhanced bioremediation in an onsite LTU for soils exceeding SSCLs for PCP (or PCP co-located with other COCs); ISCO to address deeper subsurface soils exceeding SSCLs for PCP that are difficult to excavate; and ISCO to address COCs in groundwater. The remedy also includes MNA for groundwater if dioxin and metals concentrations cannot be reduced through ISCO, long-term monitoring, engineering controls, and institutional controls. The selected remedy is detailed below.

11.2.1 Site-Wide Elements

11.2.1.1 Long-Term Monitoring

The selected remedy includes monitoring site media during remedy construction and long-term operation and maintenance. This plan will be developed during or after remedial design, is subject to DEQ approval, and will include sampling and analysis to: confirm the satisfactory performance of the remedy; ensure protection of public health, safety, and welfare, and the environment during remedy implementation; verify attainment of SSCLs; confirm achievement of RAOs; and verify compliance with ERCLs.

Monitoring may include sampling some, or all, of the existing monitoring well network that now includes 54 wells or additional wells that may be installed as part of remedial design. Monitoring may also include some or all of the existing nearby irrigation, commercial/industrial, or public water supply wells. The monitoring wells and other wells that will be included in the long-term monitoring well network will be determined after the ROD is issued, during or after remedial design. DEQ anticipates that, at a minimum, select wells will be monitored semi-annually during high and low groundwater elevations for the first five years to monitor contaminant levels for PCP, SVOCs, dioxin, VOCs, EPH, VPH, and dissolved metals and evaluate the effectiveness of the cleanup. Other analyses may be included to evaluate the effectiveness of chemical oxidation. The monitoring frequency will then be re-evaluated and may be decreased to annually or another frequency that DEQ determines appropriate, until cleanup levels are achieved. Select wells may be monitored for MNA parameters (redox potential, nitrate plus nitrite, ammonia, dissolved oxygen, ferrous or soluble iron, and sulfate) at a frequency determined appropriate by DEQ. Water levels in monitoring wells will also be measured semi-annually during high and low groundwater elevations.

Soil vapor monitoring from existing and any newly-installed monitoring points will be conducted to confirm the effectiveness of the soil and groundwater remedies in reducing soil vapor concentrations. DEQ retained the indoor air SSCLs (Table 3), which can be used to verify successful remediation of soil vapor and indoor air impacts associated with MWPS Facility contamination.

Air monitoring will be conducted, as needed, during implementation of the remedy to ensure protection of public health, safety, and welfare, and the environment. Dust suppression will also be used to ensure that particulate levels do not become elevated. Details of these activities will be developed during remedial design.

11.2.1.2 Institutional Controls

The following institutional controls will be implemented or maintained:

- Groundwater Use Restrictions: To protect human health and limit migration of contaminants through pumping, the selected remedy partially relies on institutional controls in the form of a restrictive covenant or a controlled groundwater area (or both) to prohibit installation of wells, other than those needed for remediation, at the Facility until groundwater is remediated to SSCLs for all COCs. Restrictive covenants will be required on the WWW, City, and SSLLP properties to limit the installation of wells and use of the groundwater and the controlled groundwater area could be applied to the entire MWPS Facility. This will ensure that new wells will not induce or redirect contaminated groundwater and that no non-remediation wells are installed within or adjacent to the MWPS Facility where city water services exist. On the WWW property with subsurface soil contamination that will be treated over time, irrigation is also prohibited until SSCLs are met (or DEQ otherwise approves it) to ensure that the addition of irrigation water does not disrupt or otherwise change conditions during treatment. These restrictions will remain in effect until DEQ determines they are no longer needed to ensure protection of human health. The impact of the limitation on additional wells is minimal since an additional source of water from the Mountain Water Company is available.

- Land Use Restrictions (Restrictive Covenants): The selected remedy includes a requirement that the use of the WWW property, City property (except for the City park), and the western portion of the SSLLP properties be restricted to commercial/industrial use through a restrictive covenant in substantially the same form as the models found in Appendix B. Use of the City park property must be restricted to open space use. Finally, once the LTU is constructed on the western portion of the SSLLP property, that LTU must be surveyed and use of the surveyed area must be restricted during the time that the LTU is operating. Although use of the WWW, City, and SSLLP properties has been limited through private agreement, DEQ did not approve those restrictions. Therefore, DEQ requires additional restrictive covenants that meet DEQ requirements. These additional institutional controls help assure that future uses are limited where necessary, depending on the remedial alternatives implemented, and comply with the requirements of CECRA. The placement of restrictive covenants on these properties is authorized in Section 75-10-727, MCA.

11.2.1.3 Engineering Controls

- Engineering controls such as fencing will be necessary during implementation of the remedy, in order to protect the public and workers at onsite businesses from open excavations and heavy equipment, as well as to restrict access to the LTUs and stockpiled soils. RCRA CAMU/LTU regulations require fencing, access control (e.g., locking gates), and signage which must be inspected and maintained throughout the duration of soil treatment activities to ensure the integrity of the remedy. These engineering controls will be further detailed during remedial design. Dust suppression activities will also be utilized during implementation of the remedy and will be included as part of remedial design and implementation.

11.2.2 Soil

Excavation of contaminated soils, in combination with offsite disposal, ex-situ bioremediation in a RCRA-compliant LTU within a designated CAMU, and ISCO will reduce contaminant concentrations to levels that no longer pose a risk for leaching to groundwater. Additionally, these activities will eliminate the direct contact risk 1) to workers in a commercial/industrial scenario for the WWW, City, and western portion of the SSLLP properties; 2) to both workers and residents on the eastern portion of the SSLLP property; and 3) to residents in the existing residential area.

Excavation of PCP-contaminated soils (co-located with petroleum hydrocarbons or dioxin) must be conducted to the limits of excavation using conventional excavation and earth-moving equipment, with details to be finalized during remedial design. Sheet piling with tiebacks may be necessary to excavate deeper soils adjacent to buildings or other structures. The selected remedy also includes ISCO following excavation of surface and subsurface soils in the former treating area, and to address remaining subsurface soil contamination in the former AST area and beneath Scott Street (if not able to be excavated using conventional excavation equipment). In the rock well area, which is at a depth of 12 feet bgs, as much of the contaminated material exceeding SSCLs as can be excavated using conventional equipment must removed. Contamination remaining after excavation will be addressed through ISCO,

The following is a discussion of the various components of the soil portion of the selected remedy:

11.2.2.1 <u>Excavation and Offsite Disposal</u>

The preferred remedy includes excavation and offsite disposal at a licensed and permitted disposal facility of an estimated 15,883 yd^3 of methane-containing soil, 302 yd^3 of ash/metals-contaminated soil, and 4,948 yd^3 of dioxin-contaminated soil that does not contain PCP (Figure 9). Excavation and offsite disposal of methane-containing soils and ash/metals-contaminated soils on the northern portion of the MWPS Facility will eliminate future exposure to methane contained in the soil and eliminate the leaching to groundwater risk associated with the metals contained in the ash. The soil may need to be tested prior to excavation and disposal to determine the appropriate disposal facility. Methane-containing soil (wood waste) may also be recycled at a local composting company if it is determined through sampling not to contain other COCs and is accepted by the composting company. The selected remedy also includes excavation and offsite disposal of dioxin-contaminated soils not comingled with PCP; these soils may be found at various locations at the MWPS Facility, including the one residential yard (1028½ Stoddard Street) and three grids on the eastern portion of the SSLLP property that exceed residential SSCLs (Figure 9). Prior to excavation, the residential yard will be sampled to confirm that surface soil concentrations exceed SSCLs and soil removal is needed. Finally, this alternative is also identified for an estimated 2,174 yd^3 of soils that meet the SSCLs for all COCs other than dioxin after treatment in the LTU. Excavation of contaminated soils as part of the selected remedy will also eliminate the potential for contaminant migration through surface water infiltration (runoff) into dry wells at the MWPS Facility.

11.2.2.2 <u>Excavation and Ex-Situ Enhanced Bioremediation</u>

The selected remedy includes excavation of an estimated 4,347 yd^3 of PCP-contaminated soil (including soils comingled with petroleum hydrocarbons or dioxin (see Figures 9, 10a, and 10b)) followed by ex-situ bioremediation of this soil in an onsite LTU. The PCP-contaminated soil on the southern portion of the MWPS Facility has been classified as an F032 listed hazardous waste and is banned from land disposal. However, under 40 CFR 264.552, DEQ can designate a CAMU at the Facility where the wastes originated which allows otherwise-land banned hazardous waste to be treated onsite. Using a CAMU, this alternative will be used for soil located in the former treating area where PCP is present in soils at concentrations greater than SSCLs. In many cases, this PCP may be co-located with other COCs including petroleum or dioxin. There are no known exceedances of PCP SSCLs on the northern portion of the MWPS Facility but there are exceedances of other COC SSCLs. In addition, as described above, if PCP was detected at concentrations greater than SSCLs on the northern portion of the Facility, that PCP-contaminated soil could be disposed of at a licensed offsite facility under Soil Alternative 2 or treated under Soil Alternative 3. Bioremediation will significantly reduce the amount of contamination in soil. PCP and petroleum-contaminated soils are anticipated to be treated within two treatment seasons based on experiences at a similar facility in Montana (AECOM, 2009). However, dioxin-contaminated soils may not be effectively treated to SSCLs through bioremediation. If after treatment in the LTU, soils contain dioxin at concentrations exceeding SSCLs, but meet SSCLs for other COCs, the dioxin-contaminated soils will be disposed offsite at a licensed and permitted disposal facility.

For purposes of cost estimation, it was assumed that PCP-contaminated soils (co-located with petroleum hydrocarbons or dioxin) would be excavated to approximately 15 feet bgs or to the maximum limits of excavation using conventional excavation and earth-moving equipment (to be determined during remedial design). Sheet piling with tiebacks may be necessary to excavate deeper soils adjacent to buildings or other structures. For cost estimation, it was assumed that the LTU would be lined with a 0.60 millimeter high-density polyethylene liner and geotextile and would include a leachate collection system, with leachate recycled and used for irrigation of the LTU (in combination with other water sources). Additionally, nutrients and water would be added to enhance biodegradation within the LTU. Bench-scale testing may be necessary to optimize treatment of the soils in the LTU. The LTU will be sited on the western portion of the SSLLP property, which is the only area at the Facility with available space and which is available for use in remedy implementation. Placement of the LTU on this property meets RCRA CAMU/LTU requirements and keeps the LTU further away from the existing residential neighborhood.

11.2.2.3 ISCO of Soil

The selected remedy includes ISCO following excavation of surface and subsurface soils (to the limits of traditional excavation) in the former treating area, and to address remaining subsurface soil contamination in the former AST area and beneath Scott Street (Figures 10a, 10b, and 10c). ISCO consists of adding a chemical oxidant to soil in concentrations that result in the destruction of COCs. In the former treating area, a chemical oxidant will be injected into the soils while the excavation is open and prior to backfill and will target identified contamination between the bottom of the excavation and the perched water table. In the former AST area and beneath Scott Street, a chemical oxidant will be injected into the subsurface soils and will target identified contamination throughout the soil column down to the perched water table. While ISCO is expected to be effective in reducing PCP and petroleum-hydrocarbon concentrations to SSCLs, the ability of ISCO to oxidize dioxin is less certain. However, even if ISCO is not capable of reducing dioxin concentrations to SSCLs, data from ISCO bench-scale and field-scale pilot testing at similar facilities in Montana have shown that dioxin concentrations will decrease in soil and groundwater (Douglass, 2015). Therefore, it is expected that these reductions in dioxin concentrations, combined with the treatment of PCP-contaminated soils, will reduce concentrations such that there is no longer leaching to groundwater, which will allow a groundwater treatment remedy to be successful.

For cost estimation purposes, it was assumed that Cool-Ox™ was the oxidant of choice. Cool-Ox™ is a patented oxidant from Deep Earth Technologies, Inc., which utilizes hydrogen peroxide to generate oxidizing radicals, which react with the organic contamination (PCP, petroleum hydrocarbons, and to a more limited extent, dioxin) to destroy it. As Cool-Ox™ is a patented oxidant, the cost estimate includes costs associated with injection of Cool-Ox™ by Deep Earth Technologies personnel using their own equipment. Multiple injection events may be needed to reduce the contaminant concentrations to SSCLs; the cost estimate assumes two separate injection events. Timeframes between injection events will depend on site-specific data collected during post-injections monitoring. Cool-Ox™ was identified for use in the cost estimate over other oxidants commonly used at wood treating sites because it has less undesirable byproducts as a result of the chemical oxidation than others. Given the concern expressed by commenters over byproducts and considering that the Missoula Aquifer is a sole source aquifer, DEQ will require the use of Cool- Ox™ unless a different oxidant that does not generate undesirable byproducts is identified during remedial design. In addition, during remedial design, pilot testing may be conducted to optimize system design including, but not limited to, oxidant concentrations, injection rates and frequency, and spacing of injection points.

11.2.3 Groundwater

Removal of contaminated soil, in combination with active treatment of the contaminated groundwater plume, will achieve groundwater SSCLs more quickly than waiting for contaminant concentrations to decrease on their own (Douglass, 2015).

11.2.3.1 <u>In-situ Chemical Oxidation</u>

Groundwater contaminated with PCP at the MWPS Facility is an F032 listed hazardous waste. The selected remedy includes ISCO to treat the PCP, dioxin, 2-methylnaphthalene, 1,2,4-trimethylbenzene, and petroleum hydrocarbons in groundwater at the MWPS Facility (Figures 7 and 8). As previously indicated, ISCO is capable of reducing PCP, 1,2,4-trimethylbenzene, and petroleum hydrocarbon concentrations to SSCLs. However, the ability of ISCO to reduce dioxin and metals concentrations to SSCLs is less certain, although it is anticipated to reduce dioxin concentrations in groundwater. If the ISCO treatment is unable to reduce dioxin and metals concentrations to the SSCLs and the plume is not expanding, then continued monitoring for MNA parameters, metals, and dioxin will be conducted to confirm the metals and dioxin concentrations are being reduced to eventually meet the SSCL. MNA parameters will continue to be sampled as part of the long-term monitoring plan.

Cool-Ox™ was the oxidant that was assumed for cost estimate purposes. Given the concern expressed by commenters over byproducts and considering that the Missoula Aquifer is a sole source aquifer, DEQ will require the use of Cool- Ox™ unless a different oxidant that does not generate undesirable byproducts is identified during remedial design. The Cool-Ox™ reaction is designed to leave only carbon dioxide and water as byproducts of the chemical reaction, which is an important consideration when evaluating potential impacts to the Missoula Aquifer. For cost estimate purposes, it is assumed that ISCO treatment of groundwater would consist of two separate injection events; the first would consist of injecting Cool-Ox™ into existing perched groundwater wells, starting in the former treating area. After monitoring to evaluate the effectiveness of the injections, the conceptual design assumes a second injection into some of the perched groundwater wells. Treatment of perched groundwater is expected to eliminate the continuing source or potential source of contamination to the Missoula Aquifer. However, ISCO may be used to treat the Missoula Aquifer contamination, if needed. The cost estimate also assumes installation of new wells for monitoring and/or injection, to cover areas of the perched groundwater where large distances separate existing wells. It may also be possible to use direct push methods to directly inject oxidant into the perched groundwater and these methods may be evaluated during remedial design.

Pilot testing may be conducted to optimize system design and determine the most effective oxidant(s) during remedial design. Optimization may include, but is not limited to, an evaluation of different oxidants, oxidant concentration, injection rate and frequency, and spacing of injection points.

ISCO treatment of groundwater will be completed over several months of injections (possibly covering multiple injection events). Groundwater monitoring is required to determine whether RAOs were achieved and to monitor the Missoula Aquifer (these costs are included as part of the site-wide elements).

11.2.4 RAOs and Performance Standards

DEQ has established its RAOs for each contaminated media in Section 8.0.

SSCLs for groundwater, surface and subsurface soil, and indoor air are provided in Tables 1, 2, and 3, respectively. Section 7.0 details the development of SSCLs for the MWPS Facility.

11.3 COST ESTIMATE FOR THE SELECTED REMEDY

Table 5 summarizes capital and operation and maintenance costs and the present value analysis for the selected remedy. Appendix C presents detailed summaries of the costs and assumptions for each component of the selected remedy.

The total present worth value of the selected remedy is approximately $8,274,423 (Table 5). These cost estimates were based on the information presented in the FS (Douglass, 2015). Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design of the selected remedy as well as during implementation. This is a feasibility-level engineering cost estimate expected to be within plus fifty to minus thirty percent of the actual project cost.

11.3.1 Cost Uncertainties

Remedial design will play a critical role in determining final costs for the MWPS Facility remedy and will be more reflective of actual costs than the estimated costs presented in this ROD. Optimization testing during remedial design and implementation will provide the information necessary to refine cost estimates. Uncertainties that may affect the costs of the selected remedy include but are not limited to:

- The time required for monitoring may increase or decrease the costs of the monitoring.
- Increases or decreases in the number of wells to be monitored as part of long-term groundwater monitoring may increase or decrease the costs of monitoring.
- Increases or decreases in the volume of soil exceeding SSCLs that must be excavated and either disposed of offsite or treated in the LTU may increase or decrease the cost.
- Costs associated with ISCO of deep groundwater in the Missoula Aquifer were not included. It may be necessary to complete ISCO of the Missoula Aquifer to reduce the concentrations of any contaminants that may be mobilized during completion of ISCO activities in the source area and in the perched groundwater zone. This may increase the cost of the selected remedy.
- The cost estimate for the selected remedy does not include reimbursement of remedial action costs incurred by DEQ. Reimbursement of these costs may increase the cost of the selected remedy. These costs would include the costs of petitioning for a controlled groundwater area, should DEQ determine it is necessary to request one from the Montana Department of Natural Resources and Conservation.

11.4 ESTIMATED OUTCOMES OF SELECTED REMEDY

The selected remedy uses a combination of institutional controls, engineering controls, long-term monitoring, removal and disposal of contaminated soil, soil and groundwater treatments, and MNA (if needed for dioxin and metals only) to protect public health, safety, and welfare and the environment over the long term. The remedy will reduce contaminant concentrations through a combination of technologies that cleanup soils in the source areas and accelerate cleanup of the contaminated groundwater. The technologies selected by DEQ to meet the remedy requirements include a combination of excavation, offsite disposal, ex-situ bioremediation, and in-situ chemical oxidation. Successful excavation and treatment of contaminated soil and perched groundwater zones will reduce or eliminate the continuing source of contamination contributing to groundwater and soil vapor concentrations. After completion of soil and groundwater treatments, soil contaminant concentrations will be below levels of concern for protection of human health and groundwater. Groundwater concentrations are expected to be at or below

SSCLs, with the possible exception of dioxin and metals concentrations, which may not be (for dioxin) or will not be (for metals) completely treated through chemical oxidation. Institutional and engineering controls, along with monitoring and maintenance, will prevent or mitigate exposure risks to onsite workers, visitors, and local residents during remedy implementation, will ensure people are not drinking water that exceeds SSCLs, and will ensure residential use does not occur on portions of the MWPS Facility where SSCLs are not protective of that use.

It will likely take two years for remedial design and construction. After designs are complete and remedial components are constructed, it is expected that soil biological treatment will take approximately two years based upon the estimated volume of soil and the size of the conceptually designed LTU. This timeframe may be revised if treatability testing for optimization of the LTU is conducted and a different timeframe is determined. For cost estimating purposes, the ISCO injections were assumed to be completed within one year; however, the timeframe between injection events will be determined based on site-specific contaminant concentrations and may be spread over a longer timeframe to maximize effectiveness. The total time of planned construction (not including long-term monitoring) is approximately two years as a number of these activities may occur concurrently. Long-term monitoring, including MNA monitoring, will continue until SSCLs are met.

Land uses are not expected to change as a consequence of the remedial action. Land use is expected to remain commercial/industrial at the WWW and City properties; to remain open space at the City park; and to remain residential east of Scott Street. Once the soil removal is complete on the eastern portion of the SSLLP property, it can be redeveloped. Once the soil removal is complete on the western portion of the SSLLP property, it can also be redeveloped (with the exception of the area being used for the LTU). Institutional controls in the form of restrictive covenants will ensure that the use of the properties is limited to commercial/industrial on the WWW, City, and western portion of the SSLLP properties, and that the installation of groundwater wells is limited until SSCLs are met. In addition, the SSLLP property housing the LTU cannot be used until the LTU is closed.

Groundwater use restrictions are necessary to prevent use of contaminated groundwater and to minimize migration of contaminated groundwater that could occur by pumping adjacent or nearby groundwater. After groundwater SSCLs are achieved, groundwater will again be available for unrestricted use and as allowed by local regulations. The timeframe for achieving groundwater cleanup levels throughout the plume is uncertain (as discussed in Section 5.4.2). Groundwater in the Missoula Aquifer and perched zones currently exceeds DEQ-7 groundwater standards. Due to the potential for leaching of contaminants from the perched zone to the Missoula Aquifer, unrestricted use of groundwater at the Facility in both the perched groundwater and Missoula Aquifer will not be allowed until completion of the remediation of the perched groundwater. This will be accomplished through restrictive covenants, a controlled groundwater area, or both.

Contaminant concentrations in soil vapor associated with the MWPS Facility were not found to pose an unacceptable risk to construction workers, but the removal, treatment, and attenuation of contaminants in soil and groundwater will eliminate the sources of contamination contributing to deep soil vapor concentrations.

Contamination associated with the MWPS Facility was not found to pose an unacceptable risk to ecological receptors, but the removal, treatment, and attenuation of contaminants in soil and groundwater is expected to produce a positive effect for those receptors.

12.0 STATUTORY DETERMINATIONS

Under Section 75-10-721, MCA, of CECRA, DEQ must select a remedy that will attain a degree of cleanup of the hazardous and deleterious substance and control of a threatened release or further release of that substance that assures protection of public health, safety, and welfare and of the environment. In approving or carrying out remedial actions performed under Section 75-10-721, MCA, DEQ must require cleanup consistent with applicable state and federal ERCLs, and may consider substantive state and federal ERCLs that are relevant to site conditions. In addition, DEQ must select a remedy considering present and reasonably anticipated future uses, giving due consideration to institutional controls. The selected remedy must mitigate risk, be effective and reliable in the short- and long-term, be practicable and implementable, and use treatment or resource recovery technologies, if practicable, giving due consideration to engineering controls. DEQ also evaluates the remedy for cost effectiveness. Finally, DEQ considers the acceptability of the remedy to the affected community, as indicated by community members and the local government. DEQ has considered all public comment received during the public comment period on the Proposed Plan, has responded to these comments in Part 3 of the ROD, and made changes to the selected remedy based upon those public comments.

The selected remedy is protective of public health, safety, and welfare and the environment, complies with ERCLs, mitigates risk, is effective in the short- and long-term, is practicable and implementable, uses treatment and resource recovery technologies, and is cost-effective.

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

12.1 PROTECTION OF PUBLIC HEALTH, SAFETY, AND WELFARE AND THE ENVIRONMENT

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

- Excavation of contaminated soils, followed by disposal offsite, treatment, and placement of institutional controls eliminates the incidental ingestion and dermal contact pathways for both surface and subsurface soils and will reduce the risk of contaminants leaching to groundwater.

- ISCO of deep source area soils and the perched groundwater system will reduce the concentrations of contaminants exceeding SSCLs in soil that have the potential to leach to the underlying groundwater, and will reduce the concentrations of contaminant exceeding SSCLs in the perched groundwater.

- Excavation of contaminated soils, treatment of deep subsurface soils and groundwater, and placement of institutional controls, in combination with long-term monitoring of existing and newly installed wells to ensure they do not exceed SSCLs, will eliminate the sources of contamination in drinking water and protect against the ingestion of contaminated groundwater.

- MNA, in combination with onsite source remediation, will be protective of human health and the environment by ensuring that contaminants in the perched groundwater and the Missoula Aquifer meet SSCLs. Monitoring will also ensure that soil vapor concentrations are reduced after excavation of contaminated soils and ISCO of deep subsurface soils and groundwater.

- Placement of institutional controls will restrict property use to commercial/industrial purposes on the WWW property, the western portion of the City property, and the western portion of the SSLLP property. Institutional controls will restrict the eastern portion of the City property to open space. Institutional controls in the form of restrictive covenants or a controlled groundwater area (or both) will also restrict groundwater use until SSCLs. The LTU on the western portion of the SSLLP property will be surveyed and its use restricted until the LTU is closed.

12.2 COMPLIANCE WITH ERCLS

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

For the COCs in groundwater, the contaminant-specific ERCLs for the remedial action are the standards specified in the DEQ-7 standards and the MCLs.

Certain actions (removal of non-PCP impacted soil and offsite disposal along with onsite treatment of the PCP-impacted soil in an LTU), coupled with treatment of the contaminated groundwater plume with ISCO, will lead to compliance with DEQ-7 standards within a reasonable timeframe.

The selected remedy calls for excavation and treatment of PCP-contaminated soils. The various media and wastes contaminated by PCP on the southern portion of the MWPS Facility are F032 listed hazardous wastes once they are excavated or removed. This triggers certain RCRA requirements that are applicable for the treatment, storage, and disposal of these wastes. Properly implemented, the selected remedy complies with RCRA subtitle C requirements.

12.3 MITIGATION OF RISK

The selected remedy for soil was selected over other alternatives because it is expected to achieve substantial and long-term risk reduction through excavation and treatment or disposal of contaminated soils, and treatment of contaminated groundwater. Excavation and enhanced bioremediation of the PCP-impacted soils in a RCRA-compliant LTU will directly address shallow and deep soil contamination. Excavation and offsite disposal of methane-containing, dioxins-impacted, and metals- impacted soils will remove exposure to these contaminants.

Excavation and ex-situ bioremediation of PCP-impacted soils and ISCO of deep subsurface soils and groundwater will also remove the sources of soil vapors and potential vapor intrusion at the Facility. Institutional controls and long-term monitoring will ensure mitigation of risk.

12.4 EFFECTIVENESS AND RELIABILITY

The selected remedy is effective in that it reduces the risk to acceptable levels and allows the MWPS Facility to be used for the reasonably anticipated future uses, which includes commercial/industrial, open space, and residential. Institutional controls at the MWPS Facility, such as limits on residential use in certain areas, will prevent unacceptable exposures. Long-term and performance monitoring, and operation and maintenance also provides for the long-term effectiveness and reliability of the remedy.

The selected remedy will comply with all federal and state safety laws. Short-term effectiveness of the remedy, including consideration of the risks involved to workers and the community as the remedy is being implemented, will be mitigated through the use of fencing, best management practices, adequate dust control, and other safety measures, as necessary, and will be identified as part of remedial design.

12.5 PRACTICABILITY AND IMPLEMENTABILITY

The selected remedy is technically practicable and implementable at the MWPS Facility because the selected technologies are routinely used successfully in the environmental field and the materials necessary are widely available. In addition, the presence of an operating railroad line may increase options for transportation of materials to and from the Facility. The LTU can be constructed in the limited available area on the western portion of the SSLLP property without impeding long-term use of that property. In addition, the depth of the source area excavation will limit impacts to the adjacent infrastructure including the WWW driveway and parking area, Scott Street, and the Scott Street Bridge.

The implementation of ISCO in the former treatment and AST areas is planned to be completed in two injection periods, although DEQ may determine that additional injections are necessary based upon follow-up sampling. There will be limited interference with the activities at the WWW property and the lumber mill where the former treatment and AST areas are located.

12.6 USE OF TREATMENT OR RESOURCE RECOVERY TECHNOLOGIES

The selected remedy is expected to achieve substantial risk reduction through treatment of contaminants in groundwater and soil (using ISCO) and treatment of soil in the LTU; these remedies also have the ancillary advantage of reducing contaminant concentrations in soil vapor. Methane-containing soils will be recycled, if possible, at a local composting company.

12.7 COST EFFECTIVENESS

The selected remedy is cost-effective, taking into account the total short- and long-term costs of the actions, including long-term operation and maintenance activities for the entire period during which the activities will be required. The selected remedy provides overall risk reduction proportionate to the costs. To the extent that the estimated cost of the selected remedy exceeds the costs of the other alternatives, the difference in cost is reasonably related to the greater overall reduction in risk provided by the selected remedy and the reliability. The detailed evaluation of the balance of these criteria among the alternatives considered is set forth in the FS and in Section 10, Comparative Analysis of Alternatives, of this ROD.

13.0 DOCUMENTATION OF NOTABLE CHANGES FROM THE PROPOSED PLAN

The Proposed Plan for the MWPS Facility was released for public comment on February 28, 2014. The Proposed Plan identified a combination of Soil Alternative 2 (excavation and offsite disposal) to address soils impacted by methane, dioxin, and metals; Soil Alternative 3 (excavation and ex-situ enhanced bioremediation) to address PCP-impacted soils classified as F032 listed hazardous waste; Soil Alternative 5 (ISCO of former treatment and AST area soils) to eliminate contaminants from deeper subsurface soils; and Groundwater Alternative 3 (ISCO of groundwater) to reduce COC concentrations in the groundwater to DEQ-7 groundwater standards. The preferred remedy also included MNA (for remaining dioxin and metals in groundwater after ISCO, if the plume is not expanding), institutional controls, engineering controls, and long-term monitoring. DEQ has reviewed and responded to the written comments made during the public comment period and to the oral comments provided during the public hearing for the Proposed Plan (See Part 3). Based upon this public comment, DEQ made the following specific changes to the selected remedy set forth in the Proposed Plan:

- There were numerous public comments on the Proposed Plan indicating commenters' request that either (1) the entire MWPS Facility be remediated to residential-based SSCLs; or (2) the SSLLP property be remediated to residential-based SSCLs (see Part 3 of the ROD for more information). After carefully evaluating the public comment as well as conducting a thorough statutory analysis as described above, DEQ has determined that the eastern portion of the SSLLP property must be remediated to residential SSCLs. Remediation of the eastern portion of the SSLLP property to meet residential SSCLs will result in approximately 9.7 acres of the 19-acre SSLLP property meeting residential SSCLs. This revision increased the cost estimate of the remedy by $234,215.
- DEQ re-evaluated the information provided in the BRA Addendum and has determined that surface soils on the SSLLP property do not pose an unacceptable risk to commercial/industrial workers for dioxin and therefore do not require remediation. However, soils impacted with cadmium and methane-containing soils still require excavation and offsite disposal. While the revision decreased the volume of soils to be excavated and disposed offsite, the volume used for these SSLLP property surface soils in the Proposed Plan was underestimated by 1,922 yd^3. As a result, there is no cost savings identified and the corrected volumes and cost estimates for excavation and offsite disposal of contaminated surface soils on the SSLLP property are included in the first bullet, above.
- In evaluating the soil volumes and cost estimates to address the remediation of the eastern portion of the SSLLP property to residential SSCLs, DEQ noted that the 2,174 yd^3 of dioxin-contaminated soil identified for offsite disposal after treatment in the LTU was inadvertently left out of the cost estimate for the offsite disposal in the Proposed Plan. DEQ added this volume of soil to the line-item for offsite disposal in Table C-2 (Appendix C), which increased the cost estimate of the remedy by $102,721.
- DEQ distinctly identified the possibility of a controlled groundwater area as one of the institutional controls that may be used to limit groundwater use until SSCLs are met.

- DEQ re-evaluated the area of groundwater impacts based on recent groundwater data and updated the figures depicting groundwater exceeding SSCLs in the Missoula Aquifer and perched groundwater accordingly (see Figures 7 and 8).
- Cool-Ox™ was the oxidant assumed for use in the FS cost estimates. Cool-Ox™ has less undesirable byproducts as a result of the chemical oxidation than other oxidants that are commonly used at wood treating sites. Given the concern expressed by commenters over some oxidants' byproducts and considering that the Missoula Aquifer is a sole source aquifer, DEQ will require the use of Cool- Ox™ unless a different oxidant that does not generate undesirable byproducts is identified during remedial design.

14.0 ADMINISTRATIVE RECORD REFERENCES

DEQ cited, relied upon, or considered the following documents in selecting the remedy for the MWPS facility. It does not include legal citations such as those found in the MCA, ARM, United States Code, and CFR. Any document, model, or other reference identified in the Final RI (Envirocon, 1998), BRA and BRA Addendum (CDM, 2001; CDM, 2012), fate and transport evaluation (CDM, 2011), and the Final FS (Douglass, 2015) are also incorporated herein as part of the administrative record.

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PART 3

RESPONSIVENESS SUMMARY

1.0 INTRODUCTION

The Montana Department of Environmental Quality (DEQ) solicited public comment on the February 2014 Proposed Plan (DEQ, 2014a) for the Missoula White Pine Sash (MWPS) Facility in Missoula, Montana, during a public comment period that ran from March 1, 2014, through March 30, 2014. DEQ also held a public meeting and hearing in Missoula on March 11, 2014. DEQ received oral comments at the public hearing. DEQ received requests to extend the public comment period and agreed to provide a two-week extension of the public comment period. DEQ received written comments from a number of individuals or organizations during the public comment period, some of whom had also provided oral comments.

1.1 COMMUNITY INVOLVEMENT BACKGROUND

The Montana Comprehensive Environmental Cleanup and Responsibility Act (CECRA) provides for the public to have input into the DEQ decision-making process with respect to the final cleanup of state Superfund facilities. At the MWPS Facility, DEQ has conducted more outreach and opportunity for public comment than is required by CECRA. For example, DEQ sought public comment on the Draft Remedial Investigation (RI) Work Plan (RIWP), the Draft Phase II RIWP, the Draft RI Report, the Baseline Risk Assessment (BRA) Work Plan, the BRA Report, and a draft interim remedial action work plan. For each public comment period, DEQ considered public comments and made changes to the document, if necessary, based on the public comment. DEQ held public meetings to assist with establishing a community advisory group, discuss the RIWP, discuss the Phase II RIWP, discuss the RI Report, discuss the BRA Work Plan, discuss the BRA Report, and to discuss the draft interim action work plan. (See Section 3.0 of Part 2 for more detailed information.) DEQ also sought public comment on the Proposed Plan, prepared this written responsiveness summary, and made changes, as necessary, to the Feasibility Study (FS) and the Record of Decision (ROD) based on public comment.

1.1.1 Notification of Public Comment Period

Press releases were sent to newspapers, television stations, and radio stations to announce the public comment period for the Proposed Plan. DEQ provided notice of the public comment period and public meeting/hearing associated with the Proposed Plan via postcard mailings and a Site Update distributed to the MWPS Facility mailing list. DEQ also posted the Proposed Plan and the FS, as well as notice of the public comment period and public meeting, on its website. On February 28, 2014, DEQ sent letters to the Missoula County Commissioners, the Mayor and the Missoula City Council, the Missoula City/County Health Department, Huttig Building Products, Inc. (Huttig), WWW Investments, LLC (WWW), Scott Street, LLP (SSLLP), the North-Missoula Community Development Corporation, and others notifying them of the public comment period and public meeting. A legal notice of the public comment period and public meeting/hearing was published on March 2, 2014, in the Missoulian and on DEQ's website. This notice requested that any person requiring an accommodation notify DEQ in advance of the meeting; DEQ did not receive notification from anyone requesting an accommodation. DEQ held a public meeting/hearing in Missoula on March 11, 2014, to present and discuss the

Proposed Plan, answer questions, and to receive oral public comments. DEQ received some comments complaining that the room was too small and was not handicap-accessible. The size of the meeting room selected was based on an estimate of attendees at previous MWPS meetings. Given the current level of interest, DEQ will not use that meeting room again and will ensure adequate space is available. In terms of accessibility, had anyone identified a needed accommodation the room could have been changed and, as stated, that room will not be used again. DEQ received requests to extend the public comment period and agreed to provide a two week extension, until April 14, 2014. A legal notice of the extension of the public comment period was published on March 24, 2014, in the Missoulian and on DEQ's website.

1.1.2 Administrative Record

The administrative record is the set of documents DEQ cited, relied upon, or considered when determining the final remedy. References to the administrative record are found in Part 2, Section 14.0 of the ROD. It does not include legal citations such as those found in the Montana Code Annotated (MCA), Administrative Rules of Montana (ARM), United States Code, and Code of Federal Regulations. Any document, model, or other reference identified in the Final Remedial Investigation Report (Envirocon, 1998), Baseline Risk Assessment (BRA) and BRA Addendum (CDM, 2001; CDM 2012), fate and transport analysis (CDM, 2011), and Final Feasibility Study (Douglass, 2015) are also incorporated herein as part of the administrative record.

1.1.3 Document Repositories

The complete files for the MWPS Facility, including the documents making up the administrative record for the ROD, are available for public review at the DEQ offices in Helena. A partial compilation of files, including major documents related to the Facility, is available for public review at the University of Montana Mansfield Library in Missoula and on DEQ's website at http://deq.mt.gov/StateSuperfund/missoulawhitepinesash.mcpx.

DEQ's offices in Helena:

Montana Department of Environmental Quality
Remediation Division
1225 Cedar Street
Helena, MT 59601
Telephone: (406) 444-6444

DEQ's website: http://deq.mt.gov/StateSuperfund/missoulawhitepinesash.mcpx

Missoula Public Library
301 E. Main
Missoula, MT 59802
(406) 721-2665

University of Montana Mansfield Library
32 Campus Drive
Missoula, MT 59812
Telephone: (406) 243-6866

1.1.4 Updates

To keep citizens updated about activities at the MWPS Facility, DEQ began publishing occasional informational mailings. These reports contained information on recently released documents, upcoming activities and meetings, completion of activities, sampling results and other information. Informational updates were sent to individuals on the mailing list for the MWPS Facility and local media, as well as to City and county officials, and other stakeholders. Informational updates will continue during remedial design and implementation, and will be available on DEQ's website listed above.

1.1.5 Toll-free Hotline

DEQ maintains an in-state toll-free number (1-800-246-8198) for people who want to contact DEQ about the MWPS Facility or other Superfund facilities. DEQ Remediation Division personnel direct calls to appropriate project officers. The toll-free number is answered in person during business hours. In addition, DEQ maintains a website at http://deq.mt.gov.

1.1.6 Mailing List

DEQ maintains a mailing list that is periodically updated. DEQ has actively solicited additions to the mailing list in informational updates and at public meetings. In accordance with state law, the mailing list is generally not released to the public.

2.0 RESPONSIVENESS SUMMARY

2.1 EXPLANATION

All comments received by DEQ during the public comment period on the Proposed Plan have been reviewed and considered by DEQ in the decision-making process and are addressed in this Responsiveness Summary. Due to the volume of comments and given that the majority of them are similar in nature and subject, DEQ has summarized the comments below. However, while the comments are summarized here for brevity, DEQ considered each and every comment submitted in its entirety (including all attachments, references, and supporting documents that were provided) and comments submitted during the March 11, 2014, public hearing which were recorded verbatim by a court reporter into a transcript. Those verbatim comments (including the supporting documentation submitted with the comments) and transcript are included on the attached CD and are part of the administrative record.

To assist in developing responses, DEQ added its own numbering to comments where appropriate to add clarity. Summarized comments are numbered and in italics, with DEQ's response following each. In order to avoid duplication of some responses, similar comments are usually addressed only once for the first occurrence of the comment and thereafter are referenced to the appropriate response.

2.2 COMMENTS AND DEQ RESPONSES

1. *The Proposed Plan identified the "reasonably anticipated future use" of the MWPS facility west of Scott Street as commercial/industrial. Five commenters agreed with this proposed designation. One of those commenters pointed out that the City cleaned up its own property to commercial levels, which confirms its understanding that the residents east of Scott Street are not at risk. The commenter indicated that cleanup levels for the SSLLP property should be the same as for the City-owned portions of the property and should be consistent with the intended future use of the property, which is commercial/industrial. The commenter points out that the Missoula Economic Partnership (MEP) has described the SSLLP property as unique because it has rail access to attract industrial or commercial businesses. Finally, this commenter indicated that the City resolution (discussed below) was based on inaccurate facts and in response to unwarranted concerns in the neighborhood and should not carry the same weight as the Northside Plan's view of the future development and use of the land. Another commenter (the property owner) indicated its intent to develop the SSLLP property as commercial/industrial, agreed with the proposed designation of future use, and indicated its support for an additional institutional control excluding residential development of the SSLLP property. That commenter also provided a historical perspective and additional information relating to its ownership of the property and the reasons it supports commercial/industrial development. Finally, the commenter indicated it had never withdrawn its application for the SSLLP property rezoning; rather, no action has been taken by the zoning committee.*

The majority of the comments received on the Proposed Plan objected to the proposal to identify the reasonably anticipated future use of the facility west of Scott Street as commercial/industrial. The objections were based upon a variety of reasons. As stated above, DEQ reviewed and considered the basis of these objections which can be generally summarized to include: this proposed designation does not meet the needs of the Northside residential neighborhood; it does not meet the needs of the Missoula community to provide for neighborhood growth, housing (including higher density single family homes and multifamily rental housing), and economic development; it does not adequately protect the health of children and the safety of the environment; current zoning of the property owned by WWW and SSLLP allows light industrial, commercial, and residential use and development of multi-use zoned areas is occurring within Missoula; Huttig is financially solvent and should be required to conduct a full residential cleanup which would only cost approximately $4,390,666 more (or some marginal amount that DEQ should calculate and make available for public comment); there are no site-specific limitations to a full residential cleanup; the residential area has undergone renewal with increased property sales and this designation impacts neighborhood house values and the ability to retain renters; this cleanup should not defer the cost of future cleanup to the taxpayers; DEQ should hold the polluter ("big business") accountable; human health should be prioritized over profit; zoning should determine the future use of the facility and DEQ is taking away local planning power; the facility would be a great spot for mixed use development; the property is adjacent to developed residences and a park; the property is within the Urban Renewal District; requiring cleanup to a residential level would encourage residential infill development; DEQ is not requiring a residential cleanup because it is concerned about a legal challenge from Huttig or because DEQ has deemed the neighborhood an "undesirable" place to live, which implicates environmental justice issues; DEQ lacks the resources to require a residential cleanup; future potential residential development would reap a greater fiscal benefit for the City and the landowners over time; Huttig should not be allowed input into the future use determination because it has a significant financial interest in the determination; private deed restrictions should not determine the "reasonably anticipated future use" or be allowed to determine cleanup requirements and DEQ should not consider them; and DEQ should follow OSWER Directive 9355.7-19 when determining reasonably anticipated future use.

Of these commenters who disagreed with the proposed designation of reasonably anticipated future use, some of them identified the desire to have the entire facility (including WWW and City property) remediated to residential cleanup levels and others focused their comments on the vacant property owned by SSLLP be remediated to residential cleanup levels. Among the latter commenters were the Missoula County Commissioners as well as the Missoula City Council, which issued Resolution Number 7861 on March 24, 2014, requesting that "DEQ recognize residential use – among a mix of residential and commercial/industrial activities – in its cleanup plan and final remedy decision and apply exposure levels appropriate to such use." The North-Missoula Community Development Corporation also supported this approach and provided its historical perspective and analysis of reasonably anticipated future use, which DEQ reviewed and considered. Finally, there were a few commenters who indicated the facility should be cleaned up beyond residential levels, using terms such as "at least to residential *levels"; "pristine" conditions; "all waste should be removed"; and "to the greatest extent possible."*

DEQ Response: The MWPS Facility is being addressed under CECRA. Section 75-10-721, MCA, is the statutory provision that DEQ follows in selecting the final remedy at a CECRA facility. Subsection (2)(c) states that DEQ "shall select remedial actions, considering present and reasonably anticipated future uses…." A determination of the "reasonably anticipated future use" is important because that determination drives the site-specific cleanup levels (SSCLs) that must be met as part of the remediation at the facility.

Section 75-10-701(18), MCA, defines "reasonably anticipated futures uses" as "likely future land or resource uses that take into consideration:

(a) local land and resource use regulations, ordinances, restrictions, or covenants;
(b) historical and anticipated uses of the facility;
(c) patterns of development in the immediate area; and
(d) relevant indications of anticipated land use from the owner of the facility and local planning officials."

Section 75-10-721(2)(c), MCA, directs DEQ to consider present and reasonably anticipated future uses when selecting remedial actions. The alternative selected will meet SSCLs associated with the reasonably anticipated future use, which is an important consideration in determining the appropriate extent of remediation. Under CECRA, DEQ is required to ensure that the selected remedy protects public health, safety, and welfare and the environment. Generally, evaluating the protectiveness of a remedy includes analysis of the underlying assumptions for exposure based on the reasonably anticipated future use (as defined in Section 75-10-701, MCA) of land at the Facility. The remedial actions selected by DEQ will achieve SSCLs consistent with that reasonably anticipated future land use.

The MWPS Facility is owned by a number of different parties. In order to ensure a comprehensive evaluation of the reasonably anticipated future use of the Facility, DEQ has evaluated the reasonably anticipated future use (as defined in Section 75-10-701, MCA) of the following properties:

1. Property owned by WWW;
2. Property owned by the City;
3. Property owned by SSLLP; and
4. Existing residential neighborhood to the east of Scott Street but within the Facility due to dioxin in one residential yard (1028½ Stoddard Street) exceeding the SSCL and an area where groundwater exceeds SSCLs.

1. Property owned by WWW

a) local land and resource use regulations, ordinances, restrictions, or covenants

WWW purchased approximately 10 acres of property at the southern end of the Facility from Huttig in March 1999 (Grant Deed, 1999). (The exact acreage is not identified in the transfer deeds, so this is an estimate of the acreage size; it does not affect the evaluation of reasonably anticipated future use (as defined in Section 75-10-701, MCA).) In the grant deed, WWW took the property "subject to certain negative easements and restrictive covenants." One of these restriction covenants provides: "[n]o portion of the Property shall be used in any manner for residential purposes or for any type of human residential habitation, whether permanent or temporary. If [WWW] is able to obtain the consent of the Government to lift this restriction on human residential habitation, [Huttig] agrees to remove such restriction from the Property…." These restrictive covenants run with the land, and the restrictive covenants are required to be transferred to subsequent owners of the property. The restrictive covenants can be modified if approved by the Government (as defined in the deed), Huttig, and the current owner of the property.

The WWW property is currently zoned M1R-2 (MOPG, 2011). Missoula Zoning Ordinance 20.15.010 (as updated on January 17, 2014) indicates that "Missoula's industrial (M) zoning districts are primarily intended to accommodate manufacturing, warehousing, wholesale and industrial uses. The regulations are intended to promote the economic viability of manufacturing and industrial uses, encourage employment growth, allow residential uses in the M1R district, and limit the encroachment of unplanned residential and other non-industrial development into the M1 – and M2-zoned areas."

An evaluation of the local land and resource use regulations, ordinances, restrictions, or covenants indicates there is one difference between the local ordinance/zoning and the restrictions and covenants placed on the property when it was transferred to Huttig to WWW. The M1R-2 zoning allows residential use and the restrictive covenants do not allow residential use.

(b) historical and anticipated uses of the Facility

The MWPS Facility is a former lumber mill and wood treating facility, which began operations in 1905 and continued until 1996 (Polk, 1905-1922; Envirocon, 1998). Huttig acquired the MWPS Company on July 31, 1971, and operated the mill until it closed in December 1996 (Envirocon 1998). The operation included using PCP to treat wood, and the former treatment area is on WWW property. Historically, the WWW property was used for industrial purposes.

Currently, WWW is operating a beverage distributing business on its property. Since moving its business to this property, WWW has expanded the operation a number of times. A sampling and analysis plan was submitted and approved for the completion of the phases of expansion (Douglass, 2010). In addition, there is a small woodcutting business on the southern end of the property and it also recently housed a motorcycle repair business (CDM, 2012a).

(c) patterns of development in the immediate area

The eastern boundary of the WWW property is Scott Street and east of Scott Street is a residential neighborhood. The northern boundary of the WWW property is the property owned by the City, which has been developed into commercial use for the City Public Works Department (vehicle maintenance, gravel and sand stockpiles, equipment parking), along with the City park (City, 2013). The western and southern boundaries of the WWW property are industrial properties operated by Montana Rail Link. With the exception of the existing residential neighborhood and the City park, the development in the immediate area of the WWW property has been commercial/industrial.

(d) relevant indications of anticipated land use from the owner of the Facility and local planning officials.

To evaluate anticipated land use of the WWW property, DEQ sent a letter to WWW, who indicated that its property would be used for commercial/industrial purposes in the future (DEQ, 2014b). DEQ also considered WWW's April 7, 2014, comment letter on the Proposed Plan, which indicates that WWW operates a warehouse on its property and supports cleanup to commercial cleanup levels.

To evaluate anticipated land use of the WWW property by local planning officials, DEQ considered a number of sources. First, the Joint Northside/Westside Neighborhood Plan (Plan) (City, 2000) indicates that "[l]ight industrial uses are most intense west of Scott Street, on both sides of the tracks. East of Scott Street, the industrial uses are generally less intense, with a few exceptions. Small shops, mini-storage units, Ozzie's Oil and Refinery, Bitterroot Gymnastics, offices, and construction companies are some of the businesses in the vicinity. These uses have the ability to blend with the adjacent residential areas." The Plan also acknowledges:

> "An adjacent industrial neighborhood to the west, which overlaps with the Northside neighborhood, relies heavily on the railway corridor, rail spurs, truck routes, and adjacent businesses. Elements which these two neighborhoods have in common include transportation, economic development, land use recommendations, and environmental impacts. Scott Street, as the edge of the abutting industrial neighborhood, is a main truck route running through a residential area south of the tracks; it is also the major road for residents to access their homes on the Northside. The location of light industrial uses along the railway corridor of the Plan area is important because it is compatible with the adjacent industrial neighborhood."

The Plan discusses environmental health issues in the Northside and identifies concerns associated with "the presence of diesel fumes blowing into the neighborhoods and trains idling all day" as well as the proximity to Northside transportation corridors (proximity to the Interstate highway, the Orange street interchange, the railroad corridor, and the Louisiana Pacific manufacturing plant) and the potential for a train derailment with a toxic substance release (City, 2000).

The Plan was updated in the 2006 Limited Scope Update to the Northside/Westside Neighborhood Plan (City, 2008). The updated Plan indicates that "[e]nvironmental health issues continue to trouble residents" and that they "would like to work with current owners of the former White Pine Sash property to ensure safe and compatible development." It reiterates that the neighbors are interested in meeting with industry representatives to discuss "adoption of pollution abatement standards and strategies for mitigating environmental health risks such as diesel fumes from idling engines, herbicide spraying, and particulate pollution."

DEQ also considered a January 31, 2011, letter from the Missoula Office of Planning and Grants (MOPG), which states that "it is difficult to imagine that the Zip Beverage property … bounded by the City maintenance shops, the switching yard, and the Scott Street Bridge – would ever be developed for residential use. Instead, it is most likely that the Zip property will continue to be used in a light industrial and/or commercial capacity" (MOPG, 2011).

Summary of Reasonably Anticipated Future Use for WWW property

Local land use regulations provide for commercial/industrial and residential use of the property. Restrictive covenants on the property allow for commercial/industrial use of the property, and restrict residential use unless specifically authorized by Huttig and DEQ. The historical and anticipated uses of this property are commercial/industrial. Patterns of development in the immediate area have been commercial/industrial. WWW and local planning officials have indicated that the WWW property will most likely be commercial/industrial in the future.

There were numerous public comments on the Proposed Plan indicating commenters' request that the entire MWPS Facility (including WWW property) be remediated to residential-based SSCLs. However, requiring cleanup to this level is only warranted if the reasonably anticipated future use of the property is residential. In the case of the WWW property, the only factor that points to future residential use is the current zoning and all other factors point to future commercial/industrial use of this property. In addition, the WWW property has been developed into commercial property, with a number of expansions of the commercial operations in recent years. After carefully considering and weighing the relevant information in the administrative record, and using the factors in Section 75-10-701(18), MCA, DEQ has determined that the reasonably anticipated future use of the WWW property at the MWPS Facility is commercial/industrial.

2. Property owned by the City

a) local land and resource use regulations, ordinances, restrictions, or covenants

The City purchased around four acres of property at the Facility from WWW in 2000. (The exact acreage is not identified in the transfer deeds, so this is an estimate of the acreage size; it does not affect the evaluation of reasonably anticipated future use (as defined in Section 75-10-701, MCA).) In the grant deed from WWW, the City took the property "subject to certain negative easements and restrictive covenants." One of these restrictions provides: "[n]o portion of the Property shall be used in any manner for residential purposes or for any type of human residential habitation, whether permanent or temporary" (Grant Deed, 2000). The City also purchased around 10 acres of property from SSLLP in 2000. (The exact acreage is not identified in the transfer deeds, so this is an estimate of the acreage size; it does not affect the evaluation of reasonably anticipated future use (as defined in Section 75-10-701, MCA).) In the grant deed from SSLLP, the City took the property "subject to certain negative easements and restrictive covenants." One of these restrictions provides: "[n]o portion of the Property shall be used in any manner for residential purposes or for any type of human residential habitation, whether permanent or temporary" (Grant Deed, 2000a).

The City property was zoned as D (industrial) until 2004, when the City approved ordinance number 3261 which rezoned the City property to City Maintenance Facility Special District. This rezoning classification resulted in a prohibition of residential use (City, 2004).

The City, WWW, and SSLLP also each donated one acre of property to create the three-acre White Pine Park, which is owned by the City. This property has been zoned OP1. According to the Missoula Zoning Ordinance 20.20.010 (as updated on January 17, 2014), the OP1 district is "primarily intended to preserve open space and sensitive natural resource areas, including environmentally sensitive and agricultural areas."

An evaluation of the local land and resource use regulations, ordinances, restrictions, or covenants indicates that they are consistent in disallowing residential use of the City property.

(b) historical and anticipated uses of the facility

The MWPS Facility is a former lumber mill and wood treating facility, which began operations in 1905 and continued until 1996 (Polk, 1905-1922; Envirocon, 1998). Huttig acquired the MWPS Company on July 31, 1971, and operated the mill until it closed in December 1996 (Envirocon, 1998). While the actual wood treatment occurred on WWW property, the City property was part of the historical industrial operations including a portion of the former log ponds and lumber storage areas (UM, 2014).

Three acres of City-owned property has been developed into a City park. The other portion of City property is being used for its Public Works Department.

(c) patterns of development in the immediate area

The eastern boundary of the City property is Scott Street and east of Scott Street is a residential neighborhood. The northern boundary of the City property is the property owned by SSLLP, which is vacant. The southern boundary of the City property is property owned by WWW, and the western boundary is property operated by Montana Rail Link. With the exception of the existing residential neighborhood and the City park, the development in the immediate area of the City property has been commercial/industrial.

(d) relevant indications of anticipated land use from the owner of the facility and local planning officials.

To evaluate anticipated land use of the City property, DEQ sent a letter to the City, who indicated an intention that its property, with the exception of the park, be used for commercial/industrial purposes in the future (DEQ, 2013b; City, 2013). This intended use is underscored by the significant commercial development of the property undertaken by the City in recent years. For example, the City property includes its Public Works Department maintenance shops, a small office building, and a large shed for road sand (MOPG, 2011). The

City has also planned for additional storage sheds and additional City maintenance shops and offices (MOPG, 2011). More recently, the City indicated its intent to construct a heated equipment storage building adjacent to the north shop wall (City, 2013). In addition, DEQ staff visited the City property on May 9, 2014, and observed covered equipment sheds that the City had recently constructed.

To evaluate anticipated land use of the City property by local planning officials, DEQ considered a number of sources. First, the Plan (City, 2000) indicates that "[l]ight industrial uses are most intense west of Scott Street, on both sides of the tracks. East of Scott Street, the industrial uses are generally less intense, with a few exceptions. Small shops, mini-storage units, Ozzie's Oil and Refinery, Bitterroot Gymnastics, offices, and construction companies are some of the businesses in the vicinity. These uses have the ability to blend with the adjacent residential areas." The Plan also acknowledges:

> "An adjacent industrial neighborhood to the west, which overlaps with the Northside neighborhood, relies heavily on the railway corridor, rail spurts, truck routes, and adjacent businesses. Elements which these two neighborhoods have in common include transportation, economic development, land use recommendations, and environmental impacts. Scott Street, as the edge of the abutting industrial neighborhood, is a main truck route running through a residential area south of the tracks; it is also the major road for residents to access their homes on the Northside. The location of light industrial uses along the railway corridor of the Plan area is important because it is compatible with the adjacent industrial neighborhood."

The Plan discusses environmental health issues in the Northside and identifies concerns associated with "the presence of diesel fumes blowing into the neighborhoods and trains idling all day" as well as the proximity to Northside transportation corridors (proximity to the Interstate highway, the Orange street interchange, the railroad corridor, and the Louisiana Pacific manufacturing plant) and the potential for a train derailment with a toxic substance release (City, 2000).

The Plan was updated in the 2006 Limited Scope Update to the Northside/Westside Neighborhood Plan (City, 2008). The updated Plan indicates that "[e]nvironmental health issues continue to trouble residents" and that they "would like to work with current owners of the former White Pine Sash property to ensure safe and compatible development." It reiterates that the neighbors are interested in meeting with industry representatives to discuss "adoption of pollution abatement standards and strategies for mitigating environmental health risks such as diesel fumes from idling engines, herbicide spraying, and particulate pollution."

DEQ also considered a January 31, 2011, letter from the MOPG, which states "that only foreseeable uses of the City property are current uses: a park for the eastern portion of the City-owned property and City office and maintenance shops facilities for the balance" (MOPG, 2011).

Summary of Reasonably Anticipated Future Use for City property

Local land use regulations provide for commercial/industrial use of the western portion of the City property and the eastern portion is restricted to open space. The zoning no longer allows residential use of the City property. Restrictive covenants on the City property allow for commercial/industrial use of the property, and restrict residential use unless specifically authorized by Huttig and DEQ. The historical and anticipated uses of this property are commercial/industrial (with the exception of the eastern portion of the City property where the park is located). Patterns of development in the immediate area have been primarily commercial/industrial (with the exceptions of the park and the existing residential neighborhood to the east). The City and local planning officials have indicated that the property will most likely be commercial/industrial in the future.

There were numerous public comments on the Proposed Plan indicating commenters' request that the entire MWPS Facility (including City property) be remediated to residential-based SSCLs. However, requiring cleanup to this level is only warranted if the future anticipated use of the property is residential. In the case of the City property, an analysis of the factors does not support a finding of future residential use for the City property. In addition, most of the City property has been developed into commercial property, with a number of expansions of the commercial operations in recent years. After carefully considering and weighing the relevant information in the administrative record, and using the factors in Section 75-10-701(18), MCA, DEQ has determined that the reasonably anticipated future use of the western portion of the City property at the MWPS Facility is commercial/industrial and the reasonably anticipated future use of the eastern portion of the City property at the MWPS Facility (the park) is recreational/open space.

3. Property owned by the SSLLP

a) local land and resource use regulations, ordinances, restrictions, or covenants

SSLLP purchased around 30 acres of property at the Facility from Huttig in March 1999 (Grant Deed, 1999a). (The exact acreage is not identified in the transfer deeds, so this is an estimate of the acreage size; it does not affect the evaluation of reasonably anticipated future use (as defined in Section 75-10-701, MCA).) In the grant deed, SSLLP took the property "subject to certain negative easements and restrictive covenants." One of these restrictions provides: "[n]o portion of the Property shall be used in any manner for residential purposes or for any type of human residential habitation, whether permanent or temporary. If [SSLLP] is able to obtain the consent of the Government to lift this restriction on human residential habitation, [Huttig] agrees to remove such restriction from the Property…." These restrictive covenants run with the land, and the restrictive covenants are required to be transferred to subsequent owners of the property. The restrictive covenants can be modified if approved by the Government (as defined in the deed), Huttig, and the current owner of the property. SSLLP subsequently sold the City approximately 10 acres of property in 2000 and also donated one acre to the City for the park. Currently SSLLP owns approximately 19 acres of property.

The SSLLP property is currently zoned M1R-2 (MOPG, 2011). Missoula Zoning Ordinance 20.15.010 (as updated on January 17, 2014) indicates that "Missoula's industrial (M) zoning districts are primarily intended to accommodate manufacturing, warehousing, wholesale and industrial uses. The regulations are intended to promote the economic viability of manufacturing and industrial uses, encourage employment growth, allow residential uses in the M1R district, and limit the encroachment of unplanned residential and other non-industrial development into the M1 – and M2-zoned areas." As indicated in its comments on the Proposed Plan, SSLLP requested that its property be rezoned to exclude potential residential use, but that rezoning has not been approved.

An evaluation of the local land and resource use regulations, ordinances, restrictions, or covenants indicates there is one difference between the local ordinance/zoning and the restrictions and covenants placed on the property when it was transferred from Huttig to SSLLP. The M1R-2 zoning allows residential use and the restrictive covenants do not allow residential use.

(b) historical and anticipated uses of the Facility

The MWPS Facility is a former lumber mill and wood treating facility, which began operations in 1905 and continued until 1996 (Polk, 1905-1922; Envirocon, 1998). Huttig acquired the MWPS Company on July 31, 1971, and operated the mill until it closed in December 1996 (Envirocon, 1998). Although wood was not treated on the SSLLP property, it was part of the MWPS operations and included the log ponds and a teepee burner. Historically, the SSLLP property was used for industrial purposes. Currently, the SSLLP property is vacant.

(c) patterns of development in the immediate area

The eastern boundary of the SSLLP property is Scott Street and east of Scott Street is a residential neighborhood. The northern boundary of the SSLLP property is the property owned by Clawson Distributing, which has historically been commercial property and is not included within the MWPS Facility. The western boundary of the SSLLP property is property operated by Montana Rail Link. The southern boundary of the SSLLP property is property owned by the City, which has been developed into a City park and into commercial use for the City Public Works Department (vehicle maintenance, gravel and sand stockpiles, equipment parking). With the exception of the existing residential neighborhood and the City park, the development in the immediate area of the SSLLP property has been commercial/industrial.

(d) relevant indications of anticipated land use from the owner of the Facility and local planning officials.

To evaluate anticipated land use of the SSLLP property, DEQ sent a letter to SSLLP, who indicated an intention that its property be used for commercial/industrial purposes in the future (DEQ, 2013b; DEQ, 2013c; DEQ, 2014). SSLLP had previously indicated its intention to use its property for commercial/industrial purposes in 2011 (SSLLP, 2011). DEQ also considered SSLLP's April 11, 2014, comment letter on the Proposed Plan, which indicates that "the intended purpose for development is commercial/industrial."

To evaluate anticipated land use of the SSLLP property by local planning officials, DEQ considered a number of sources. First, the Plan (City, 2000) indicates that "[l]ight industrial uses are most intense west of Scott Street, on both sides of the tracks. East of Scott Street, the industrial uses are generally less intense, with a few exceptions. Small shops, mini-storage units, Ozzie's Oil and Refinery, Bitterroot Gymnastics, offices, and construction companies are some of the businesses in the vicinity. These uses have the ability to blend with the adjacent residential areas." The Plan also acknowledges:

> "An adjacent industrial neighborhood to the west, which overlaps with the Northside neighborhood, relies heavily on the railway corridor, rail spurts, truck routes, and adjacent businesses. Elements which these two neighborhoods have in common include transportation, economic development, land use recommendations, and environmental impacts. Scott Street, as the edge of the abutting industrial neighborhood, is a main truck route running through a residential area south of the tracks; it is also the major road for residents to access their homes on the Northside. The location of light industrial uses along the railway corridor of the Plan area is important because it is compatible with the adjacent industrial neighborhood."

The Plan discusses environmental health issues in the Northside and identifies concerns associated with "the presence of diesel fumes blowing into the neighborhoods and trains idling all day" as well as the proximity to Northside transportation corridors (proximity to the Interstate highway, the Orange street interchange, the railroad corridor, and the Louisiana Pacific manufacturing plant) and the potential for a train derailment with a toxic substance release (City, 2000).

The Plan was updated in the 2006 Limited Scope Update to the Northside/Westside Neighborhood Plan (City, 2008). The updated Plan indicates that "[e]nvironmental health issues continue to trouble residents" and that they "would like to work with current owners of the former White Pine Sash property to ensure safe and compatible development." It reiterates that the neighbors are interested in meeting with industry representatives to discuss "adoption of pollution abatement standards and strategies for mitigating environmental health risks such as diesel fumes from idling engines, herbicide spraying, and particulate pollution."

In its April 11, 2014, letter, SSLLP points out that its intended development of its property as commercial/industrial "will coincide with the development of land from Scott Street to Reserve Street and compliment the fact that a platted and accepted rail easement exists across the City property to the [SSLLP property] thereby offering the opportunity for a commercial or industrial entity to utilize rail transportation" and that its property "is only one of two parcels in Missoula with such rail access to attract industrial commercial businesses in need of rail transport…."

DEQ also considered a January 31, 2011, letter from the MOPG, which states that "the most likely future use for the northern portion of [the facility] is less certain. However, the property:

1) Is adjacent to a park and a residential neighborhood;
2) Is convenient to Downtown and the Northside;

3) Is flanked to the north by recent residential development; and
4) Has been the subject of earnest residential development efforts.

This leads me to conclude the residential use is one of the most valuable and most viable potential future uses of the northern portion of [the Facility]" (MOPG, 2011).

In an email dated October 16, 2013, SSLLP explained that it had "only one serious inquiry to develop housing on [its property] in the 15 years" that SSLLP has owned the property and that the residential development failed (SSLLP, 2013). SSLLP also indicated that it had received approximately 100 other inquiries, all of which were non-residential. DEQ notes that it spent significant time working with a residential developer for the SSLLP property between 2003 and 2004 and that, after that time, SSLLP marketed the property as having potential residential use (Oaks, 2005).

Summary of Reasonably Anticipated Future Use for SSLLP property

Local land use regulations provide for commercial/industrial and residential use of the property. Restrictive covenants on the property allow for commercial/industrial use of the property, and restrict residential use unless specifically authorized by Huttig and DEQ. The historical uses of this property are commercial/industrial. With the exception of the existing residential neighborhood and the City park, the development in the immediate area of the SSLLP property has been commercial/industrial. The owner of the SSLLP property has indicated that the property will most likely be commercial/industrial in the future; the MOPG identified residential use as "one of the most valuable and most viable potential future uses" of the property.

The statutory analysis of the reasonably anticipated future uses of the WWW property and SSLLP property is similar: the zoning and restrictive covenants on the properties are the same; both properties were used as part of the historical MWPS operations; the patterns of development in the immediate area are generally the same; and both property owners have expressed their intent that their property be used as commercial/industrial property in the future. The primary differences between the two properties are (1) a local planning official has indicated his belief that residential use is "one of the most valuable and most viable potential future uses" of the SSLLP property; and (2) WWW has developed its property commercially, and SSLLP has only expressed intent for commercial development but the property remains vacant.

The statutory analysis of the reasonably anticipated future uses of the City property and SSLLP property is also similar: the restrictive covenants on the properties is the same; both properties were used as part of the historical MWPS operations; the patterns of development in the immediate area is the same; and both property owners have expressed their intent that their property be used as commercial/industrial property in the future (or, for the park property, as open space). The primary differences between the two properties are (1) a local planning official has indicated his belief that residential use is "one of the most valuable and most viable potential future uses" of the SSLLP property; (2) the City has developed its property commercially and SSLLP has only expressed an intent for commercial development but the property remains vacant; and (3) the City has been successful in having its property rezoned and SSLLP's request for rezoning has not been approved.

In the case of the SSLLP property, factors that point to future residential use include the current zoning and a 2011 letter from the MOPG indicating residential use is a potential future use. In addition, unlike the WWW and City properties which have been developed into commercial operations, the SSLLP property is vacant. DEQ also notes that SSLLP previously marketed the property as residential and DEQ worked with a residential developer in the past. The SSLLP property's unique location, adjacent to commercial/industrial operations on the west, the City Park to the south, and the residential neighborhood to the east, provides additional future use opportunities not necessarily available on the WWW and City properties, which have already been developed commercially. DEQ recognizes the desire by the local community and local government to not foreclose the possibility of future residential use on the SSLLP property. At the same time, however, DEQ recognizes that the owner of the SSLLP property has expressed an interest in commercial use of the property; that the property has existing restrictions that prohibit residential use unless approved by Huttig and DEQ; that the property has historically been used for commercial/industrial purposes; and that a platted rail easement exists to this property which offers a commercial/industrial business the ability to utilize rail transportation.

Section 75-10-701, MCA, identifies the factors DEQ must evaluate to determine the reasonably anticipated future use of the Facility. Evaluation of some of the factors pointed to future residential use and some of the factors pointed to future commercial/industrial use, and neither was particularly more compelling than the other. Therefore, DEQ further considered Section 75-10-721(3), MCA, which directs DEQ to "consider the acceptability of the [remedial] actions to the affected community, as indicated by community members and the local government." There were commenters who indicated the SSLLP property should have commercial use in the future; however, there were many more commenters who indicated a desire for future residential use.

DEQ has balanced the statutory analysis of "reasonably anticipated future use" as well as the competing interests expressed during the public comment period. After carefully weighing the relevant information in the administrative record, and using the factors in Section 75-10-701(18), MCA, as well as a consideration of Section 75-10-721(3), MCA, DEQ has determined that the reasonably anticipated future use of the western portion (approximately 9.3 acres) of the SSLLP property at the MWPS Facility is commercial/industrial. This is the portion of the SSLLP property that is closer to the operating railyard and the platted rail easement across the City's property to the SSLLP property. DEQ has carefully weighed the relevant information in the administrative record, and using the factors in Section 75-10-701(18), MCA, as well as a consideration of Section 75-10-721(3), MCA, and has determined that the reasonably anticipated future use of the eastern portion (approximately 9.7 acres) of the SSLLP property at the MWPS Facility is residential.

DEQ will require that the eastern portion of the SSLLP property (which is adjacent to the City park and the residential area) be remediated to meet residential-based SSCLs. This blending of property uses for the SSLLP property is consistent with the Plan; balances the competing interests expressed by the property owner, the local community, and local government; and is consistent with the analysis of Section 75-10-701(18), MCA. Remediation of the eastern portion of the SSLLP property to meet residential SSCLs will result in approximately 9.7 acres of the 19-acre SSLLP property meeting residential SSCLs (see Figure 9). This does not require that the future development and use of the property be residential, but such a use would be a potential future option because residential SSCLs will be met.

4. Property East of Scott Street

Currently, a small portion of the existing residential neighborhood to the east of Scott Street is within the MWPS Facility due to dioxin in one residential yard (1028½ Stoddard Street) exceeding the SSCL and groundwater exceeding SSCLs. This area was not part of the historical MWPS operations. However, because it is within the Facility, DEQ conducted a reasonably anticipated future use analysis for this property as a whole.

a) local land and resource use regulations, ordinances, restrictions, or covenants

The property east of Scott Street is currently zoned RM1-45 (MOPG, 2011). Missoula Zoning Ordinance 20.05.010 (as updated on January 17, 2014) indicates that "Missoula's residential (R) zoning districts are primarily intended to create, maintain and promote a variety of housing opportunities for individual households and to maintain and promote the desired physical character of existing and developing neighborhoods. While the districts primarily accommodate residential use types, some nonresidential uses are also allowed."

(b) historical and anticipated uses of the Facility

Based upon a review of historical and current aerial photographs taken from 1948 through 2014, the property east of Scott Street has historically been used for residential property (UM, 2014). DEQ is not aware of any information that would suggest the anticipated use of this property will change.

(c) patterns of development in the immediate area

The eastern, northern, and southern boundary of the property east of Scott Street is a continuation of the residential neighborhood. The western boundary of the residential property (across Scott Street) is SSLLP, which is vacant; the City property, which has been developed as commercial/industrial property and City park; and the WWW property, which has been developed as commercial/industrial property.

(e) relevant indications of anticipated land use from the owner of the facility and local planning officials.

To evaluate anticipated land use of the property east of Scott Street by local planning officials, DEQ considered a number of sources. First, the Plan (City, 2000) references the "adjacent residential areas" with no suggestion that these areas will be changing in the future. The Plan also discusses environmental health issues in the Northside and identifies concerns associated with “the presence of diesel fumes blowing into the neighborhoods and trains idling all day.” The Plan was updated in the 2006 Limited Scope Update to the Northside/Westside Neighborhood Plan (City, 2008). The updated Plan indicates that “[e]nvironmental health issues continue to trouble residents” and that they “would like to work with current owners of the former White Pine Sash property to ensure safe and compatible development.” It reiterates that the neighbors are interested in meeting with industry representatives to discuss “adoption of pollution abatement standards and strategies for mitigating environmental health risks such as diesel fumes from idling engines, herbicide spraying, and particulate pollution.” There is no suggestion in the update that the residential area will be converted to a different use in the future.

DEQ also considered that the area east of Scott Street has been primarily residential for many years and that it is zoned residential. DEQ did not get any comments on the Proposed Plan indicating that other uses might be preferred for this area. In fact, a number of commenters identified the amount of redevelopment and resale of residential property in the area, which further supports that the anticipated future use of this area is residential.

DEQ also considered a January 31, 2011, letter from the MOPG, which states that the “area to the east of White Pine Sash is immutably residential” (MOPG, 2011).

<u>Summary of Reasonably Anticipated Future Use for property east of Scott Street</u>

Local land use regulations provide for residential use of the property. The historical and anticipated uses of this property are residential. Patterns of development in the immediate area have been commercial/industrial and recreational (on the west) and primarily residential on the other three sides. Local planning officials have indicated that the property is “immutably residential” and a number of commenters confirmed their current and intended future use of their property as residential. After carefully considering and weighing the relevant information in the administrative record, and using the factors in Section 75-10-701(18), MCA, DEQ has determined that the reasonably anticipated future use of the property east of Scott Street within the MWPS Facility is residential.

Other concerns raised by the commenters related to reasonably anticipated future identified above not addressed specifically by DEQ’s response above include:

a. *Remediating to commercial/industrial levels does not adequately protect the health of children and the safety of the environment.*

   <u>Response:</u> SSCLs based on a commercial/industrial exposure assumed that a worker would be exposed to MWPS Facility soils 187 days per year (assumes five-day work weeks, a two-week vacation, and three months of snow-cover) for 25 years and would ingest 50 milligrams (mg) of soil per day each of those days (CDM, 2012). Even with their smaller size, given that children are not anticipated to be present on the non-park City, WWW, and western portions of the SSLLP properties for 187 days per year for 25 years, cleanup to SSCLs protective of commercial/industrial workers on these properties will be protective of adjacent residential areas. Further, inhalation of dust generated from surface and subsurface

soils was evaluated in the BRA (CDM, 2001) and BRA Addendum (CDM, 2012) for the future on-site and current/future off-site residential exposure scenarios (and all other scenarios as well). These evaluations determined that the dust inhalation pathway is not significant compared to the soil ingestion pathway (CDM, 2001; CDM, 2012). As a result, cleanup to SSCLs protective of the various exposure scenarios (commercial/industrial or recreational), which evaluated risks associated with soil ingestion along with other pathways, will remove the elevated contaminant concentrations and dust generation post-cleanup will not pose an unacceptable risk. SSCLs protective of direct contact with contamination combined with those calculated for the soil contamination leaching to groundwater pathway are adequate to ensure protection of the environment.

b. Huttig is financially solvent and should be required to conduct a full residential cleanup which would only cost approximately $4,390,666 more.

<u>Response:</u> DEQ will require Huttig to implement the final remedy. However, DEQ is limited to what it can require by the statutory provisions under which the cleanup is being conducted, and that includes requiring cleanup consistent with the reasonably anticipated future use. In other words, DEQ cannot require more than what is justified by the statute and will not require less. Financial solvency is not a consideration for selecting the remedy under CECRA.

c. There are no site-specific limitations to a full residential cleanup.

<u>Response:</u> DEQ is limited to what it can require by the statutory provisions under which the cleanup is being conducted, and that includes requiring cleanup consistent with the reasonably anticipated future use which must be evaluated in accordance with Section 75-10-701(18), MCA. DEQ cannot require more than what is justified by the statute and will not require less.

d. DEQ is not requiring a residential cleanup because it is concerned about a legal challenge from Huttig or because it has deemed the neighborhood an "undesirable" place to live, which implicates environmental justice concerns.

<u>Response:</u> DEQ will require cleanup consistent with its authority under CECRA. DEQ is limited to what it can require by the statutory provisions under which the cleanup is being conducted, and that includes requiring cleanup consistent with the reasonably anticipated future use, which must be evaluated in accordance with Section 75-10-701(18), MCA. DEQ cannot require more than what is justified by the statute and will not require less. Neither will DEQ decline to require a cleanup that is statutorily justified because DEQ is concerned about a legal challenge. In addition, DEQ has never identified the Northside as an undesirable place to live. With its comments on the Proposed Plan, the North-Missoula Community Development Corporation included a memo dated November 7, 2013, from Huttig's attorney. That memo was also provided by Huttig in its comments. In that memo, it indicated that, because two of the large manufacturing businesses on or near the MWPS Facility were no longer operating, there was "little desire or need to live by" the property. The memo also indicates that "most people do not desire to live in the proximity of the

railyard…." However, this is not a DEQ document; DEQ has never deemed the neighborhood "undesirable"; and DEQ will require cleanup on a site-specific basis based upon an objective analysis of the statutory factors. Two commenters mentioned environmental justice. This term is not defined CECRA; however, the U.S. Environmental Protection Agency (EPA) defines environmental justice as "fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (http://www.epa.gov/environmentaljustice/). While EPA's definition is not binding on DEQ, it was considered by DEQ in responding to these comments. CECRA provides for public comment in DEQ's decision-making for final remedial actions. DEQ has reviewed and considered all public comment received on the Proposed Plan regardless of who that comment came from and has addressed and integrated the concerns raised by the comment to the extent possible and in accordance with CECRA.

e. *Huttig should not be allowed input into the future use determination because it has a significant financial interest in the determination.*

   Response: CECRA does not limit the liable person's ability to provide public comment on the Proposed Plan and DEQ reviewed and considered Huttig's comments along with all other comments received.

f. *Private deed restrictions should not determine the "reasonably anticipated future use" or be allowed to determine cleanup requirements.*

   Response: When evaluating risk associated with potential future uses of the Facility in the BRA and BRA Addendum, DEQ did not consider the existence of the deed restrictions. That is why DEQ generated SSCLs for potential future residential use of the Facility. Similarly, DEQ did not allow the existence of the deed restrictions to determine the scope of other remedial actions to date, such as the RI, supplemental investigations, and FS. For example, DEQ required that Huttig sample the SSLLP property using a residential sampling density. However, once DEQ is at the point of determining the final remedy, Section 75-10-721(2)(c), MCA, requires that DEQ consider reasonably anticipated future uses of a facility when selecting remedial actions. Section 75-10-701(18), MCA, defines the criteria DEQ is required to consider when evaluating reasonably anticipated future use which, as described above, impacts which site-specific cleanup levels must be met. That statute mandates a consideration of "local land and resource use regulations, ordinances, restrictions, or covenants." Therefore, private deed restrictions are considered amongst the other factors, but are not, in and of themselves, determinative.

g. *The facility should be cleaned up beyond residential levels, using terms such as "at least to residential levels"; "pristine" conditions; "all waste should be removed"; and "to the greatest extent possible."*

   Response: DEQ requires cleanup to levels determined to be protective for the current and reasonably anticipated future uses of the various properties. Specifically, DEQ derives

SSCLs such that they do not result in a cumulative excess lifetime cancer risk greater than 1 in 100,000 ($1x10^{-5}$) or a hazard quotient of one for non-carcinogenic compounds.

h. *DEQ should calculate the marginal cost of a residential cleanup on the SSLLP property including additional excavation and disposal costs, sampling, and construction oversight and make that information available for public comment.*

Response: Cost estimates for the various cleanup options considered are included in the FS (Douglass, 2015) and utilized a unit cost approach combined with the soil volume associated with cleanup to residential SSCLs as they represented the largest soil volume and therefore the highest cleanup cost estimates. This is a conservative approach given that the future anticipated use determination is not identified until the Proposed Plan, which is issued after the FS is prepared by the liable person. The cost estimate included in the Proposed Plan is the one associated with DEQ's preferred remedy, which is often a combination of alternatives. As such, DEQ utilizes the unit costs from the FS and the appropriate soil volume estimates based on the future anticipated use determination identified within the Proposed Plan. Preparation of the Proposed Plan and associated cost estimates for the preferred remedy requires a significant expenditure of time and effort by DEQ that the liable person is required to reimburse. Cost of cleanup is not a consideration in DEQ's evaluation of "reasonably anticipated future use." As a general practice, DEQ does not calculate cost estimates for all potential combinations of future use separate from that outlined in the preferred remedy. Doing so is an unnecessary expenditure of time and effort, particularly given that cost is not one of the threshold criteria on which DEQ must base its decision on future use. Rather, cost effectiveness, as determined through an evaluation of incremental risk reduction, is a balancing criterion when selecting the overall remedy. Therefore, if two alternatives achieve the same level of risk reduction, only then would the cost be a potentially deciding factor. With that said, the FS includes cost estimates for removal and off-site disposal of dioxin-contaminated soil exceeding residential cleanup levels and the commenter can refer to those estimates for more information.

i. *DEQ should not consider the existence of private deed restrictions and DEQ has consistently said it would not recognize the deed restrictions unless the SSLLP property was rezoned. DEQ is usurping local zoning authority.*

Response: Section 75-10-721(2)(c), MCA, requires that DEQ consider reasonably anticipated future uses of a facility when selecting remedial actions. Section 75-10-701(18), MCA, defines the criteria DEQ is required to consider when evaluating reasonably anticipated future use which, as described above, impacts which site-specific cleanup levels (SSCLs) must be met. The criteria include a consideration of "local land and resource use regulations, ordinances, restrictions, or covenants." Therefore, private deed restrictions are considered amongst the other factors when evaluating reasonably anticipated future use, but are not, in and of themselves, determinative. DEQ has not stated that it would not recognize the deed restrictions on the SSLLP property unless the property was rezoned. Rather, DEQ has identified the four statutory criteria it evaluates when evaluating reasonably anticipated future use, one of which includes zoning considerations. The commenter is correct that DEQ has historically told Huttig that it would not recognize the deed restrictions when conducting the remedial actions to date, such as the remedial investigation, supplemental investigations, and feasibility study. For example, DEQ required that Huttig sample the SSLLP property using a residential sampling density and DEQ also established residential SSCLs in the BRA and BRA Addendum. It is not until the Proposed Plan that the existence of these deed restrictions is evaluated by DEQ as required by the statute.

j. *DEQ has indicated it "scrupulously follows the same policies that the EPA uses in analysis and remediation of all federal superfund sites." Therefore, DEQ should be bound by the March 17, 2010, OSWER Directive 9355.7-19 when determining reasonably anticipated future use.*

   Response: DEQ is authorized to conduct remedial actions at the MWPS Facility under CECRA. When CECRA or state law does not direct otherwise, DEQ may use EPA guidance where appropriate but is not required to follow or be bound by that guidance. However, not all EPA guidance is used; for example, when calculating SSCLs, EPA allows an acceptable risk range for cancer causing compounds of an increased cancer risk of $1x10^{-4}$ through $1x10^{-6}$. DEQ does not provide for this range and requires that SSCLs be calculated based on cumulative risk levels less than or equal to a total excess cancer risk of $1x10^{-5}$ for cancer causing compounds. Each agency evaluates site-specific conditions and makes its own decisions regarding cleanup on a site-specific basis. DEQ disagrees that it has indicated that it "scrupulously follows" EPA policy. In addition, under CECRA, the Montana Legislature has enacted state law identifying what criteria DEQ must use in evaluating reasonably anticipated future use, and those criteria are not the same as the OSWER directive mentioned by the commenter. Therefore, DEQ will comply with state law in conducting the reasonably anticipated future use analysis.

k. *DEQ should require cleanup of the SSLLP property to meet residential SSCLs, and should include confirmation sampling to ensure those cleanup levels are met.*

   Response: DEQ has determined that residential SSCLs must be met on the eastern portion of the SSLLP property based upon the reasonably anticipated future use determination. DEQ will require that confirmation sampling be included as part of remedial design and final cleanup for the SSLLP and all other properties requiring cleanup.

2. *While not specifically a comment on the Proposed Plan, two commenters criticized DEQ for its inactivity in pursuing a timely ROD and indicated DEQ's inaction had been the greatest barrier to the Facility's successful remediation and reuse.*

   Response: Progress toward a ROD at the MWPS Facility has been slow in the past, due to a number of factors. Specifically, since completion of the RI in 1998, contamination has been identified in areas previously unknown to contain contamination. Discovery of new contamination required additional investigation to determine the nature and extent of contamination in these areas. Additionally, much of the delay in progress toward a ROD can be directly correlated to interim actions conducted at the MWPS Facility. Over the years there have been numerous interim actions to allow WWW and the City to cleanup and redevelop their respective properties. Additionally, there have been numerous interim actions conducted on behalf of Huttig that have removed contamination from areas of the MWPS Facility. DEQ also expended a significant amount of time working on an interim action development proposal for the SSLLP property. For these interim actions to occur, DEQ must review and approve the interim action work plans to ensure that the actions proposed are consistent with a final remedy. Had these interim actions not been performed, there would be significantly more contamination present at the MWPS Facility that may present a risk to human health and the environment that would still have to be addressed through the final remedy. Interim actions at the Facility have been instrumental in removing contamination and allowing redevelopment to occur, but have been undertaken at the cost of timely advancement toward a ROD. This is a recognized tradeoff in the superfund process. Given that number of interim actions at the Facility and that the WWW, City, and residential property to the east of Scott Street has been redeveloped or improved, DEQ does not agree that the Facility has not had any remediation or reuse.

3. *One commenter indicated that institutional controls have failed to protect those living in proximity to the site. In 1999, Huttig constructed the total fluids recovery (TFR) building without the approval of DEQ and in fall of 2013, the residence at 1028 ½ Stoddard Street was demolished without the approval of the city or DEQ. (Another commenter referred to this building removal as "illegal.") Institutional controls will not prevent soil remediated to a commercial/industrial SSCL from traveling into the current residential neighborhood through human or natural activity, primarily winds from the west blowing across the property. Another commenter indicated that prevailing westerly winds and a relatively shallow water table spread contaminants into the surrounding neighborhood. A different commenter indicated that city building officials could not ensure compliance with institutional controls through local building or excavation permits and that institutional controls for soil exposure should only be considered if they are consistent with local land use and building regulations. Another commenter questioned how a layering of additional restrictive covenants would be monitored or enforced.*

Response: Currently there are no DEQ-approved institutional controls in place at the MWPS Facility as those are not selected by DEQ until it issues the ROD. Some commenters indicated that DEQ should limit the use of institutional controls; however, consideration of use of these controls is required by Section 75-10-721(2)(c), MCA. When the TFR building was constructed in 1999, Huttig did not obtain DEQ approval, and DEQ has repeatedly informed Huttig that it may be necessary to remove the TFR building to remove contaminated soils. DEQ approval for the demolition of the residence on Stoddard Street was similarly not required by CECRA. As described in response to comment 1(a), inhalation of dust generated from surface and subsurface soils was evaluated in the BRA (CDM, 2001) and BRA Addendum (CDM, 2012) for the future on-site and current/future off-site residential exposure scenarios (and all other scenarios as well). These evaluations determined that the dust inhalation pathway is not significant compared to the soil ingestion pathway (CDM, 2001; CDM, 2012). In addition, sampling conducted east of Scott Street identified only one property had surface soil impacts above residential-based SSCLs, confirming that contaminants were not widely spread into the neighborhood surface soil via deposition as dust. Therefore, given that dust being blown into the residential neighborhood did not result in widespread contamination and was determined not to pose an unacceptable risk prior to cleanup of the MWPS Facility, dust blown into the neighborhood post cleanup will be of lower concentration than in the past and will still not pose an unacceptable risk. The selected remedy requires in-situ chemical oxidation (ISCO) of the contaminated groundwater underlying the residential neighborhood, which will reduce contaminant concentrations. Monitoring and enforcement of the institutional controls is included in the cost estimates, and will be incorporated into the long-term monitoring program.

4. *One commenter indicated that engineering controls surrounding the site have been lacking and people often travel beyond the park boundary to the SSLLP property. Others identified that children trespass on the property and play in the dirt.*

Response: There are currently no DEQ-mandated engineering controls at the Facility. However, engineering controls have been included in the ROD. In any case, these controls can only limit a certain amount of access by trespassers. However, incidental exposure to soils will not result in unacceptable health concerns as the risk from exposure is over the long-term. DEQ evaluated the current and future on-site trespasser scenario in the BRA (CDM, 2001) assuming that a trespasser would access the property at a frequency of 75 days per year for 13 years (a typical timeframe assumed for trespassers (ages 6 to 18 years of age)) and determined the SSLLP property did not pose an unacceptable risk to the trespasser. The BRA Addendum did not recalculate the risks to the current and future on-site trespasser as SSCLs protective of residential or commercial/industrial workers are protective of trespassers given that the assumptions for residential (270 days per year for a total of 30 years) and commercial/industrial workers (187 days per year for 25 years) assume higher exposures than would be assumed for a trespasser (CDM, 2012). In any case, DEQ has determined that residential SSCLs must be met on the eastern portion of the SSLLP property which is just north of the City park, so long-term risk will be mitigated.

5. *There were no bioremediation trials for the soil and to more accurately estimate the cost and time involved in treating soils, this should have been done rather than simply stating that bioremediation is a presumptive remedy.*

Response: One of the purposes of a presumptive remedy is to avoid unnecessary pilot tests because the technology has already been established as viable and effective, which is what DEQ assumes the commenter means by “bioremediation trials.” Treatability studies to optimize soil treatment in the LTU to determine site-specific treatment timeframes and to optimize system design may occur as part of remedial design if necessary. However, as discussed in the ROD, information on designing and optimizing the LTU already exists, both in the presumptive remedy document prepared by EPA (EPA, 1995) and for a similar site in Montana (AECOM, 2009). In terms of estimating costs, Huttig prepared the FS and included an estimate of costs that provide interested parties with rough-order-of-magnitude estimates to implement specific tasks. These are preliminary cost estimates only. Final remedial design and implementation will determine actual cost.

6. *The time allowed between soil and water oxidation treatments should include a full hydrological cycle of 13 months in order to ensure there will be no contaminant rebound in the groundwater from the source zone.*

Response: Design of the various remedy components, including the ISCO groundwater remedy, will occur during the remedial design phase. Implementation of the ISCO groundwater remedy will likely require monitoring prior to, during, and after injection of the selected oxidant. Typically, post-injection monitoring occurs for some time to ensure that the chemical reaction is occurring to destroy the targeted contamination. Timeframes between injection events can vary from months to years depending on the oxidant, site-specific design of the injection program, and phasing of other portions of the remedy. Evaluation of contaminant rebound is an essential part of the post-injection monitoring process and will be factored into the monitoring program and overall remedial design of the ISCO groundwater remedy.

7. *How will the general public and direct neighbors be kept updated during the cleanup process and how will the public know that the cleanup process is being executed properly?*

Response: During the remedial design and cleanup process, DEQ will provide updates via the mail to members of the MWPS Facility mailing list, and on the MWPS Facility project website. DEQ will host public meetings as needed to convey information about upcoming work and will publish press releases and site updates distributed via the mailing list to communicate the progress at the MWPS Facility. Additionally, DEQ's project staff is available via email and telephone to answer questions throughout the CECRA process. DEQ's staff, or environmental contractors working on behalf of DEQ, will oversee the cleanup process in its entirety to ensure that the work is progressing consistently with DEQ's requirements. Also, DEQ has historically provided the Missoula Valley Water Quality District with copies of virtually all correspondence and documents related to this Facility and will continue this practice.

8. *The Montana Constitution states that its citizens have a right to a "clean and healthful environment" so Huttig should cleanup the neighborhood to the best possible standard available. Not doing so ignores this constitutional mandate. This is the only way that the community's constitutional right to a clean and healthful environment can be assured.*

Response: Section 75-10-706(2), MCA, states that "[t]he legislature, mindful of its constitutional obligations under Article II, section 3, and Article IX of the Montanan constitution, has enacted [CECRA]. It is the legislature's intent that the requirements of this part provide adequate remedies for the protection of the environmental life support system from degradation and provide adequate remedies to prevent unreasonable depletion and degradation of natural resources." Therefore, when DEQ selects a final remedy at a CECRA facility using the criteria found in Section 75-10-721, MCA, the legislature has determined that the constitutional mandate is met. In terms of cleaning up to "the best possible standard available," please see response to comment 1(g).

9. *One commenter asked if there is any possibility that the chemicals from the MWPS facility can leak into aging water pipes, some of which may still be wood.*

Response: According to the Final RI Report, a former wood water line that existed at the Facility was replaced with a polyvinyl chloride water line in 1995. Existing water lines at the MWPS Facility are not located in areas of known soil contamination and existing groundwater contamination is at depths below those where water lines are installed (Envirocon, 1998).

Therefore, based on current information, it does not appear likely that contamination from the Facility will leak into water pipes.

10. *One commenter said without a comprehensive cleanup, workers, residents, and casual visitors to the area face health risks associated with exposure to PCP, dioxins, and cadmium.*

Response: The BRA and BRA Addendum (CDM, 2001; CDM, 2012) evaluated risks to residents, commercial/industrial workers, recreational visitors, trespassers, and construction workers. SSCLs were calculated for areas with unacceptable risk and DEQ's selected remedy requires cleanup to the SSCLs appropriate for the determined reasonably anticipated future use of the properties. As a result, the WWW, City, and western portion of the SSLLP properties will be remediated to SSCLs protective of commercial/industrial workers (where needed). The City park property was evaluated for a recreational exposure scenario and requires no additional cleanup. DEQ has determined that the eastern portion of the SSLLP property, closest to the current residential area and the City park, will be cleaned up to residential SSCLs (see response to comment 1). For PCP, SSCLs were determined for both direct contact and the contamination in soil leaching to groundwater pathway. In the case of PCP, the leaching to groundwater-based number was actually lower (more protective) than the direct contact-based SSCL. As a result, cleanup to ensure contamination in soils does not result in groundwater impacts will also ensure that there is no unacceptable risk for human health. Similarly, the area of cadmium contamination requiring cleanup at the MWPS Facility is also associated with exceedances of a leaching to groundwater-based SSCL rather than a direct contact-based SSCL. As a result, cleanup of the MWPS Facility for dioxin, PCP, and cadmium as identified in the selected remedy will be protective of workers, residents, and casual visitors to the area.

11. *The commenter agreed that groundwater cleanup is best accomplished through source cleanup and in-situ chemical oxidation provided that the oxidant does not leave behind breakdown products that would compromise water quality. The commenter agrees with DEQ that a hydrogen peroxide product is preferable to a permanganate-type oxidant.*

Response: Comment noted. The Proposed Plan identified that, depending on the specific oxidant selected for remediation, undesirable degradation products such as insoluble sulfate, hydrogen sulfide gas, precipitate manganese dioxide, heavy metals, and breakdown products of contaminants could occur. Depending on the oxidant selected and the application approach, the potential impact from the generation of byproducts of oxidation can be mitigated. Cool-Ox™ is an oxidant which utilizes hydrogen peroxide and was evaluated for use at the Facility. Given the concern expressed over byproducts and considering that the Missoula Aquifer is a sole source aquifer, the ROD requires the use of Cool- Ox™ unless a different oxidant that does not generate undesirable byproducts is identified during remedial design.

12. *Two commenters indicated that, to maximize the effectiveness of the oxidant in the aquifer, the source area near Scott Street should be excavated to the greatest extent feasible. DEQ should remove the injection well that was used to dispose of dip tank waste along with the highly contaminated soil and sludge at the base of the injection well. While infrastructure issues would require additional engineering to fully excavate the injection well, this can be done and would result in a better cleanup within a shorter period of time. Two commenters*

indicated that complete removal of the injection well is consistent with what the county has required at facilities such as auto repair shops in the Missoula Valley under its local authority. Those same commenters identified the use of engineering controls such as sheet piling and tie backs to allow additional excavation. They also recognized that excavation of all subsurface contamination is not possible and that treatment with chemical oxidant is appropriate for soils below depths of feasible excavation and areas inaccessible to excavation. Another commenter indicated that complete removal of the injection well will expedite restoration/recovery of the Missoula Valley Aquifer, an EPA-designated Sole Source Aquifer, which has been impacted by the facility.

Response: The selected remedy includes excavation of PCP-contaminated soils (co-located with petroleum hydrocarbons or dioxin) to the limits of excavation using conventional excavation and earth-moving equipment (actual depth to be determined during remedial design). Sheet piling with tiebacks may be necessary to excavate deeper soils adjacent to buildings or other structures. The selected remedy also includes ISCO following excavation of surface and subsurface soils in the former treating area, and to address remaining subsurface soil contamination in the former above-ground storage tank (AST) area and beneath Scott Street (if not able to be excavated using conventional excavation equipment). Since the rock well, which is what DEQ assumes the commenters are referring to when referencing the "injection well," is at a depth below ground surface (bgs) of approximately 12 feet, DEQ will require that as much of the contaminated material as can be excavated using conventional equipment be removed. However, DEQ recognizes the limitations on excavation in the former treatment area and in the vicinity of the rock well due to the presence of Scott Street (including the approach to the overpass) and various structures (some of which may also require removal). DEQ selected the combination of excavation and ISCO to ensure that contamination remaining after excavation would also be addressed; recognizing some of the site-specific circumstances that may make complete removal of contaminated soils through excavation difficult or impossible. Specifics associated with the design of the excavation and ISCO portions of the remedy will be determined during remedial design and may be different from those used for estimating costs (i.e., specific depths in certain areas, more or different areas targeted with ISCO, multiple injection events for ISCO, etc.). Regardless, DEQ will require that the contamination be addressed to ensure that the contaminant source is addressed and does not pose a risk to human health and the environment, including the Missoula Aquifer.

13. *Two commenters indicated that DEQ should specify more detail about monitored natural attenuation (MNA) such as how long it will take place; when chemical oxidation would be complete; when MNA would start; if MNA does not occur, when DEQ would develop another plan for addressing the groundwater; maximum timeframes; and at what point a controlled groundwater area would become necessary. These commenters indicated a desire to see the Mountain Water Company well in the area reactivated upon completion of cleanup and as soon as possible. One of these commenters indicated MNA should continue for a limited time frame, if possible.*

Response: While MNA is included in the selected remedy, it is included only as a follow-up to active remediation efforts (i.e., source removal and ISCO). After ISCO is complete and so long as the plume is not expanding, MNA will be used to ensure that SSCLs for dioxin and metals are met given that the ISCO will likely not be as effective at reducing the contaminant concentrations for these compounds. The presence of the metals in groundwater is primarily the result of previous ISCO pilot testing using permanganate that likely mobilized some naturally occurring metals from the soils into the groundwater, as well as reducing conditions caused by the presence of the contamination, which can also mobilize metals present in the soils. Therefore, once the PCP and residual (not mobile) source of petroleum is destroyed through ISCO, the reducing conditions will be removed, and the metals concentrations will decrease. Dioxin concentrations are likely to decrease through ISCO application, but are unlikely to decrease to concentrations at or less than the SSCL for dioxin. As a result, so long as the plume is not expanding, metals and dioxin concentrations will be monitored over time to ensure contaminant concentrations continue to decrease through MNA. Sampling for metals, dioxin, and MNA parameters will begin after treatment and continue through time as part of the long-term monitoring program. DEQ will require treatment with ISCO as needed to reduce the PCP and petroleum concentrations to SSCLs; the details of the ISCO application will be determined through remedial design. Treatment using ISCO may require multiple injection events over multiple years as determined necessary through ongoing monitoring post-injection. DEQ cannot specify at this time how long MNA may be required; that decision will be based on the data collected to evaluate the effectiveness of the remedy (long-term monitoring) and ongoing MNA monitoring. The ROD provides for the use of institutional controls limiting groundwater use until SSCLs are met, and those institutional controls may include use of a controlled groundwater area. Once SSCLs are met, limits on groundwater use can be removed. In terms of the Mountain Water Company well in the area, the FS indicates that the company "has no intentions of using the well under any circumstances" (Douglass, 2015). However, regardless of whether that well is put back into use, water quality standards still must be obtained. If MNA is not reducing the concentrations of dioxin and metals to SSCLs, DEQ may determine that a modification to the ROD is required and will generally follow the procedures outlined in EPA's Guide to Preparing Superfund Proposed Plans, Records of Decisions, and Other Remedy Selection Decision Document. This guidance document provides various options for documenting changes to the ROD, depending on the nature of the modification. Specifically, options may include preparing a memorandum to the file, an explanation of significant difference, and a ROD amendment. DEQ will determine if additional public comment is required based upon the specifics of any modification. When DEQ would make that decision cannot be established now, as it depends on evaluation of data trends once ISCO is complete and ongoing MNA monitoring is underway.

14. *A commenter indicated that what is known about current environmental risk to residents may no longer be accurate five or ten years from now, so cleaning the property to the highest residential standards reduces the possibility that we make a remediation mistake.*

<u>Response:</u> If DEQ issues a ROD and at some point in the future new information is presented that suggests the SSCLs are no longer protective of public health, safety, and welfare or the environment, DEQ can require additional remedial actions. See response to comment 13 for a description of how a change to the ROD could occur if necessary.

15. *A commenter indicated that the Proposed Plan appropriately incorporates a combination of remedial technologies to effectively and efficiently achieve appropriate remedial objectives*

that are protective for the intended future use. The Proposed Plan also indicates that specific technologies may be selected at the remedial design phase. DEQ should use the Triad approach as a framework for development of the most cost-effective, efficient, and effective plan for the Facility and in order to achieve the applicable remediation standards.

Response: The Proposed Plan did not indicate that specific technologies will be selected during remedial design. Rather, the Proposed Plan identified the ability to optimize or further refine a selected technology. The ROD identifies DEQ's selected remedy for the MWPS Facility which must be implemented, and DEQ will not negotiate on remedial technologies as part of remedial design. However, additional data may be collected as part of remedial design to assist in optimizing or refining the selected remedial components.

16. *A commenter indicated that the SSCLs for dioxin in soil are lower than EPA levels intended to be applied nationally, and are unnecessarily stringent. The risk assessment used the CalEPA cancer slope factor which is too conservative. EPA does not have a currently approved cancer slope factor for dioxin and instead recommends that cleanup levels based on the non-cancer endpoint be protective of cancer within the EPA accepted risk range of $1x10^{-6}$ to $1x10^{-4}$. DEQ should use 1,800 ng/kg as the SSCL for dioxin in the soil which is consistent with the EPA removal management level.*

Response: As discussed in Section 7.1.3.3, Part 2, of the ROD, the BRA used the California Environmental Protection Agency (CalEPA) oral cancer slope factor (CSF) for dioxin, and this was identified as an uncertainty in the BRA. The commenter is correct that the EPA has not finalized a CSF for dioxin, but the CalEPA derived a CSF in 2009. CalEPA is recognized as a Tier 3 source for toxicity values in the EPA hierarchy and its values are peer reviewed and used in human health risk assessments nationally. Therefore, it is appropriate for consideration here. The 1,800 ng/kg removal management level (RML) for dioxin suggested for use as a cleanup level by the commenter is based on a cancer risk of 1×10^{-4} (EPA, 2015). (DEQ notes that this RML was updated in May 2014 to a value of 2,200 ng/kg, which is based on non-carcinogenic toxicity data and on a total hazard quotient of three.) The use of this level is typically applied during a time critical removal action, which is not necessarily the final cleanup level that is applied for remediation purposes. EPA's RML website states that "ccalculated RMLs should not be confused with or used as Preliminary Remediation Goals (PRGs), cleanup levels or cleanup standards required by the Applicable or Relevant and Appropriate Requirements (ARARs) under CERCLA." Further, EPA indicates that while RMLs may be used to determine if a removal action is needed, final cleanup levels should be determined that address the site-specific threat. The risk level basis for the RML for dioxin is not acceptable to DEQ and DEQ is not required to use the same risk range or cleanup levels as EPA. Each agency evaluates site-specific conditions and makes its own risk management decisions regarding cleanup on a site-specific basis. In addition, the ROD identifies the final remedial actions that must occur at the MWPS Facility and the final remedial action includes a "removal." DEQ allows cleanup levels calculated based on cumulative risk levels less than or equal to a total excess cancer risk of $1x10^{-5}$ for cancer causing compounds or a total hazard index less than or equal to 1 for non-cancer causing compounds. As such, the SSCLs established in the ROD are the cleanup levels that must be met.

17. *A commenter indicated that EPA Risk Assessment Guidance for Superfund (RAGS) Part A indicates that adjustments can be made to exposure estimates when a chemical is less well absorbed from the medium of exposure under consideration (i.e., soil) from the study used as basis for the toxicity value (cancer slope factor, reference dose value, etc.). The commenter indicated that use of an assumed 100% bioavailability in SSCLs for dioxin overestimates risks by at least a two-fold factor based on data in the scientific literature. Assumed bioavailability of dioxin should be revised to 50% in accordance with standard practices and the scientific literature. The commenter referenced studies by Budinsky et al, 2008, and provided an appendix with examples of the use of bioavailability adjustment factors and indicated this is further justification for use of the EPA removal action level of 1,800 ng/kg as the SSCL for dioxin in soil stated in Comment 16.*

Response: As discussed in Section 7.1.3.3, Part 2, of the ROD, which describes the uncertainties associated with the toxicity assessment used in the BRA and BRA Addendum, bioavailability is not currently incorporated into dioxin toxicity assessments in accordance with information provided by EPA (EPA, 2010). While EPA acknowledges in this report that currently available information suggests that bioavailability of dioxins in soil can be expected to be less than 100%, available estimates of dioxin bioavailability are not adequate and sufficient to estimate a value for use in risk assessment as an alternative to the default of 100% or site-specific values. Additionally, a preferred animal model or bioassay protocol has not been established for predicting soil bioavailability in humans (EPA, 2010). Therefore, a default bioavailability factor of 100 percent was used for dioxin in soil in the MWPS Facility risk assessment even though actual bioavailability may be lower. Since tests to evaluate site-specific bioavailability for dioxin has not been conducted for the MWPS Facility, per EPA guidance DEQ used the default bioavailability of 100 percent in the BRA and BRA Addendum (CDM, 2001; CDM, 2012). Use of this conservative value is appropriate to ensure protection of human health.

DEQ noted that the majority of the examples included in the commenter's appendix used site-specific data to determine the relative bioavailability of dioxin. No bioavailability study was conducted at the MWPS Facility, and Huttig did not request to conduct one. In addition, such a study is not required by CECRA. Further, RAGS Part A (EPA, 1989) identified by the commenter discusses making adjustments to Superfund site-specific risk assessment when the medium of exposure in an exposure assessment differs from the medium of exposure assumed by the toxicity value based on site-specific bioavailability data. An adjustment would be considered if evidence were sufficient to indicate that the relative bioavailability of the dioxins in soil was less than 100% (EPA, 1989). In 2013, EPA evaluated nine studies that were designed to determine the relative bioavailability of dioxin, including the Budinsky et al, 2008 study cited by the commenter (EPA, 2013). EPA did not include an evaluation of variations in experimental designs (e.g., differences in design for dosing animals, metrics for estimating bioavailability, and data reduction methods for calculating soil absolute bioavailability or relative bioavailability or the extent to which these variations affect relative bioavailability estimates) between the various studies. Rather, although various methods of estimating the relative bioavailability of dioxin in soils had been explored, there was not a single methodology determined to be optimal. Additionally, EPA specifically identified the Budinsky study because it was the only study to compare the relative bioavailability estimates for the same material in more than one assay. When discussing the Budinsky study, EPA noted that the outcome of the study was dissimilar estimates of relative bioavailability for two soils based on a single dose rat bioassay and a multiple dose swine bioassay (EPA, 2013).

Due to: 1) the inconsistency of data in studies evaluating the bioavailability of dioxin; 2) the lack of site-specific bioavailability data; and 3) the importance of ensuring protection of human health as required by CECRA, DEQ retained the 100% bioavailability of dioxin in the calculation of the MWPS Facility SSCLs. As described in the previous response, use of the 1,800 ng/kg cleanup level is not justified or appropriate at the MWPS Facility.

18. *A commenter said that the cumulative risk target of $1x10^{-5}$ is 10 times more stringent than the upper end of the risk range identified by the EPA in the National Contingency Plan. Because the target level of 1×10^{-5} for carcinogenic contaminants of concern (COCs) combined is very health protective, DEQ should allow more flexibility in selecting remedial alternatives for the facility.*

Response: As provided for in ARM 17.55.113, the calculation of SSCLs must use exposure assumptions and risk levels acceptable to DEQ. For human health, DEQ allows the calculation of SSCLs based on cumulative risk levels less than or equal to a total excess cancer risk of $1x10^{-5}$ for cancer causing compounds or a total hazard index less than or equal to 1 for non-cancer causing compounds. DEQ does not agree that the risk level range allowed by EPA is appropriate at CECRA facilities and will not accept a cumulative carcinogenic risk level of more than $1x10^{-5}$. DEQ is not required to use the same risk levels as EPA, and each agency evaluates site-specific conditions and makes its own risk management decisions regarding cleanup on a site-specific basis. The ROD for the MWPS Facility identifies the remedy that DEQ has determined best meets the CECRA cleanup criteria specified in Section 75-10-721, MCA.

19. *A commenter indicated cleanup levels for groundwater are highly conservative and the application of the groundwater cleanup levels to small, perched aquifers assumes consumption of groundwater that is unlikely to ever occur.*

Response: ARM 17.30.1001(6) defines "ground water" as "water occupying the voids within a geologic stratum and within the zone of saturation." The Montana Board of Environmental Review has adopted standards (DEQ-7) that apply to groundwater throughout the state. These DEQ-7 standards apply to Class I, II, and III groundwater whether or not the groundwater is used for drinking water purposes. The groundwater at the MWPS Facility is Class I, and the DEQ-7 standards are the cleanup levels that apply. These standards apply to the perched groundwater and the Missoula Aquifer. The perched groundwater impacts the Missoula Aquifer and, during certain times of the year, the water table of the Missoula Aquifer intermingles with the perched groundwater (Douglass, 2015). Finally, in addition to being the SSCLs for groundwater, DEQ-7 standards are also applicable environmental laws that must be met.

20. *A commenter said the proposed remedy should incorporate evaluation of advanced technologies for in-situ bioremediation of soils in the vadose zone. During the past 25 years, numerous bioventing applications for PCP and chlorinated hydrocarbons have been employed and achieved excellent results. DEQ should evaluate the capabilities of the*

indigenous microbial population to biodegrade PCP and dioxin at the facility while evaluating in parallel the effectiveness of non-indigenous microbes which have been shown to specifically degrade these compounds. The commenter provided an appendix with case studies in bioremediation. In-situ treatment will avoid the risks of excavation and transport of contaminated soils posed by ex-situ treatment. Since ex-situ bioremediation is already included in the proposed remedy for soil, this alternative could be incorporated into the final remedy without significantly changing the Proposed Plan. Effective implementation of in-situ bioremediation may obviate the need for, or significantly reduce the volumes of materials requiring ex situ treatment in the LTU. Therefore, in-situ bioremediation should be evaluated as a preferred remedy for implementation at the facility during remedial design.

Response: The commenter was responsible for preparation of the both the FS work plan and the FS and did not include evaluation of "advanced technologies for in-situ bioremediation" in either document. The commenter also did not request nor identify a desire for collection of indigenous microbe samples to allow further evaluation of in-situ biodegradation in either the FS or the FS work plan. The commenter considered and evaluated both in-situ and ex-situ bioremediation of soils in the Feasibility Study (Douglass, 2015), which stated that "ex-situ bioremediation is typically more effective than in-situ bioremediation due to the homogeneous nature of soil after excavation, transport, placement in a treatment cell, and mixing with amendments." Additionally, EPA's Presumptive Remedies guidance indicates that "ex-situ bioremediation is faster than in-situ bioremediation" and states that ex-situ bioremediation "may be able to achieve higher performance efficiencies than the in-situ process due to increased access and contact between microorganisms, contaminants, nutrients, water, and electron acceptors" (EPA, 1995). While there are some risks associated with excavation and transport of the contaminated soils to the LTU, those risks can be easily managed with appropriate engineering controls and construction practices. Engineering controls and best management construction practices are frequently employed during superfund cleanups to limit the short-term exposure to contaminants. The selected remedy requires that dust control measures be implemented during excavation and land treatment activities. Air monitoring will also be conducted during implementation of the remedial action. While safety regulations are not ERCLs, they are independently applicable and health and safety plans are required. Implementation of the selected remedy must comply with all federal and state safety laws. Ex-situ bioremediation is a well-established cleanup alternative for wood treating sites that will effectively remove a significant quantity of high concentration contamination from the soils and assist in reducing both soil and groundwater concentrations more quickly than would likely occur with in-situ bioremediation, particularly when combined with the in-situ chemical oxidation to address remaining soil and groundwater contamination. DEQ is not going to evaluate entirely new proposed remedies as part of remedial design; it did an evaluation in the Proposed Plan and ROD. Rather, in the ROD, DEQ has selected the final remedy that must be implemented, which includes construction of the LTU and subsequent ex-situ bioremediation of contaminated soils.

21. *A commenter said ISCO treatment of shallow soil in the former treating area should be preferred over ex-situ biotreatment in an LTU and advanced technologies for in-situ bioremediation of soils in the vadose zone should be evaluated for implementation during the remedial design phase. While it is not possible to determine without treatability studies, it is likely that in-situ treatment with ISCO followed by removal and disposal at the local landfill*

pursuant to a contained-in determination would be more efficient, effective and a lower risk approach for the treatment of shallow soils. At the Libby Superfund site, the ISCO bench scale testing established that PCP concentrations could be reduced from 200 milligrams per kilograms (mg/kg) to less than 1 mg/kg using potassium permanganate. The ISCO pilot test determined that PCP concentrations could be reduced from over 400 mg/kg to well below 100 mg/kg in situ. It is reasonable to believe that these same levels of reduction could be achieved treating near surface soil with more optimal mixing and selection of the best oxidant.

Response: DEQ evaluated remedies in the Proposed Plan and ROD and is not going to evaluate entirely new proposed remedies as part of remedial design. Rather, in the ROD, DEQ has selected the final remedy that must be implemented, which includes excavation and ex-situ bioremediation of PCP-contaminated soils in an LTU, combined with ISCO for subsurface soils. The FS prepared by Huttig, as well as the Proposed Plan, evaluated ISCO in subsurface soils only. As identified in the ROD, the primary considerations for application of ISCO are the interference of other oxidizable materials in the soil matrix, the ability to deliver chemical oxidants to COCs in the subsurface matrix, and the ability of the oxidant to reduce COCs to concentrations less than SSCLs. Because chemical oxidants are non-selective, any oxidizable materials in the soil will consume the oxidant, which can limit or eliminate the effect on remaining COCs in the subsurface and decrease the overall efficiency of the treatment. Given that shallow soils are easily excavated and excavation removes the contamination source, excavation of shallow soils eliminates more risk. In-situ delivery of chemical oxidants is reserved for the subsurface soils that are unable to be excavated using conventional excavation equipment and the remedial design will factor in the difficulties associated with maximizing contact between the ISCO and the heterogeneous contaminated soils and complex geology/hydrogeology at the MWPS Facility. Please see response to comment 20 regarding use of "advanced technologies for in-situ bioremediation." DEQ considered the bench tests conducted for the MWPS Facility at the Libby Superfund Site onsite lab, as well as bench tests conducted for other facilities (see Section 4.3.3.2 and subsequent subsections of the FS) in making the determination that ISCO would be utilized for the MWPS Facility. However, DEQ disagrees that it is reasonable to assume that contaminant concentrations at the MWPS Facility could be reduced at levels comparable to those seen in the Libby Superfund Site bench test. Conditions at bench-scale (e.g., solid/liquid ratio, amount of mixing or contact between oxidants and contaminated soil, etc.) are often quite different than conditions at the actual site, and it is widely recognized that samples used in a bench-scale study may not fully represent field conditions (e.g., soil heterogeneities, contaminant concentrations, etc.). Additionally, potassium permanganate mobilizes metals and is not as strong an oxidizer for recalcitrant contaminants like PCP and dioxin; rather stronger oxidizers like persulfate and Cool-Ox™ are more widely used (ITRC, 2005).

22. *One commenter indicated that construction of an LTU creates the potential for negative impacts such as impacting a presently uncontaminated area. The only potential location for an LTU within the facility is on the SSLLP property. However, there are no exceedances of SSCLs on that property and there is a reasonable risk that contamination may be spread if the LTU liner is compromised or spoils occur when transporting contaminated media to or from the LTU. There is also the potential for windblown dust to spread over the SSLLP*

property. Another commenter (the SSLLP property owner) did not object to placement of the LTU on its property but requested that testing and treatment be maximized to the greatest extent possible to minimize the size and duration of the LTU operations.

Response: The SSLLP property is not a "presently uncontaminated area" as it has exceedances of some SSCLs. Appropriate construction of the LTU will ensure that the liner is not compromised and appropriate implementation of the remedy will ensure that spoils do not occur. DEQ has successfully overseen implementation of LTUs at other sites and neither of these issues raised by the commenter has occurred. The ROD identifies environmental requirements, criteria, and limitations (ERCLs) which apply to the cleanup of the MWPS Facility, which include Resource Conservation and Recovery Act (RCRA) regulations that address construction of the LTU. One of the identified ERCLs is 40 CFR 264.552, which allows the designation of a corrective action management unit (CAMU) located within the contiguous property where the wastes are to be managed in the CAMU originated and provides requirements for siting, managing, and closing the CAMU. The SSLLP property meets the CAMU requirements for contiguous property and is available to Huttig (under its "control" as contemplated by 40 CFR 264.552) for use in remediation under the terms of the Grant Deed between Huttig and SSLLP (Grant Deed, 1999a). The CAMU-eligible waste at the MWPS Facility includes the F032-contaminated soil that must be managed to implement the remedy selected in the ROD. The property owner would like the LTU size and duration to be minimized. There is some tradeoff in LTU construction – a smaller LTU may need to be operated for longer, whereas a larger LTU may allow for shorter operation. The LTU configuration will occur during remedial design, which will also include an operations plan to address potential dust generation and ensure dust is not spread over the SSLLP property. In addition, inhalation of dust generated from surface and subsurface soils was evaluated in the BRA (CDM, 2001) and BRA Addendum (CDM, 2012) for the future on-site and current/future off-site residential exposure scenarios (and all other scenarios as well). These evaluations determined that the dust inhalation pathway is not significant compared to the soil ingestion pathway (CDM, 2001; CDM, 2012).

23. *A commenter indicated the target level for any type of soil treatment should be 10 times the universal treatment standards (UTS) for contaminated soil. The technology that can achieve these levels for the lowest cost (based on treatability testing during remedial design) should be the one implemented. Therefore, ISCO should be evaluated during remedial design as a preferred remedy for shallow soils when compared to ex-situ treatment in an LTU, and the LTU should not be constructed on the SSLLP property.*

Response: The development of SSCLs is driven by the requirement in CECRA to protect public health, safety, and welfare and the environment. It is not appropriate to manipulate cleanup levels based on concerns with respect to the limits of certain technologies or disposal requirements as is suggested by the commenter. Additionally, unless the PCP-contaminated soils are to be disposed at a RCRA disposal facility, which would be very expensive and would not require treatment of any kind, the only way to apply the UTS and dispose of soils at a non-RCRA disposal facility (as non-hazardous waste) is with a contained-in determination from DEQ. EPA requires that soil and other environmental media be managed as if they were hazardous waste if they contain a listed hazardous waste or exhibit a characteristic of hazardous waste. The PCP on the southern portion of the MWPS Facility has been determined to be an F032 listed hazardous waste. The contained-in determination for media containing a listed hazardous waste refers to a process where a site-specific determination is made that concentrations of hazardous constituents in any given volume of environmental media are low enough to determine the media no longer contains hazardous waste. The determination that media no longer contains a listed waste may be (but is not required to be) made by an authorized state or EPA. Montana is an authorized state. Contained-in determinations may be made before or after treatment of a contaminated environmental media and include consideration of site-specific exposure pathways (potential for human exposure, soil permeability, leaching potential to groundwater), as well as final disposition of the media. A contained-in determination must meet two basic criteria: 1) the environmental media must not exhibit a characteristic of hazardous waste; and 2) concentrations of hazardous constituents in the media must not present a threat to human health and the environment at final disposition. As a result, DEQ would not make a contained-in determination allowing disposal of the PCP-contaminated soils as non-hazardous waste based on the UTS alone as the potential threat to human health and the environment must also be considered. Additionally, for PCP, 10 times the UTS level is greater than both the direct contact and leaching to groundwater-based cleanup levels. As a result, the UTS may not be protective of human health and the environment for disposal of PCP-contaminated soils as non-hazardous waste.

DEQ evaluated remedies in the Proposed Plan and ROD and is not going to evaluate remedies as part of remedial design. Rather, in the ROD, DEQ has selected the final remedy that must be implemented, which includes construction of the LTU. Section 75-10-721, MCA, identifies the criteria that DEQ must evaluate in selecting the final remedy, which includes an evaluation of cost-effectiveness. DEQ is not required to select the technology that is the “lowest cost.” The FS prepared by Huttig as well as the Proposed Plan evaluated ISCO in subsurface soils and DEQ has determined that ISCO will be applied to subsurface soil but not shallow soil. As identified in the ROD, the primary considerations for application of ISCO are the interference of other oxidizable materials in the soil matrix, the ability to deliver chemical oxidants to COCs in the subsurface matrix, and the ability of the oxidant to reduce COCs to concentrations less than SSCLs. Because chemical oxidants are non-selective, any oxidizable materials in the soil will consume the oxidant, which can limit or eliminate the effect on remaining COCs in the subsurface and decrease the overall efficiency of the treatment. Given that shallow soils are easily excavated and excavation removes the contamination source, excavation of shallow soils eliminates more risk. In-situ delivery of chemical oxidants is reserved for the subsurface soils that are unable to be excavated using conventional excavation equipment and the remedial design will factor in the difficulties associated with maximizing contact between the ISCO and the heterogeneous contaminated soils and complex geology/hydrogeology at the MWPS Facility.

24. *A commenter indicated that surface soils at the SSLLP property meet the commercial/industrial SSCL for dioxins/furans, although the Proposed Plan indicated they did not. Text and tables (specifically Table 2) should be changed to make this information clear and the cells showing exceedances of SSCLs on Figure 6 should be removed.*

<u>Response:</u> DEQ concurs. The BRA Addendum (CDM, 2012) determined that there was no unacceptable risk for commercial/industrial workers exposed to dioxin at the SSLLP properties;

therefore, there is no applicable SSCL for dioxin in surface soil on this property and no exceedances. DEQ has revised the figures and associated volume estimates in the ROD to reflect this correction. DEQ did not revise Table 2, Site-Specific Cleanup Levels in Soil, in response to this comment as this table simply identifies SSCLs for soil by exposure population (residential, commercial/industrial, etc.) and does not specifically link the SSCLs to individual properties.

25. *One commenter indicated that EPA's landfill gas model LandGEM predicts declining methane production over time from buried organic material. The decay rate can be fairly rapid especially when no new waste is being interred and the buried materials are not capped, as is the case on the SSLLP property. The 2007-08 methane investigation on the SSLLLP property measured methane at five locations for approximately one year and no measurements have been made since November 2008. Because the buried material historically containing methane has been interred at least since 1969, methane may no longer be generated or the methane producing capacity of the soil may be severely depleted. Prior to requiring remediation of these soils, the remedial design should include testing of the methane-containing soil in the two areas specified for remediation and determine whether venting of the material will release stored methane. If methane is no longer present above 5% of the lower explosive limit (LEL), removal of the material may not be required to achieve SSCLs. At a minimum, if methane production is declining or severely depleted, concerns about spreading this material on the surface should be reduced. Another commenter indicated that it supports excavation and off-site disposal of methane-producing waste.*

Response: DEQ allowed Huttig to conduct additional methane monitoring in May 2014. The sampling event included monitoring of two of the original sampling points, SG-01 and SG-04. The observed methane concentrations were 5% methane by volume at SG-01 and 9.1% methane by volume at SG-04 (Douglass, 2014a). This monitoring event showed that there was little change in the methane concentration since the previous sampling events completed in 2007 (Douglass, 2008). Additionally, as 5% methane by volume is equivalent to 100% of the LEL, these concentrations still greatly exceed the action level of 25% of the LEL (1.25% methane by volume) identified for methane. Therefore, methane remains at concentrations above 5% of the LEL and methane concentrations have not declined. The ROD includes excavation and offsite disposal of the methane-containing soils/wood waste. DEQ also included the option of recycling the methane-containing soils/wood waste at a local composting company, assuming that the soil/wood waste material is determined through sampling not to contain contamination and is accepted by the composting company. If the soil/wood waste material is not accepted by the composting company, it must be removed and disposed off-site.

26. *One commenter said spreading of methane-containing soil on the SSLLP property should be the preferred remedy if testing proves that methane is still present above 5% of the LEL. This Proposed Plan indicates that this alternative meets all the CECRA criteria and is less expensive. The only objections to this identified in the Proposed Plan are that the material might be reburied and begin generating methane and that spreading the material would limit redevelopment. If the excavations from which the methane-containing soil has been removed are backfilled and compacted with clean inert soil, there is no plausible scenario under which the spread-out methane-containing material would be reburied. The majority of the*

SSLLP property already contains large amounts of wood waste/organics in the top 1-2 feet of soil. Where these organics have been blended with the inert sandy and gravel, they have allowed the soil to produce vegetation on the majority of the property, reducing runoff, infiltration, and windblown dust. If the methane-containing soil is thoroughly spread out, the status of the property will be no different than it is today, with a large amount of wood waste/organics already existing on the SSLLP property, and no additional limitations would be imposed on development of the property. Also, it is not clear where redevelopment is included in the factors that DEQ can consider when evaluating a remedy. Finally, the excavated wood waste would be usable for composting by Eko Compost, although testing would be necessary to ensure Eko Compost's requirements are met.

Response: As discussed in the previous response, a limited methane evaluation was completed in May 2014 which indicated that concentrations of methane were still 5% methane by volume (100% LEL) or greater at the two locations sampled (Douglass, 2014a). These concentrations of methane exceed the action level of 25% LEL (1.25% methane by volume) identified for methane. The estimated volume of methane-impacted soil, which is likely associated with buried wood waste, is 15,883 cubic yards (yd^3). This volume would fill approximately 800 standard-sized dump trucks, and if spread one foot thick would cover almost 10 acres. A review of historic operations on the facility indicates that the various ponds were significantly larger than the methane areas identified in Figure 9 of the ROD, so this volume could be underestimated. DEQ disagrees that there is no "plausible scenario" for the wood waste to be reburied. SSLLP and the majority of the commenters have identified a desire for redevelopment of the SSLLP property in the future. With redevelopment typically comes excavation for footings, or grading of soil at the very least. It is plausible that these activities could result in the soil/wood waste capable of generating methane being reburied, thereby allowing the proper conditions to exist to begin generating methane again. Additionally, the presence of wood waste may limit opportunities to construct buildings on the SSLLP property as a result of structural limitations associated with building on wood waste. As a result, and as identified in the Proposed Plan and ROD, spreading the methane-generating soil/wood waste on the surface of the SSLLP property would limit redevelopment and would potentially require an institutional control to address the limitation. The commenter questioned where redevelopment potential was included in the factors DEQ can consider when evaluating a remedy. As identified in previous responses, Section 75-10-721, MCA, is the statutory provision that DEQ is required to follow in selecting the final remedy at a CECRA facility. Subsection (2)(c) states that DEQ "shall select remedial actions, considering present and reasonably anticipated future uses…." As both the property owner and the majority of public comments have indicated a desire for redevelopment of the SSLLP property, DEQ will consider redevelopment potential ("future uses") in selecting the final remedy. Lastly, the commenter indicated that excavated wood waste would be usable for composting by Eko Compost, although testing would be necessary to ensure Eko Compost's requirements are met. If the soil/wood waste material could be used by Eko Compost, it is consistent with Section 75-10-721(2)(c)(iv), MCA, and the preference for "resource recovery." Therefore, DEQ has included this option in the ROD, assuming that the soil/wood waste material is determined through sampling not to contain contamination and is accepted by the composting company. If the soil/wood waste material is not accepted by the composting company, it must be removed and disposed off-site.

27. *One commenter indicated that additional investigation should be undertaken prior to requiring excavation at 1028½ Stoddard Street. The sample collected in 2000 and a new composite sample from the top six inches of the entire garden should be collected and analyzed for dioxins/furans before requiring excavation and removal. Alternatively, Huttig should be allowed the option of removing and disposing of the identified garden soil without additional testing, replacing it with commercially available topsoil. A different commenter agreed that this property should be resampled but suggested it be done as an immediate interim action and removal, if warranted. The commenter also indicated that other rental structures on the same parcel (a duplex at 1026 A/B Stoddard and a multifamily dwelling at 1028 Stoddard) should be resampled for dioxin because of four surface soil samples with a maximum dioxin concentration of 70.3 nanograms/kilogram (ng/kg). The commenter also indicated that the property at 1039 Cooley Street should also be resampled as it is immediately across Scott Street from the former wood treatment area and had dioxin concentration of 38.1 ng/kg in surface soil.*

Response: DEQ is aware that the conditions of the property at 1028½ Stoddard Street may have changed since the 2000 sample as a result of building demolition and potential grading activities. As a result, DEQ may require sampling of this residential yard during remedial design to obtain accurate dioxin concentrations given the recent demolition activities. Alternatively, Huttig may choose to remove the soil from this entire residential yard and dispose of it without additional sampling, given the historical sample results. However, disposal facilities typically require sampling data to determine the type and concentration of contamination prior to accepting the waste, so it is unlikely that Huttig will be able to move forward without any additional sampling. In addition, if removal is necessary, DEQ will require confirmation sampling to confirm SSCLs are met. DEQ reviewed data from the Brownfields Site Assessment (Hydrometrics, 2001) and identified only three samples associated with the 1026/1028/1028½ Stoddard Street properties (not four as mentioned in the comment). As the commenter noted, of these, one sample exceeded the dioxin residential cleanup level of 40 (ng/kg). The sample for 1028½ Stoddard Street had a detected dioxin concentration of 70.3 ng/kg during the 2000 sampling event and has been identified as a property requiring remediation in the ROD. The other two samples (from 1026 and 1028 Stoddard Street) did not contain detected concentrations above the SSCL of 40 ng/kg (they were 32.5 and 32.2 ng/kg respectively) and do not require remediation. Similarly, the sample collected from 1039 Cooley Street, with a detection of 38.1 ng/kg, did not exceed the SSCL of 40 ng/kg and does not require remediation. These samples and associated analytical data were determined to be of adequate quality for use in decision-making during the risk assessment. In addition, interim actions have been conducted at the MWPS Facility that have reduced contaminant concentrations and the potential for contaminant spreading via wind dispersion. Based upon current information, there is no reason to resample these locations.

28. *One commenter indicated ISCO and biotreatment of groundwater may not directly reduce dioxin and metals concentrations, however, these alternatives can reduce the concentrations of PCP and petroleum. By doing so, the groundwater chemistry is likely to change, resulting in a less reducing environment that can reduce metals concentrations. Mobility of dioxins/furans would also be reduced. Once source soils are removed and/or remediated, it is very likely that natural attenuation will over time reduce both metals and dioxin*

concentrations and this could be easily verified by monitoring. Since PCP and petroleum are very amenable to natural attenuation, MNA should be the first option for groundwater once source soils are removed and/or remediated. Groundwater in the perched aquifer systems has attenuated in the same manner as the Missoula aquifer has, although concentrations have yet to reach DEQ-7 levels in most perched aquifer wells. Therefore, active treatment with ISCO (with the associated risks) may be unnecessary or may only be necessary in "spot" treatments at selected locations. Enhancement of biological degradation may be more effective, and there is far less risk associated with enhanced biological degradation of groundwater than with ISCO. MNA following treatment/removal of source soil should be the preferred remedy for groundwater. If necessary, enhanced bioremediation of groundwater or perhaps limited ISCO application, could be employed. Every perched aquifer well, including those located in the former treating area, has demonstrated significant natural attenuation of PCP and dioxin/furan concentrations since the beginning of the project, without significant treatment of source soils. The average PCP reduction in perched aquifer wells is 99.2% and the average dioxin/furan reduction in perched aquifer wells is 96.84%. The average PCP reduction in Missoula aquifer wells is 92.64% and the average dioxin/furan reduction in Missoula aquifer wells is 83.05%. These figures are presented in the March 2014 groundwater monitoring report and are based on the percent reduction between the highest concentration ever measured and the lowest concentration ever measured for each aquifer and chemical. In addition, all Missoula aquifer wells, including those that are connected in some manner to the perched aquifers at low water levels (WPS-04D, WPS-06D, and WPS-18D), have attenuated to the point where PCP is below DEQ-7 levels and dioxins/furans in all Missoula aquifer wells are approaching the DEQ-7 value, PCP and dioxin/furan concentrations in many perched aquifer wells remain above DEQ-7 values, but the perched aquifer has demonstrated the ability to naturally attenuate without treatment of source soils. Even perched aquifer wells immediately adjacent to the former treating area (B-02S, B-04-S, B-09S, and WPS-25S) have experienced significant attenuation and could be expected to reach DEQ-7 levels within a few years. These data indicate that treatment of source soils many not be necessary in order to protect groundwater; that a much smaller area of source soil treatment may be required; and/or that a smaller treatment of source soil should be conducted, followed by monitoring of the perched aquifer wells. In addition, these data indicate that removal of any soil based on a very low leaching-to-groundwater cleanup level, is not necessary. The lack of any detection of Light, Non-Aqueous Phase Liquid ("LNAPL") is another fact that indicates MNA will be effective in a reasonable period of time. Therefore, MNA following treatment/removal of source soil should be the preferred remedy for groundwater.

Response: Enhanced bioremediation (biotreatment) was not retained as the selected remedy for groundwater at the MWPS Facility for the reasons outlined in the ROD; however, ISCO was the selected remedy for groundwater. DEQ concurs with the commenter that reduction of PCP and petroleum concentrations will change the groundwater chemistry such that it is a less reducing environment that will reduce metals concentrations over time. Once PCP, dioxin, and petroleum-contaminated soils are excavated or treated with ISCO and no longer present a continuing source to groundwater, combined with treatment of the groundwater with ISCO, dioxin concentrations will likely decrease. DEQ does not concur with the commenter that MNA should be the first option for groundwater; rather DEQ has chosen source removal (excavation) followed by ISCO for soil and groundwater and lastly, MNA (if the plume is stable). DEQ considered EPA's guidance document, *Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action and Underground Storage Tank Sites*, to evaluate when natural attenuation is an appropriate alternative for corrective action (EPA, 1999). The natural attenuation guidance states, "[MNA] alone is generally not sufficient to remediate petroleum release sites. Implementation of source control measures in conjunction with [MNA] is almost always necessary. Other controls (e.g., institutional controls), in accordance with applicable state and federal requirements, may also be necessary to ensure protection of human health and the environment." PCP and dioxin are considered recalcitrant compounds and are known to be difficult to treat. As such, they are also are harder to biodegrade or naturally attenuate than petroleum and the identified statements from the EPA MNA guidance above are applicable for the MWPS Facility contamination as well. Since the water line leak at the MWPS Facility was identified and repaired, concentrations of contaminants of concern have significantly decreased in the Missoula Aquifer. While PCP was not detected at concentrations above the SSCL in Missoula Aquifer wells in the March 2014 (most recent) or June 2013 sampling events, it was detected at concentrations above the SSCL in the February 2013 and June 2013 events. Additionally, concentrations of dioxin, barium, arsenic, manganese, and petroleum hydrocarbons still exceed SSCLs in the Missoula Aquifer at the MWPS Facility. The concentrations of contaminants in the perched groundwater remain at concentrations greater than SSCLs for PCP, dioxin, 1,2,4-trimethylbenzene, petroleum hydrocarbons, iron, manganese, arsenic, and barium. The March 2014 groundwater monitoring report referenced by the commenter does provide an evaluation of data indicating that there have been significant changes in concentration of PCP in groundwater. However, DEQ has reviewed this report and much of the evaluation of the data included in the report is questionable; DEQ will be providing comments on the report and it will require significant revision. For example, well B-01S data indicates that there has been a 97.75% reduction in the concentration of dioxin in groundwater (see Figures 7 and 8 in the ROD for well locations). The data analysis simply uses the highest concentration (105,000 ng/kg from February 2013) and the lowest concentration (2,360 ng/kg from June 2013) to derive the 97.75% reduction in the concentrations. Since these two data points are from data that were collected from sequential sampling events it is more likely that the difference in concentration is the result of changes in static water levels (which are not always measured) than a reduction in concentration of multiple orders of magnitude in a matter of months. A review of the groundwater data at multiple perched groundwater wells indicates that the concentrations of dioxin at each of the wells is consistent and with the exception of individual sampling events, the concentrations remain greater than the DEQ-7 groundwater standard. The March 2014 groundwater monitoring report (Douglass, 2014) evaluation of PCP concentrations in the perched groundwater indicates that similar reductions in concentrations have occurred in each of the monitoring wells. For example, in Table 3 of the report well B-03S indicates a reduction in concentration of 99.99%, again using the high and the low concentration to derive the change in concentration. An evaluation of the PCP data for this well indicates that the concentration of PCP at this location has increased an order of magnitude since 2007 (541 micrograms per liter [ug/L] to 7100 ug/L) and is greater than the DEQ-7 standard of 1 ug/L. PCP concentrations at a number of wells have decreased (e.g. WPS-25S, WPS-36S, WPS-37S, etc.) to at or below DEQ-7. However, to determine the percent reduction in concentration simply by using the highest and the lowest concentrations is erroneous. The reduction in the concentrations of COCs in the Missoula Aquifer at a number of well locations is likely the result of the repair of the water line leak in the vicinity of the source area. The leak was repaired in between 1995 and 1996. The leak resulted in the addition of approximately 226 gallons per minute (gpm) (approximately 325,000 gallons per day) to the groundwater system (Envirocon, 1998). This water exacerbated the distribution of contaminants from the former treatment area to the areas east and west. An evaluation of the groundwater impacts in the Missoula Aquifer since 1995-1996 indicates that the concentrations of COCs have decreased significantly. For example, the concentrations of PCP in well WPS-01D decreased three orders of magnitude from 1995 to 1996 when the water line was repaired. Similar decreases occurred in wells WPS-08D, WPS-09D, and WPS-10D. MNA will play a part in the remediation of this facility, however, the concentrations of COCs within the perched groundwater and surface and subsurface soil will act as a potential continuous source of impacts to the Missoula Aquifer and DEQ has required more aggressive treatment approaches.

29. *One commenter stated there have been numerous findings since the pilot test was completed that now present information about various microbial consortia that are capable of biodegrading PCP or dioxin under various environmental conditions (supporting documents attached). The commenter provided a number of examples and suggested that an in-situ bioremediation approach for groundwater may include biostimulation to enhance the indigenous microbial population with appropriate nutrient amendments and/or bioaugmentation, which would involve injecting microbes that are able to biodegrade PCP or dioxin. A combination of ISCO along with in-situ bioremediation may be a significantly more cost- and treatment-effective approach for the groundwater. In addition, if the groundwater is anaerobic, it would be appropriate to evaluate enhanced anaerobic biodegradation of PCP and dioxin via biostimulation and bioaugmentation. Bioremediation of groundwater was included in the FS; however, new information is now available and this alternative should be retained as an option for consideration during remedial design. Therefore, biostimulation and bioaugmentation should be evaluated as an option for groundwater remediation.*

Response: The commenter was responsible for preparation of the FS and did not include biostimulation and bioaugmentation in the document. However, in-situ enhanced bioremediation was evaluated by Huttig in the FS and evaluated by DEQ in the ROD. As discussed in the ROD, DEQ has determined that ISCO is preferable to in-situ enhanced bioremediation at the MWPS Facility. In addition, it has been successfully implemented at this and other wood treating facilities in the United States and Montana. Finally, the commenter cited to 13 studies discussing different microbes that were capable of PCP or dioxin biodegradation. Whether there are microbes that are capable of degrading PCP or dioxin does not change the fact that there are other alternatives that are capable of breaking down or otherwise reducing concentrations more effectively and more rapidly. This does not support the commenter's position that there is "new information" available that suggests a different remedial alternative would be better than ISCO. The commenter has been working on the FS since 2002 and has not presented any compelling reason to add a new alternative for evaluation at this time.

30. *One commenter claimed the Proposed Plan contains inaccurate or incomplete statements with regard to the management of hazardous waste. F032 soils do not necessarily require treatment before disposal at a local landfill. Treatment is not required prior to obtaining a*

contained-in determination and it is likely that a large amount of the soil in the former treating area may qualify for the contained-in determination without treatment. The commenter provided a table summarizing soil data for the uniform hazardous constituents (UHC) from surface and subsurface soil data on the WWW property. The determining concentration for the contained-in determination should be 10 times the UTS for the UHC. Utilizing the contained-in determination to allow direct disposal of the soils at a local landfill would be an effective, rapid, reliable, and cost-effective remediation of a substantial volume of shallow soils that exceeds the SSCLs for direct contact and leaching to groundwater.

Response: Please see previous response to comment #23 regarding application of UTS and contained-in determinations for more detail. A contained-in determination may be (but is not required to be) granted by DEQ if the soil is no longer considered a hazardous waste. DEQ concurs that treatment is not required prior to requesting a contained-in determination if PCP concentrations meet health-based SSCLs and meet 10 times the UTS. However, some PCP soil concentrations at the MWPS Facility exceed health-based SSCLs and DEQ will not make a contained-in determination (without which the soil cannot be disposed locally) for soil with exceedances of health-based SSCLs.

31. *One commenter stated that DEQ's evaluation of applications for the contained-in determination must consider the risks presented at the location where the material will be placed. For disposal at the local Republic Services landfill, DEQ should develop cleanup levels that are protective of human health and the environment for this location. The commenter contacted Republic Services, the local solid-waste landfill, and it expressed a willingness to accept soil that receives the contained-in determination from DEQ. Because the landfill is lined and leachate is discharged to the City sewer treatment plant, leaching-to-groundwater cleanup levels would not be applicable. Since the material would be buried, covered, and managed in the long term under the landfill permit, direct-contact exposure for commercial or construction worker scenarios is also not applicable. Based on the site-specific characteristics of this local landfill, DEQ should establish 10 times the UTS for UHC as the target level for off-site disposal, granting of the contained-in determination, and any treatment that is necessary to reach these levels.*

Response: DEQ requires that PCP-contaminated soil be treated to meet health-based SSCLs prior to disposal and will not develop new cleanup levels based on the disposal facility. In addition, any information Huttig wished DEQ to consider about the disposal facility in support of its comments needed to have been provided as an attachment to its comments, and was not.

32. *One commenter indicated that, before the TFR building was constructed, Huttig sampled beneath the structure and the soil contained no detectable PCP and dioxins/furans were below the residential direct contact SSCL. Part of the building is being rented and deeper soil in that area can be treated in-situ, if necessary. One commenter indicated that the construction of the structure that occupies and supports the pumping and treating of the wastewater is vital to the cleanup efforts and should not be removed. The building has been in place since January 2000 and has been used continually. Another commenter indicated that demolition of the TFR building is unnecessary. Other commenters indicated the TFR*

building should be removed if necessary to access highly contaminated soils, and a different commenter pointed out that the building was installed prior to a final cleanup decision and should not be an obstacle for excavation.

Response: As discussed in Section 2.4, Part 2, of the ROD, the TFR building was constructed within the former treatment area (and therefore potentially on top of contaminated soil) without DEQ approval in 1999. Less than two feet of soil was excavated from the footprint of the building foundation and Huttig collected two samples prior to construction of the TFR building. A five-point composite sample was collected in March 1998 on the west side of the approximate TFR building footprint (which was not constructed until fall 1999) during removal of the pipeline to the dip tanks. This sample was collected at approximately two feet bgs, but approximately three feet of fill was later placed over the area sampled to fill in the former railroad grade, so this sample is representative of subsurface soils at approximately five feet bgs. PCP was detected in this sample at 0.041 mg/kg, which exceeds the leaching to groundwater SSCL for subsurface soil; dioxin was not analyzed. A second sample (10-point composite) was collected in September 1999 from the eastern half of the TFR building footing excavation (approximately 19.5 feet by 75.5 feet) at a depth of approximately 2 feet bgs. PCP and dioxin were both non-detect in this sample (Douglass, 2013b; Douglass, 2013d). Since the former process area is adjacent to the TFR building, and contaminated soils remain in the former process area, sampling will be necessary during remedial design to determine if demolition of the TFR building is necessary. DEQ will require removal of the TFR building if contaminated soils are identified up to the current building footprint. DEQ has identified the possibility that the TFR building would require removal to Huttig as far back as 1999, when the TFR building was first constructed without DEQ approval (DEQ, 1999). The TFR building has primarily been used to house the groundwater pump-and-treat system that was installed as part of an interim cleanup action conducted by Huttig. This system will not be used as part of the final remedy, so the building would not be necessary for continued housing of this system. If the building requires removal, DEQ would allow replacement of this building after cleanup.

33. *One commenter said the Proposed Plan is ambiguous to the depth and extent to which PCP and hydrocarbon contaminated soil will be excavated, treated, and disposed of in a landfill. The Proposed Plan should be more specific in requiring excavation, treatment, and disposal of highly contaminated soils in the former treating area (process area), soils near the former rock well (injection well), and to the southwest of the former treating area. Soils near and below the rock well are highly contaminated and should be excavated, treated, and disposed. Excavation should be to the maximum depth possible. Excavating the soils will reduce the amount of time contaminants may continue to leach to groundwater, helping to meet groundwater remediation goals faster. Greater source removal will also reduce long-term costs associated with water quality monitoring and enforcing institutional controls.*

Response: Details regarding the location, depth, and volume of soil to be excavated will be more thoroughly described in the remediation plan design documents. The FS provides discussion on the location and potential depths of excavations dependent upon the nature of the remediation activities. Nevertheless, as described in the FS and ROD for Soil Alternative 2 –

Excavation and Off-Site Disposal (the excavation approach is the same regardless of the final disposition of the excavated soil), it was assumed that shallow (<15 feet bgs and not near buildings or structures) contaminated soils would be excavated using conventional earth-moving equipment and sheet piling with tiebacks would be necessary to excavate deeper soil (>15 feet bgs) and near buildings or other structures. Excavation below groundwater or to depths below the reach of conventional excavators (approximately 15 feet) would require specialized equipment such as a crane using a clamshell. The FS and ROD also identified an issue with excavation of deep subsurface soils as being the potential for threatening the stability of surrounding structures and utilities (including Scott Street and Scott Street bridge). While excavation of deep subsurface soil could occur through additional shoring and other practices, doing so would significantly increase the cost. The FS and ROD also evaluated ISCO, which is capable of treating contamination in the deep subsurface soils underneath areas that would otherwise be difficult to reach with conventional excavation strategies. As identified in the ROD, the final remedy includes excavation of PCP-contaminated soils to the limits of conventional excavation (approximately 15 feet bgs) followed by ISCO of the underlying deep subsurface soils and groundwater. This will remove contamination that otherwise would continue to be a threat to human health and a continuing source of contamination leaching to groundwater.

34. *Two commenters indicated support for the plan to excavate and dispose of cadmium contaminated soils in a licensed landfill. The removal of these soils will protect the Missoula Valley Aquifer and will provide a more permanent remedy.*

<u>Response:</u> DEQ concurs.

35. *One commenter said the Proposed Plan needs to clearly outline how the public will be protected from contaminants which will continue to be present in groundwater for years or decades into the future. The timeframe for groundwater and contaminated soils to be remediated using ISCO is not clear but will likely take years. Additionally, the persistent organic pollutant dioxin may take decades to degrade. Areas of maximum groundwater contamination are located on perched low permeability layers below the facility and a portion of the northside residential area east of Scott Street. The areas of highest contamination exist perched on low permeability layers above the MVA. There are also a number of public water supplies, irrigation wells, and individual domestic wells within ½ mile of a point in the southern portion of the facility. These existing wells are near the contaminant plume and are vulnerable to any change in the location of the plume. It should be considered that installation of new wells in the area, including geothermal and irrigation wells, could contribute to spread of contaminants. Proposed institutional controls for groundwater identify that deed restrictions for former Huttig properties will restrict the drilling of any new drinking water wells. These proposed deed restrictions do not prevent offsite installation of new wells where there is clearly subsurface contamination. The proposed deed restrictions also do not prevent installation of new nondrinking water wells onsite or offsite which could potentially spread contamination via irrigation or otherwise. The Missoula Valley Water Quality Ordinance and Missoula City-County Health Code Regulation 5 are not adequate institutional controls to ensure prevention that contaminants*

will not be spread and to prevent human contact or consumption for the expected time that contaminants will remain in groundwater.

Response: As part of the selected remedy DEQ will require cleanup of contamination in the perched groundwater, which will eliminate the source of contamination to the Missoula Aquifer. DEQ will also require long-term monitoring of both the perched groundwater and the Missoula Aquifer. Historically, the contaminants in groundwater were spread and distributed through the subsurface due to their presence in the perched groundwater. Contaminant distribution through the subsurface was exacerbated by the water line leak that altered site conditions by introducing approximately 226 gallons per minute of water to the subsurface. This influx of water from the leaking water line transported contaminants from the source area to the perched groundwater and to the Missoula Aquifer (Envirocon, 1998).

With respect to the installation of non-drinking water wells either on or off of the MWPS Facility, DEQ concurs that the Missoula Valley Water Quality Ordinance and Missoula City-County Health Code Regulation 5 (Water Well Protection and Permits) are not adequate controls to ensure prevention that contaminants will not be spread and to prevent human contact or consumption for the expected time that contaminants will remain in groundwater. The selected remedy relies on institutional controls in the form of land use and groundwater use restrictions (restrictive covenants or controlled groundwater area (or both)). For the property within the MWPS Facility located west of Scott Street, no additional wells, with the exception of those installed as part of the remedial design, will be allowed until SSCLs in groundwater are met. Finally, to address groundwater use restrictions at the Facility, including the property east of Scott Street, DEQ may petition for a controlled groundwater area. Restrictive covenants will be required on the WWW, City, and SSLLP properties to limit the installation of wells and the controlled groundwater area could be applied to the entire MWPS Facility. This will ensure that new wells will not induce or redirect contaminated groundwater and that no drinking water wells are installed within or adjacent to the MWPS Facility where city water services exist. These groundwater use restrictions will remain in effect until DEQ determines they are no longer needed to ensure protection of human health.

36. *One commenter indicated support for the proposed cleanup plan for groundwater and mentioned that byproducts of the oxidant identified in the Proposed Plan are carbon dioxide and water. Monitoring groundwater from the nearby Mountain Water Company well should be part of the monitoring plan and remedial design.*

Response: Comment noted. As stated in the ROD, the Dickens and Defoe well has been taken out of service due to the presence of contaminants in groundwater in this area; however, it may be possible to sample this well as part of remedial design and the long-term monitoring program. Details of the long-term monitoring will be developed as part of remedial design.

37. *The Missoula City-County Health Department/Water Quality District requested the opportunity to review and comment on the remedial design and monitoring plan.*

Response: The City-County Health Department/Water Quality District will have an opportunity to review the remedial design and associated sampling and analysis plan documents and analytical data when they become available.

38. *The commenter recognized on-site treatment is an EPA presumptive remedy and indicated the ROD and remedial design should detail operation of the LTU such as treatment seasons and whether there is an acceptable location on-site. The ROD should also identify any treatability studies necessary for remedial design to minimize delay and uncertainty. The LTU should not be allowed to remain in place indefinitely or become a permanent waste repository. The LTU should be allowed to remain on site for a maximum of three years and if it does not meet treatment objectives, a plan should be specified for off-site disposal of contaminated soil The commenter wants to ensure that the responsibility for the final disposal of waste material and site closure be required of the responsible party.*

Response: The FS (Douglass, 2015) and the ROD indicate that the LTU will be constructed on approximately two acres of land on the SSLLP property. Under 40 CFR 264.552, DEQ can designate a CAMU at the Facility where the wastes to be managed in the CAMU originated and allows otherwise land-banned hazardous waste to be treated onsite. The FS and ROD estimate that there will be two 12-18 inch lifts of contaminated soil (based on the estimated volume of contaminated soil) placed in the LTU and that treatment of each lift would require approximately two years (four years total treatment time being the expected upper limit of the operational life of the LTU). The LTU will not remain in place indefinitely and soil will be removed from the LTU once SSCLs are met. DEQ will require that Huttig implement the required remedial action and pay the associated costs, which include the costs for final disposal of dioxin soils that may not meet the SSCL, and closure of the LTU.

39. *One commenter requested that all excavations where material is removed be backfilled with acceptable structural backfill materials.*

Response: Specifications for backfill materials will be included in the remedial design documents. However, DEQ typically requires that backfill material meet typical structural requirements.

40. *The commenter requested that the schedule for implementation of the remedy prioritize remediation on the SSLLP property so that redevelopment could begin.*

Response: The schedule for implementation of the remedy will be established as part of remedial design. Since construction and design of the LTU will depend on the volume of the soil that will be excavated from the source areas, and subsequent to its construction the excavated soil will have to be placed in the LTU, DEQ will require continuous access to the LTU location during remediation. The redevelopment schedule will be considered, if one is available, when completing remediation activities but remediation activities will be structured to be completed in the most efficient manner possible.

41. *The commenter requested that if the Scott Street SLLP property meets cleanup requirements prior to the rest of the facility, that the SSLLP property be*

separated from the balance of the facility and provided a no further action letter from the DEQ.

Response: DEQ will provide no further action notifications at the appropriate time based on completion of remediation activities at the Facility.

43. *One commenter indicated that the contaminated soil and groundwater of the entire facility could be remediated to residential levels with mostly in situ bioremediation using species of ligninolytic-degrading fungi, engineered for the particular contaminants (PCP, dioxins, heavy metals, petroleum derivatives, etc.), or the spent mushroom compost already containing high concentrations of the degrading enzymes. It may even be possible to acquire labor through volunteers or students if the 'mycoremediation' is branded as the 'clean, green, sustainable' process that it is, with the compromise that if the city supplies the manpower to go the rest of the way meeting residential standards, Huttig will pay for the materials. They could easily consist of a few tarps, a few large drums, a few hundred pounds of straw or woodchip, and the spawn of targeted species, all costing mere thousands of dollars out of the millions proposed. This is also a part of the cleanup that could be started immediately under the Voluntary Cleanup and Redevelopment Act, given the chance that it could significantly reduce toxic materials on the site prior to the next phase of the cleanup, saving on the expense of the entire operation. This could be done ex situ or in situ. However, ex situ bioremediation would be significantly more effective, taking days or weeks instead of weeks or months, but could still be done on site in bins or drums rather than taken off-site.*

Response: While the FS does include bioremediation as a remedial alternative for PCP-impacted soil, currently, it does not include use of fungi for the remediation of PCP and as such it was not included as an option in the Proposed Plan or ROD. However, DEQ is aware that use of fungi to degrade PCP has been attempted at other sites with mixed results and cannot verify that it would be effective at reducing contaminant concentrations to SSCLs even if it had been considered as an alternative in the FS. The PCP-contaminated soil present in the southern portion of the facility is F032-listed hazardous waste and requires special handling. The approach outlined by the commenter could not be conducted as described and comply with the hazardous waste regulations, and costs to appropriately manage the F032-listed hazardous waste would be similar to those estimated for construction of the RCRA-compliant LTU in Soil Alternative 3, which does not result in cost savings overall. Also, remediation workers typically have the Occupational Safety and Health Administration hazardous waste operations and emergency response training, which is required for workers that perform activities that expose or potentially expose them to hazardous substances (29 CFR 1910.120). Therefore, use of volunteers and students to conduct cleanup activities would not be appropriate. Lastly, the MWPS Facility is not eligible for remediation under the Voluntary Cleanup and Redevelopment Act as it is a facility under order (see Section 75-10-732(1)(b), MCA).

FIGURES

TABLES

Table 1
Site-Specific Cleanup Levels for Groundwater
Missoula White Pine Sash Facility

Contaminant of Concern	Units	SSCL	Source of SSCL
VOCs/SVOCs			
2-Methylnaphthalene	µg/L	27	EPA Tapwater
1,2,4-Trimethylbenzene	µg/L	15	EPA Tapwater
Pentachlorophenol	µg/L	1	DEQ-7
Metals			
Arsenic	µg/L	10	DEQ-7
Barium	µg/L	1,000	DEQ-7
Iron	µg/L	11,000	EPA Tapwater
Lead	µg/L	15	DEQ-7
Manganese	µg/L	320	EPA Tapwater
Petroleum Hydrocarbons			
C9-C10 Aromatics	µg/L	210	Derived based on DEQ-7
C9-C12 Aliphatics	µg/L	700	Derived based on DEQ-7
C11-C22 Aromatics	µg/L	210	Derived based on DEQ-7
C9-C18 Aliphatics	µg/L	700	Derived based on DEQ-7
Dioxins/Furans			
2,3,7,8-TCDD TEQ (2005 TEFs)	pg/L	2	DEQ-7

Notes:
Derivation of groundwater SSCLs is presented in Appendix I of BRA Addendum
N/A - Not available. There are no toxicity criteria available to develop a SSCL.
SSCL - Site-specific cleanup level

Table 2
Site-Specific Cleanup Levels in Soil
Missoula White Pine Sash Facility

Contaminant	Residential (surface soil)	Commercial/Industrial (surface soil)	Construction Worker (subsurface soil)	Leaching (surface soil)	Leaching (subsurface soil)
Pentachlorophenol	8.5 mg/kg	45 mg/kg	NA	5.69 mg/kg	0.27 mg/kg
C9-C12 Aliphatics	500 mg/kg	4,700 mg/kg	NA	NA	NA
C9-C10 Aromatics	2,400 mg/kg	NA	NA	NA	NA
Dioxins/Furans (4)	40 ng/kg	310 ng/kg	470 ng/kg	NA	NA
Cadmium	NA	NA	NA	1.82 mg/kg	NA
1-methylnaphthalene	NA	NA	NA	0.93 mg/kg	0.05 mg/kg
2-methylnaphthalene	NA	NA	NA	60.9 mg/kg	3.02 mg/kg
Hexachlorobenzene	NA	NA	NA	0.26 mg/kg	0.01 mg/kg

Source: 2012 BRA Addendum
SSCL - Site-specific cleanup level
Surface soil - surface to two feet below ground surface
Subsurface soil - greater than two feet below ground surface
mg/kg - milligrams per kilogram (parts per million)
ng/kg - nanograms per kilogram (parts per trillion)
NA - Not available
Note: Exposure Areas requiring cleanup were identified in the Baseline Risk Assessment Addendum (CDM 2012) and are discussed in Section

Table 3
Site-Specific Cleanup Levels for Indoor Air
Missoula White Pine Sash Facility

Contaminant of Concern	Units	Residential SSCL	Commercial SSCL
VOCs			
Benzene	µg/m^3	0.7	3.5
Ethylbenzene	µg/m^3	2.2	11
Naphthalene	µg/m^3	0.16	0.8
Tetrachloroethene	µg/m^3	21	105
Trichloroethene	µg/m^3	0.96	6.7
Xylenes (m&p and o)[1]	µg/m^3	104	438
1,2,4-Trimethylbenzene	µg/m^3	7.3	31
Petroleum Hydrocarbons			
C5-C8 Aliphatics	µg/m^3	313	1,314
C9-C10 Aromatics	µg/m^3	104	438
C9-C12 Aliphatics	µg/m^3	52	219

Source: BRA Addendum, December 2012, Table 6-4

Notes:

(1) When evaluating these two COCs, the concentrations are summed and compared to the appropriate SSCL.

SSCL - Site-specific screening level

Table 4
Comparative Analysis of Alternatives
Missoula White Pine Sash Facility

Soil Alternatives	Description	Protectiveness	Compliance with ERCLs	Mitigation of Risk	Effectiveness & Reliability	Implementability & Practicability	Treatment or Resource Recovery Technologies	NPV Cost
1	No Action	No	No	No	No	Yes	No	$0.00
2	Excavation and Offsite Disposal	Yes (when combined)	Yes (when combined)	Yes (when combined)	Yes (when combined)	Yes	No (unless methane soils are recycled)	$21,185,133
3	Excavation and Ex-Situ Enhanced Bioremediation	Yes (when combined)	Yes (when combined)	(When combined) Yes (PCP and petroleum), Maybe (dioxins), No (metals)	(When combined) Yes (PCP and petroleum), Maybe (dioxins), No (metals)	Yes	Yes	$3,182,139
4	Excavation and Onsite Spreading	Yes (when combined)	Yes (when combined)	(When combined) Yes (methane), No (other soils)	(When combined) Yes (methane), No (other soils)	Yes	No	$372,184
5	In-Situ Chemical Oxidation (ISCO)	Yes (when combined)	Yes (when combined)	(When combined) Yes (PCP, petroleum), Maybe (dioxins), No (metals)	(When combined) Yes (PCP, petroleum), Maybe (dioxins), No (metals)	Yes	Yes	$2,295,346
6	Excavation and Onsite Containment	Yes (when combined)	Yes (when combined)	Yes (when combined)	Yes (when combined)	Yes	No	$963,561
Groundwater Alternatives								
1	No Action	No	No	No	No	Yes	No	$0
2	In-Situ Enhanced Bioremediation	Yes (when combined)	Yes (when combined)	(When combined) Yes (PCP and petroleum), Maybe (dioxins), No (metals)	(When combined) Yes (PCP and petroleum), Maybe (dioxins), No (metals)	Yes	Yes	$1,062,897
3	In-Situ Chemical Oxidation (ISCO)	Yes (when combined)	Yes (when combined)	(When combined) Yes (PCP, petroleum), Maybe (dioxins), No (metals)	(When combined) Yes (PCP and petroleum), Maybe (dioxins), No (metals)	Yes	Yes	$656,246
4	Pumping & Ex-Situ Treatment with GAC	Yes (when combined)	Yes (when combined)	Yes (when combined)	Yes (when combined)	Yes	Yes	$2,295,346

ERCL - Environmental Requirements, Criteria, or Limitations
NPV - Net Present Value
UV - Ultraviolet
GAC - Granulated Activated Carbon
SSLLP - Scott Street, LLP
AST - Above-Ground Storage Tank

Table 5
Selected Remedy Cost Estimate Summary
Missoula White Pine Sash Facility

Alternatives		Timeframe (years)	Capital Cost	Annual O&M Costs	Estimated Present Worth Cost at 3%
	Site-Wide Elements (ICs, Long-term monitoring, MNA)	30	$6,250	$175,938	$1,954,751
Soil Alt. 2	Excavation & Offsite Disposal	1	$1,556,238	$0	$1,556,238
Soil Alt. 3	Excavation & Ex-Situ Enhanced Bioremediation	4	$1,824,734*	$77,026	$2,487,334
Soil Alt. 5	ISCO of Soils	1	$1,619,854	$0	$1,619,854
GW Alt. 3	ISCO of Groundwater	1	$656,246	$0	$656,246
				TOTAL	**$8,274,423**

Notes:

Total present worth cost is calculated at 3% over a number of years to implementation

O&M - Operations and Maintenance

* - Capital cost value includes initial capital costs and costs associated with closure of the LTU

Appendix A

Determination of
Environmental Requirements, Criteria, and Limitations

INTRODUCTION

Remedial actions undertaken pursuant to the Comprehensive Environmental Cleanup and Responsibility Act (CECRA), §§ 75-10-701, et seq., MCA, must "attain a degree of cleanup of the hazardous or deleterious substance and control of a threatened release or further release of that substance that assures protection of public health, safety, and welfare and of the environment." Section 75-10-721(1), MCA. Additionally, the Montana Department of Environmental Quality (DEQ) "shall require cleanup consistent with applicable state or federal environmental requirements, criteria, or limitations" and "may consider substantive state or federal environmental requirements, criteria or limitations that are relevant to the site conditions." Section 75-10-721(2)(a) and (b), MCA.

A distinction exists between "applicable" requirements and those that are "relevant." "Applicable" requirements are those requirements that legally apply at the Missoula White Pine Sash (MWPS) Facility regardless of the CECRA action. "Relevant" requirements are those requirements that are not applicable, but address situations or problems sufficiently similar to those at the MWPS Facility and, therefore, are relevant for use at the facility.

Environmental requirements, criteria, and limitations (ERCLs) are grouped into three categories: contaminant-specific, location-specific, and action-specific. Contaminant-specific requirements are those that establish an allowable level or concentration of a hazardous or deleterious substance in the environment or which describe a level or method of treatment for a hazardous or deleterious substance. Location-specific requirements are those that serve as restrictions on the concentration of a hazardous or deleterious substance or the conduct of activities because they are in specific locations. Action-specific requirements are those that are relevant or applicable to implementation of a particular remedy. Action-specific requirements do not in themselves determine the remedy but rather indicate the manner in which the remedy must be implemented. Some ERCLs may fit into more than one category and will not typically be repeated.

CECRA defines cleanup requirements as only state and federal ERCLs. Remedial actions, including but not limited to designs, implementation, operation, and maintenance must, nevertheless, comply with all other applicable laws, including local, state, and federal. Many such laws, while not strictly environmental, have environmental impacts. It remains the responsibility of the entity implementing the remedial action to identify and comply with all other laws.

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

Within this document, DEQ has identified applicable or relevant state and federal ERCLs for the remedial actions at the MWPS Facility. The description of applicable or relevant federal and state requirements that follows includes summaries of the legal requirements which set out the requirement in a reasonably concise fashion that is useful in evaluating compliance with the requirement. These descriptions are provided to allow the user a basic indication of the requirement without having to refer back to the statute or regulation itself. However, in the event of any inconsistency between the law itself and the summaries provided in this document, the actual requirement is ultimately the requirement as set out in the law, rather than any paraphrase of the law provided here.

CONTAMINANT SPECIFIC REQUIREMENTS

GROUNDWATER

The federal Safe Drinking Water Act, 42 USC §§ 300f et seq. and the National Primary Drinking Water Regulations (40 CFR Part 141) (Applicable) establishes maximum contaminant levels (MCLs) for contaminants in drinking water distributed in public water systems. These requirements were evaluated during this ERCLs analysis in conjunction with the groundwater classification standards promulgated by the State of Montana.[1] The MCLs are identified because the groundwater in the area of the MWPS Facility is a source of drinking water. As described in Section 6.2, Part 2, of the Record of Decision (ROD), EPA has designated the Missoula Aquifer as a Sole Source Aquifer, which is an aquifer that provides more than 50 percent of the drinking water consumed in the overlying area, and where there is no viable alternative drinking water source.

EPA's guidance on Remedial Action for Contaminated Groundwater at Superfund Sites states that MCLs developed under the Safe Drinking Water Act generally are ARARs [the federal equivalent of ERCLs] for current or potential drinking water sources. EPA has also established maximum contaminant level goals (MCLGs) for contaminants in drinking water distributed in public water systems. MCLGs which are above zero are relevant under the same conditions (55 Fed.Reg. 8750-8752, March 8, 1990). See also, State of Ohio v. EPA, 997 F.2d 1520 (D.C. Cir. 1993), which upholds EPA's application of MCLs and non-zero MCLGs as ARARs for groundwater which is a potential drinking water source. At the MWPS Facility, barium is the only primary contaminant of concern with a non-zero MCLG; MCLG for barium is 2,000 μg/L which is equivalent to the MCL for barium.

MCLs for the primary contaminants of concern in groundwater are listed below. However, compliance with all MCLs is required and remedial actions must meet the MCLs for all contaminants at the MWPS Facility, including any breakdown products generated during remedial actions.

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1 MCLs are promulgated pursuant to both federal and state law. Under the Safe Drinking Water Act, EPA has granted the State of Montana primacy in implementation and enforcement of the Safe Drinking Water Act.

Chemical	MCL
Arsenic	10 µg/L
Barium	2,000 µg/l
Dioxins/furans	.00003 µg/L
Lead	15 µg/L
Pentachlorophenol	1 µg/L

In addition, the Secondary Maximum Contaminant Levels (SMCLS) specified in 40 CFR Part 143.3 are relevant requirements to be attained by the remedy for the MWPS Facility. This regulation contains levels for iron, manganese, color, odor, and corrosivity that are relevant to the remedial actions.

The Montana Water Quality Act, § 75-5-605, MCA (Applicable) provides that it is unlawful to cause pollution of any state waters and § 75-6-112, MCA (Applicable) provides that is unlawful to discharge drainage or other waste that will cause pollution of state waters used as a source for a public water supply or for domestic use as well as prohibits other unlawful actions. Section 75-5-605, MCA (Applicable) also states that it is unlawful to place or cause to be placed any wastes where they will cause pollution of any state waters. Section 75-5-303, MCA (Applicable) states that existing uses of state waters and the level of water quality necessary to protect the uses must be maintained and protected.

ARM 17.30.1006 (Applicable) classifies groundwater into Classes I through IV based upon its specific conductance and establishes the groundwater quality standards applicable with respect to each groundwater classification. Class I is the highest quality class; class IV the lowest. Class I groundwater has a specific conductance of less than 1000 micromhos per centimeter (µmhos/cm) at 25 degrees Celsius. As discussed in Section 5.2.3 of the ROD, the June 2013 groundwater sampling event indicated that the specific conductance of perched groundwater ranged from 360 µmhos/cm at well B-09S to 1190 µmhos/cm at well B-02S and the specific conductance of the Missoula Aquifer ranged from 374 umhos/cm at well WPS-14D to 699 umhos/cm at well WPS-04D (Douglass, 2013c). Therefore, based on its specific conductance, groundwater at the MWPS Facility has been classified as Class I groundwater. Concentrations of substances in groundwater within Class I may not exceed the human health standards for groundwater listed in Circular DEQ-7, Montana Numeric Water Quality Standards, October 2012 (Applicable). In addition, no increase of a parameter may cause a violation of § 75-5-303, MCA (Applicable). For concentrations of parameters for which human health standards are not listed in DEQ-7, ARM 17.30.1006 allows no increase of a parameter to a level that renders the waters harmful, detrimental or injurious to the beneficial uses listed for that class of water.

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

Chemical	DEQ-7 Standard
Arsenic	10 μg/L
Barium	1,000 μg/L
Dioxins/furans	.000002 μg/L
Lead	15 μg/L
Pentachlorophenol	1 μg/L

ARM 17.30.1011 (Applicable) provides that any groundwater whose existing quality is higher than the standard for its classification must be maintained at that high quality in accordance with § 75-5-303, MCA, and ARM Title 17, chapter 30, subchapter 7.

SURFACE WATER

As discussed in Sections 5.2.2 and 7.2, Part 2, of the ROD, the MWPS Facility is located one-half mile to the north of the Clark Fork River and no surface water bodies are impacted by contamination from the Facility. ARM 17.30.607 provides that the Clark Fork River is classified as B-1. ARM 17.30.623 provides the classification standards and beneficial uses for the B-1 classification and provides that concentrations of carcinogenic, bioconcentrating, toxic, or harmful parameters that would remain in the water after conventional water treatment may not exceed DEQ-7 standards. The section also provides the specific water quality standards for water classified as B-1 that must be met.

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

There is no current data indicating that the MWPS Facility is impacting the Clark Fork River or other surface water. Therefore, no additional surface water ERCLs have been identified. However, if information regarding the presence of or impact on surface water changes, DEQ may identify applicable or relevant ERCLs.

AIR QUALITY

The Clean Air Act (42 USC §§ 7401 et seq.) provides limitations on air emissions resulting from cleanup activities or emissions resulting from wind erosion of exposed hazardous substances. Sections 75-2-101, et seq, MCA (Applicable) provides that state emission standards are enforceable under the Clean Air Act of Montana.

ARM 17.8.204 and 206 (Applicable) establish monitoring, data collection and analytical requirements to ensure compliance with ambient air quality standards and requires compliance with the Montana Quality Assurance Project Plan except when DEQ determines more stringent requirements are necessary.

ARM 17.8.220 (Applicable) provides that settled particulate matter shall not exceed a 30 day average of 10 grams per square meter.

ARM 17.8.223 (Applicable) provides that PM-10 concentrations in ambient air shall not exceed a 24 hour average of 150 micrograms per cubic meter of air and an annual average of 50 micrograms per cubic meter of air.

Ambient air standards are also promulgated for sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, hydrogen sulfide, and lead. If emissions of these compounds were to occur at the MWPS Facility in connection with any remedial action, these standards would also be applicable. See ARM 17.8.210, 17.8.211, 17.8.212, 17.8.213, 17.8.214, and 17.8.222.

METHANE

ARM 17.50.1106 (Relevant) specifies the concentration of methane gas generated by a solid waste facility cannot exceed 25 percent of the lower explosive limit for methane in facility structures.

LOCATION-SPECIFIC REQUIREMENTS

The Endangered Species Act and implementing regulations (16 USC §§ 1531 et seq., 50 CFR Part 402, 40 CFR 6.302(h), and 40 CFR 257.3-2) (Relevant) require that any federal activity or federally authorized activity may not jeopardize the continued existence of any threatened or endangered species or destroy or adversely modify a critical habitat. Compliance with this requirement involves consultation with the U.S. Fish and Wildlife Service (USFWS) and a determination of whether there are listed or proposed species or critical habitats present at the facility, and, if so, whether any proposed activities will impact such wildlife or habitat. As described in Section 7.2, Part 2, of the ROD, no animal species of special concern have been identified without a four-mile radius of the MWPS Facility and no federal actions activities are anticipated. However, if any threatened or endangered species are subsequently encountered during remedial actions, consultation with the USFWS will occur.

Montana Nongame and Endangered Species Conservation Act, §§ 87-5-101 et seq (Applicable) provides that endangered species should be protected in order to maintain and to the extent possible enhance their numbers. These sections list endangered species, prohibited acts and penalties. See also, § 87-5-201, MCA, (Applicable) concerning protection of wild birds, nests and eggs; and ARM 12.5.201 (Applicable) prohibiting certain activities with respect to specified endangered species. As described in Section 7.2, Part 2, of the ROD, no animal species of special concern or critical habitat has been identified at the MWPS Facility. However, if any threatened or endangered species or critical habitat are subsequently encountered during remedial actions, compliance with these ERCLs is required.

Migratory Bird Treaty Act (Relevant) (16 USC §§ 703 et seq.) establishes a federal responsibility for the protection of the international migratory bird resource and requires continued consultation with the USFWS during remedial design and remedial construction to ensure that the cleanup does not unnecessarily impact migratory birds. Specific mitigative measures may be identified for compliance with this requirement. As described in Section 7.2, Part 2, of the ROD, the Facility is not attractive to migratory waterfowl and the level of human activity is likely to discourage significant use by wildlife. However, if any migratory birds are encountered during remedial actions, consultation with the USFWS will occur.

Bald Eagle Protection Act (Relevant) (16 USC § 668 et seq.) establishes a federal responsibility for protection of bald and golden eagles, and requires continued consultation with the USFWS during remedial design and remedial construction to ensure that any cleanup does not unnecessarily adversely affect the bald and golden eagle. As described in Section 7.2, Part 2, of the ROD, no animal species of special concern have not been identified at the MWPS Facility. However, if any bald or golden eagles are subsequently encountered during remedial actions, consultation with the USFWS will occur.

Historic Sites, Buildings, Objects and Antiquities Act (Relevant) (16 USC 461 et seq.) provides that, in conducting an environmental review of a proposed action, the responsible official shall consider the existence and location of natural landmarks using information provided by the National Park Service pursuant to 36 CFR 62.6(d) to avoid undesirable impacts upon such landmarks. To date, no such landmarks are identified in the area. Therefore, no further actions are required to comply with this requirement. In addition, historic cultural resources at the MWPS Facility were evaluated in the Feasibility Study (FS) (Douglass, 2015) and the Montana State Historic Preservation Office was consulted.

Resource Conservation and Recovery Act (Relevant) (40 CFR 264.18) provides location standards for facilities where treatment of hazardous waste will occur. Portions of those treatment areas must not be located within 200 feet of a fault which has had displacement in Holocene time and treatment areas in or near a 100 year floodplain must be designed, constructed, operated, and maintained to avoid washout.

Wetlands, Floodplains, and Streambed Preservation – As described in Sections 5.2.2 and 7.2, Part 2, of the ROD, there are no designated wetlands, floodplains, or other surface water bodies present at the MWPS Facility. Therefore, certain ERCLs (including but not limited to the Floodplain Management Order, 40 CFR Part 6, Appendix A, Executive Order No. 11,988; Protection of Wetlands Order, 40 CFR Part 6, Appendix A, Executive Order No. 11,990; 33 USC § 1344(b)(1); the Montana Floodplain and Floodway Management Act and Regulations, §§ 76-5-401, et seq., MCA, ARM 36.15.601, et seq.; Fish and Wildlife Coordination Act, 16 USC §§ 661 et seq. and 40

CFR § 6.302(g); dredge and fill regulations, 40 CFR Part 230; and the Montana Natural Streambed and Land Preservation Act and Regulations, § 75-7-102, MCA, and ARM 36.2.401 et seq.) have not been identified. If information regarding the presence of or impact on wetlands, floodplains, or surface water changes, DEQ may identify applicable or relevant ERCLs.

Montana Solid Waste Management Act, §§ 75-10-201, et seq., MCA, and its regulations (ARM 17.50.501 et seq.) specify requirements that apply to the location of any solid waste management facility. DEQ did not select a remedy that includes construction of an onsite solid waste facility so has not identified siting regulations such as ARM 17.50.505, design regulations such as ARM 17.50.506, or closure regulations such as ARM 17.50.530.

Any media disposed offsite will be taken to a licensed solid waste facility that is in compliance with applicable regulations. Transportation of that material must comply with ARM 17.50.523 (Applicable) which requires that waste be transported in such a manner as to prevent its discharge, dumping, spilling or leaking from the transport vehicle.

In addition, § 75-10-212, MCA, (Applicable) prohibits dumping or leaving any garbage, debris, or refuse upon or within 200 yards of any highway, road, street, or alley of the State or other public property, or on privately owned property where hunting, fishing, or other recreation is permitted. However, the restriction relating to privately owned property does not apply to the owner, his agents, or those disposing of debris or refuse with the owner's consent.

ACTION-SPECIFIC REQUIREMENTS

Point Source: If point sources of water contamination are retained or created by any remediation activity, applicable Clean Water Act standards would apply to those discharges. The State of Montana established state standards and permit requirements in conformity with the Clean Water Act, and these standards and requirements apply to point source discharges. See ARM 17.30.1201 et seq., (standards) and ARM 17.30.1301 et seq. (permits).

Air Quality: Dust suppression and control of certain substances that may be released into the air as a result of earth moving, transportation and similar actions may be necessary to meet air quality requirements. These have been included in the contaminant-specific analysis, above, and are not repeated here.

ARM 17.8.304 and 17.8.308 (Applicable) provide that no person shall cause or authorize the production, handling, transportation or storage of any material; or cause or authorize the use of any street, road, or parking lot; or operate a construction site or demolition project, unless reasonable precautions to control emissions of airborne particulate matter are taken. Emissions of airborne particulate matter must be controlled so that they do not exhibit an opacity of 20% or greater averaged over six consecutive minutes.

ARM 17.24.761 (Relevant) specifies a range of measures for controlling fugitive dust emissions during mining and reclamation activities and requires that a fugitive dust control program be implemented. Some of these measures could be considered relevant to control fugitive dust emissions in connection with excavation, earth moving, and transportation activities conducted as part of the remedy at the MWPS Facility. Such measures include, for example, paving, watering, chemically stabilizing, or frequently compacting and scraping roads, promptly removing rock, soil or other dust-forming debris from roads, tilling, restricting vehicles speeds, revegetating, mulching, or otherwise stabilizing the surface of areas adjoining roads, restricting unauthorized vehicle travel, minimizing the area of disturbed land, and promptly revegetating regraded lands.

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

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

ARM 17.30.641 (Applicable) provides standards for sampling and analysis of water to determine quality.

ARM 17.30.646 (Applicable) requires that bioassay tolerance concentrations be determined in a specified manner.

ARM 36.21.670-678 and 810 (Applicable) specifies certain requirements that must be fulfilled when abandoning monitoring wells.

Substantive MPDES Permit Requirements: Because the State of Montana has been delegated the authority to implement the Clean Water Act, these requirements are enforced in Montana through the Montana Pollutant Discharge Elimination System (MPDES) (ARM 17.30.1342-1344) (Applicable). These regulations set forth the substantive requirements applicable to all MPDES and National Pollutant Discharge Elimination System permits. The substantive requirements, including the requirement to properly operate and maintain all facilities and systems of treatment and control are applicable requirements.

Technology-Based Treatment: ARM 17.30.1203 (Applicable) incorporates provisions of 40 CFR Part 125 for criteria and standards for the imposition of technology-based treatment requirements. 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.

Storm Water Runoff: ARM 17.30.1341 to 1344 (Applicable) requires a Storm Water Discharge General Permit for stormwater point sources. Generally, the permit requires the permittee to implement Best Management Practices (BMP) and to take all reasonable steps to minimize or prevent any discharge which has a reasonable likelihood of adversely affecting human health or the environment. However, if there is evidence indicating potential or realized impacts on water quality due to any storm water discharge associated with the activity, additional protections may be required.

ARM 17.24.633 (Relevant): All surface drainage from a disturbed area must be treated by the best technology currently available.

RCRA Subtitle C Requirements and corresponding State requirements
The Resources Conservation and Recovery Act (RCRA), 42 USC §§ 6901 et seq., (Applicable, as incorporated by the Montana Hazardous Waste Act), the Montana Hazardous Waste Act, §§ 75-10-401 et seq., MCA, (Applicable) and the regulations under these acts establish a regulatory structure for the generation, transportation, treatment, storage and disposal of hazardous wastes. These requirements are applicable to substances and actions at the MWPS Facility that involve the active management of hazardous wastes, including excavation of listed hazardous waste and the pentachlorophenol land treatment unit described in the Record of Decision.

Wastes may be designated as hazardous by either of two methods: listing or demonstration of a hazardous characteristic. Listed wastes are the specific types of wastes determined by EPA to be hazardous as identified in 40 CFR Part 261, Subpart D (40 CFR 261.30 - 261.33) (Applicable, as incorporated by the Montana Hazardous Waste Act). Listed wastes are designated hazardous by virtue of their origin or source, and must be managed as hazardous wastes. Characteristic wastes are those that by virtue of concentrations of hazardous constituents demonstrate the characteristic of ignitability, corrosivity, reactivity or toxicity, as described at 40 CFR Part 261, Subpart C (Applicable, as incorporated by the Montana Hazardous Waste Act).

40 CFR 261.31 defines F032 waste as:

> Wastewaters (except those that have not come into contact with process contaminants), process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations (except potentially cross-contaminated wastes that have had the F032 waste code deleted in accordance with §261.35 of this chapter or potentially cross-contaminated wastes that are otherwise currently regulated as hazardous wastes (i.e., F034 or F035), and where the generator does not resume or initiate use of chlorophenolic formulations). This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachlorophenol.

As described in Section 3.1.1 of the FS (Douglass, 2015) and Section 2.1, Part 2, of the ROD, media on the southern portion of the MWPS Facility is contaminated with pentachlorophenol from process residuals, preservative drippage, and spent formulations from a wood treating process that used chlorophenolic formulations. Therefore, the MWPS Facility contains F032 listed hazardous wastes and the various media and wastes contaminated by the F032 wastes are hazardous wastes pursuant to 40 CFR Part 261. The RCRA requirements specified below are applicable requirements for the treatment, storage and disposal of these F032 wastes.

The RCRA regulations at 40 CFR Part 262 (Applicable, as incorporated by the Montana Hazardous Waste Act) establish standards that apply to generators of hazardous waste. These standards include requirements for obtaining an EPA identification number and maintaining certain records and filing certain reports. These standards are applicable for any waste which will transported offsite.

The RCRA regulations at 40 CFR Part 263 (Applicable, as incorporated by the Montana Hazardous Waste Act) establish standards that apply to transporters of hazardous waste. These standards include requirements for immediate action for hazardous waste discharges. These standards are applicable for any onsite or offsite transportation.

The regulations at 40 CFR 264, Subpart B (Applicable, as incorporated by the Montana Hazardous Waste Act) establish general facility requirements. These standards include requirements for general waste analysis, security and location standards.

The regulations at 40 CFR 264, Subpart F (Applicable, as incorporated by the Montana Hazardous Waste Act) establish requirements, including monitoring requirements, for groundwater protection for RCRA-regulated solid waste management units (including land treatment units). 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 40 CFR 264.97(c). Monitoring is required during the active life of a hazardous waste management unit. If hazardous waste remains, monitoring is required for a period necessary to protect human health and the environment.

40 CFR Part 264, Subpart G (Applicable, as incorporated by the Montana Hazardous Waste Act) establishes that hazardous waste management facilities 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. Requirements for facilities requiring post-closure care include the following: the facilities 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. In addition, all contaminated equipment, structures and soil must be properly disposed

of or decontaminated unless exempt and free liquids must be removed or solidified, the wastes stabilized, and the waste management unit covered.

40 CFR Part 264, Subpart I (Applicable, as incorporated by the Montana Hazardous Waste Act) apply to owners and operators of facilities that store hazardous waste in containers. These regulations are applicable to any storage of purge water or other media containing F032 hazardous waste. The related provisions of 40 CFR 261.7 regarding residues of hazardous waste in empty containers are also applicable, as incorporated by the Montana Hazardous Waste Act.

40 CFR Part 264, Subpart L (Applicable, as incorporated by the Montana Hazardous Waste Act) applies to owners and operators of facilities that store or treat hazardous waste in piles. The regulations include requirements for the use of run-on and run-off control systems and collection and holding systems to prevent the release of contaminants from waste piles. These regulations apply to any storage in waste piles.

40 CFR Part 264, Subpart M (Applicable, as incorporated by the Montana Hazardous Waste Act) apply to owners and operators of facilities that treat hazardous waste in land treatment units.

40 CFR Part 264, Subpart S (Applicable, as incorporated by the Montana Hazardous Waste Act) provides special provisions for cleanup; 40 CFR 264.552 allows the designation of a corrective action management unit (CAMU) located within the contiguous property under the control of the owner or operator where the wastes to be managed in the CAMU originated and provides requirements for siting, managing, and closing the CAMU. If staging piles are needed during remediation, compliance with 40 CFR 264.554 will be required.

40 CFR 264.554 sets forth the requirements for a staging pile. A staging pile must be located within the contiguous property under the control of the owner/operator where the wastes to be managed in the staging pile originated. The staging pile must be designed so as to prevent or minimize releases of hazardous wastes and hazardous constituents into the environment, and minimize or adequately control cross-media transfer, as necessary to protect human health and the environment (for example, through the use of liners, covers, run-off/run-on controls, as appropriate). The staging pile must not operate for more than two years (unless an extension is provided) and cannot be used for treatment.

Since F032 listed waste is present at the MWPS Facility, the RCRA Land Disposal Restrictions (LDRs) treatment levels set forth in 40 CFR Part 268 are applicable requirements (as incorporated by the Montana Hazardous Waste Act) including the treatment levels for F032 listed wastes for the disposal of hazardous wastes generated at the MWPS Facility. With the exception of treated soils, hazardous wastes are prohibited from disposal onsite.

The Hazardous Waste Identification Rule (HWIR) for Contaminated Media promulgated at 63 Fed. Reg. 65874 (November 30, 1998) allows listed waste treated to levels protective of human health and the environment to be disposed onsite without triggering land ban or minimum technology requirements for these disposal requirements. Treated soils containing hazardous waste will need to meet site-specific cleanup levels as well as the LDR treatment standards (Applicable, as incorporated by the Montana Hazardous Waste Act) (40 CFR 268.49(c) (1)(C)), which requires that contaminated soil to be land disposed be treated to reduce concentrations of the hazardous constituents by 90 percent or meet hazardous constituent concentrations that are ten times the universal treatment standards (UTS) (found at 40 CFR 268.48), whichever is greater, to avoid triggering land ban.

40 CFR Part 270 (Applicable, as incorporated by the Montana Hazardous Waste Act) sets forth the hazardous waste permit program. The requirements set forth in 40 CFR Part 270, Subpart C (permit conditions), including the requirement to properly operate and maintain all facilities and systems of treatment and control are applicable requirements.

For any management (i.e., treatment, storage, or disposal) or removal or retention, the RCRA regulations found at 40 CFR 264.116 and .119 (governing notice and deed restrictions), 264.228(a)(2)(i) (addressing de-watering of wastes prior to disposal), and 264.228(a)(2)(iii)(B)(C)(D) and .251 (c)(d)(f) (regarding run-on and run-off controls), are relevant requirements for any waste management units created or retained at the MWPS Facility that contain non-exempt waste. A construction de-watering permit covers similar requirements and is applicable to the MWPS Facility.

The Montana Hazardous Waste Act, §§ 75-10-401 et seq., MCA (Applicable) and regulations under this act establishes a regulatory structure for the generation, transportation, treatment, storage and disposal of hazardous wastes. These requirements are applicable to substances and actions at the MWPS Facility that involve hazardous wastes.

ARM 17.53.501-502 (Applicable) adopts the equivalent of RCRA regulations at 40 CFR Part 261, establishing standards for the identification and listing of hazardous wastes, including standards for recyclable materials and standards for empty containers, with certain State exceptions and additions.

ARM 17.53.601-604 (Applicable) adopts the equivalent to RCRA regulations at 40 CFR Part 262, establishing standards that apply to generators of hazardous waste, including standards pertaining to the accumulation of hazardous wastes, with certain State exceptions and additions.

ARM 17.53.701-708 (Applicable) adopts the equivalent to RCRA regulations at 40 CFR Part 263, establishing standards that apply to transporters of hazardous waste, with certain State exceptions and additions.

ARM 17.53.801-803 (Applicable) adopts the equivalent to RCRA regulations at 40 CFR Part 264, establishing standards that apply to hazardous waste treatment, storage and disposal facilities, with certain State exceptions and additions.

ARM 17.53.1101-1102 (Applicable) adopts the equivalent to RCRA regulations at 40 CFR Part 268, establishing land disposal restrictions, with certain State exceptions and additions.

Section 75-10-422 MCA (Applicable) prohibits the unlawful disposal of hazardous wastes.

ARM 17.53.1201-1202 (Applicable) adopts the equivalent to RCRA regulations at 40 CFR Part 270 and 124, which establish standards for permitted facilities, with certain State exceptions and additions.

Underground Injection Control Program: All injection wells are regulated under the Underground Injection Control Program in accordance with 40 CFR 144 and 146 (Applicable) which set forth the standards and criteria for the injection of substances into aquifers. Wells are classified as Class I through V, depending on the location and the type of substance injected. For all classes, no owner may construct, operate or maintain an injection well in a manner that results in the contamination of an underground source of drinking water at levels that violate MCLs or otherwise adversely affect the health of persons. Each classification may also contain further specific standards, depending on the classification.

Tanks/Piping/Free Product Removal: Information generated during the Remedial Investigation (Envirocon, 1998) indicates that all known tanks and underground piping have been removed from the MWPS Facility and that there is no known free product at the facility. ARM 17.56.607 specifies that all free product must be removed to the maximum extent practicable before a release may be considered resolved. This is relevant if any free product is discovered during remedial activities. ARM 17.56.702 requires that all tanks and connecting piping which are taken out of service permanently must be removed from the ground. This is applicable if any remaining tanks or underground piping are encountered during remedial activities. In addition, if information regarding the presence of tanks, piping, or free product changes, DEQ may identify additional applicable or relevant ERCLs.

Reclamation Requirements (Relevant): Certain portions of the Montana Strip and Underground Mining Reclamation Act and Montana Metal Mining Act as outlined below are relevant requirements for activities at the MWPS Facility. While no mining activities are occurring at the MWPS Facility, these requirements are relevant for the management and reclamation of areas disturbed by excavation, grading, or similar actions.

ARM 17.24.631(1), (2), (3)(a) and (b): Disturbances to the prevailing hydrologic balance will be minimized. Changes in water quality and quantity, in the depth to groundwater and in the location of surface water drainage channels will be minimized, to the extent consistent with the selected remedial action. Other pollution minimization devices must be used if appropriate, including stabilizing disturbed areas through land shaping, diverting runoff, planting quickly germinating and growing stands of temporary vegetation, regulating channel velocity of water, lining drainage channels with rock or vegetation, mulching, and control of acid-forming, and toxic-forming waste materials.

ARM 17.24.633: Surface drainage from a disturbed area must be treated by the best technology currently available (BTCA). Treatment must continue until the area is stabilized.

ARM 17.24.635 through 17.24.637: Set forth requirements for temporary and permanent diversions.

ARM 17.24.638: Sediment control measures must be implemented during operations.

ARM 17.24.640: Discharges from diversions must be controlled to reduce erosionand to minimize disturbance of the hydrologic balance.

ARM 17.24.641: Practices to prevent drainage from toxic forming spoil material into ground and surface water will be employed.

ARM 17.24.643 through 17.24.646: Provisions for groundwater protection, groundwater recharge protection, and groundwater and surface water monitoring.

ARM 17.24.701 and 702: Requirements for redistributing and stockpiling of soil for reclamation. Also outlines practices to prevent compaction, slippage, erosion, and deterioration of biological properties of soil.

ARM 17.24.703: When using materials other than, or along with, soil for final surfacing in reclamation, the operator must demonstrate that the material (1) is at least as capable as the soil of supporting the approved vegetation and subsequent land use; and (2) the medium must be the best available in the area to support vegetation. Such substitutes must be used in a manner consistent with the requirements for redistribution of soil in ARM 17.24.701 and 702.

ARM 17.24.711: Requires that a diverse, effective and permanent vegetative cover of the same seasonal variety and utility as the vegetation native to the area of land to be affected must be established. This provision would not be relevant and appropriate in certain instances, for example, where there is dedicated development.

ARM 17.24.713: Seeding and planting of disturbed areas must be conducted during the first appropriate period for favorable planting after final seedbed.

ARM 17.24.714: Mulch or cover crop or both must be used until adequate permanent cover can be established.

ARM 17.24.716: Establishes method of revegetation.

ARM 17.24.717: Relates to the planting of trees and other woody species if necessary, as provided in § 82-4-233, MCA, to establish a diverse, effective, and permanent vegetative cover.

ARM 17.24.718: Requires soil amendments if necessary to establish a permanent vegetative cover.

ARM 17.24.721: Specifies that rills or gullies must be stabilized and the area reseeded and replanted if the rills and gullies are disrupting the reestablishment of the vegetative cover or causing or contributing to a violation of water quality standards for a receiving stream.

ARM 17.24.723: Requires periodic monitoring of vegetation, soils, water, and wildlife.

ARM 17.24.724: Specifies how revegetation success is measured.

ARM 17.24.726: Sets the required methods for measuring vegetative success.

ARM 17.24.731: If toxicity to plants or animals is suspected, comparative chemical analyses may be required.

Noxious Weeds (Applicable): Section 7-22-2101(8)(a), MCA defines "noxious weeds." Designated noxious weeds are listed in ARM 4.5.201 through 4.5.204 and must be managed consistent with weed management criteria developed under § 7-22-2109(2)(b), MCA and in compliance with § 7-22-2152, MCA.

OTHER LAWS (NON-EXCLUSIVE LIST)

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

Occupational Safety and Health Regulations

The federal Occupational Safety and Health Act regulations found at 29 CFR 1910 are applicable to worker protection during conduct of all remedial activities.

Public Water Supply Regulations

If remedial action at the MWPS Facility requires any reconstruction or modification of any public water supply line or sewer line, the construction standards specified in ARM 17.38.101 must be observed.

Water Rights

Section 85-2-101, MCA, declares that all waters within the state are the state's property, and may be appropriated for beneficial uses. The wise use of water resources is encouraged for the maximum benefit to the people and with minimum degradation of natural aquatic ecosystems. Parts 3 and 4 of Title 85, Chapter 2, MCA, set out requirements for obtaining water rights and appropriating and utilizing water. All requirements of these parts are laws which must be complied with in any action using or affecting waters of the state

Controlled Groundwater Areas

Pursuant to § 85-2-507, MCA, the Montana Department of Natural Resources and Conservation may grant either a permanent or a temporary controlled groundwater area. The maximum allowable time for a temporary area is two years, with a possible two-year extension.

Pursuant to § 85-2-506, MCA, designation of a controlled ground water area may be proposed if: (i) excessive ground water withdrawals would cause contaminant migration; (ii) ground water withdrawals adversely affecting ground water quality within the ground water area are occurring or are likely to occur; or (iii) ground water quality within the ground water area is not suited for a specific beneficial use.

Occupational Health Act, §§ 50-71-111 et seq., MCA

ARM 17.74.101 addresses occupational noise. In accordance with this section, no worker shall be exposed to noise levels in excess of the levels specified in this regulation. This regulation is applicable only to limited categories of workers and for most workers the similar federal standard in 29 CFR 1910.95 applies.

ARM 17.74.102 addresses occupational air contaminants. The purpose of this rule is to establish maximum threshold limit values for air contaminants under which it is believed that nearly all workers may be repeatedly exposed day after day without adverse health effects. In accordance with this rule, no worker shall be exposed to air contaminant levels in excess of the threshold limit values listed in the regulation.

This regulation is applicable only to limited categories of workers and for most workers the similar federal standard in 29 CFR 1910.1000 applies.

Montana Safety Act

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

Employee and Community Hazardous Chemical Information Act

Sections 50-78-201, 202, and 204, MCA, state that each employer must post notice of employee rights, maintain at the work place a list of chemical names of each chemical in the work place, and indicate the work area where the chemical is stored or used. Employees must be informed of the chemicals at the work place and trained in the proper handling of the chemicals.

Appendix B

Model Restrictive Covenants

DECLARATION OF RESTRICTIVE COVENANTS ON REAL PROPERTY [WWW, LLC property]

THIS DECLARATION OF RESTRICTIVE COVENANTS ON REAL PROPERTY is made by (insert name of property owner) as of ____________, 2015.

RECITALS

WHEREAS, (insert name of property owner) is the owner of certain real property (the Subject Property) located in Missoula, Montana, more particularly described as:

[insert property description here]

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

WHEREAS, DEQ, under the authority of the Montana Comprehensive Environmental Cleanup and Responsibility Act, §§ 75-10-701 et seq., MCA, has selected a remedy to abate the imminent and substantial endangerment posed by the hazardous or deleterious substances.

WHEREAS, the selected remedy requires that (insert name of property owner) restrict use of the Subject Property in order to mitigate the risk to the public health, safety or welfare or the environment and DEQ requires that such restrictions be recorded as provided for in § 75-10-727, MCA:

NOW, THEREFORE, (insert name of property owner) hereby agrees and declares:

1. No wells may be drilled within the boundaries of the Subject Property without the express prior written approval of DEQ. Groundwater within the Subject Property may not be used for any purpose other than for remediation purposes (including but not limited to monitoring) without the express prior written approval of DEQ. The integrity of any monitoring wells must be maintained and no seals may be removed on any closed wells.

2. No residential development or use shall occur upon the Subject Property, including but not limited to construction of homes; accommodations for caretakers, watchmen, or custodians; any permanent or temporary structures which allow overnight use; or any temporary or permanent mobile home or camper. It is (insert property owner's name)'s intention that this restriction be interpreted as broadly as possible to prohibit any type of residential use of the Subject Property whatsoever.

3. No action shall be taken, allowed, suffered, or omitted on the Subject Property if such action or omission is reasonably likely to create a risk of migration of hazardous or deleterious substances or a potential hazard to public health, safety, or welfare or the environment. This includes, but is not limited to, a prohibition on irrigation of the property until DEQ determines that site-specific cleanup levels are met or otherwise provides its express prior written approval allowing irrigation to occur.

4. (Insert name of property owner) agrees to provide DEQ and its representatives and contractors and all representatives and contractors of any person conducting remedial actions approved by DEQ on the Subject Property access at all reasonable times to the Subject Property.

5. At all times after (insert name of property owner) conveys its interest in all or any portion of the Subject Property and no matter what person or entity holds title to or is in possession of the Subject Property, (insert name of property owner) and its agents shall retain the right to enter the Subject Property at reasonable intervals and at reasonable times of the day in order to inspect for violations of the Restrictive Covenants contained herein. In addition, if (insert name of property owner) conveys all or any portion of its interest in the Subject Property, (insert name of property owner) retains the right and obligation to enforce these Restrictive Covenants as an intended beneficiary.

6. DEQ shall be entitled to enforce these covenants as an intended beneficiary thereof. (Insert name of property owner) specifically agrees that the remedy of "specific performance" shall be available to DEQ in such proceedings.

7. The provisions of this Declaration governing the use restrictions of the Subject Property shall run with the land and bind all holders, owners, lessees, occupiers, and purchasers of all or any portion of the Subject Property. These restrictive covenants apply in perpetuity and every subsequent instrument conveying an interest in all or any portion of the Subject Property shall include these Restrictive Covenants.

8. (Insert name of property owner) shall cause the requirements of these Restrictive Covenants to be placed in all instruments that convey an interest in the Subject Property and shall file this document with the county clerk and recorder in Missoula, Montana.

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

IN WITNESS WHEREOF, (insert name of property owner) has executed this Declaration of Restrictive Covenants on Real Property as of the first date written above.

(insert name of property owner)

____
By:

State of Montana)
:ss.
County of Missoula)

On this __ day of _______, 2015, personally appeared ____________, before me, a Notary Public for the State of Montana, known to me to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same, as ________ of the (insert name of property owner).

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

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

DECLARATION OF RESTRICTIVE COVENANTS ON REAL PROPERTY
[City shop property]

THIS DECLARATION OF RESTRICTIVE COVENANTS ON REAL PROPERTY is made by (insert name of property owner) as of **____________**, 2015.

RECITALS

WHEREAS, (insert name of property owner) is the owner of certain real property (the Subject Property) located in Missoula, Montana, more particularly described as:

[insert property description here]

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

WHEREAS, DEQ, under the authority of the Montana Comprehensive Environmental Cleanup and Responsibility Act, §§ 75-10-701 et seq., MCA, has selected a remedy to abate the imminent and substantial endangerment posed by the hazardous or deleterious substances.

WHEREAS, the selected remedy requires that (insert name of property owner) restrict use of the Subject Property in order to mitigate the risk to the public health, safety or welfare or the environment and DEQ requires that such restrictions be recorded as provided for in § 75-10-727, MCA:

NOW, THEREFORE, (insert name of property owner) hereby agrees and declares:

1. No wells may be drilled within the boundaries of the Subject Property without the express prior written approval of DEQ. Groundwater within the Subject Property may not be used for any purpose other than for remediation purposes (including but not limited to monitoring) without the express prior written approval of DEQ. The integrity of any monitoring wells must be maintained and no seals may be removed on any closed wells.

2. No residential development or use shall occur upon the Subject Property, including but not limited to construction of homes; accommodations for caretakers, watchmen, or custodians; any permanent or temporary structures which allow overnight use; or any temporary or permanent mobile home or camper. It is (insert property owner's name)'s intention that this restriction be interpreted as broadly as possible to prohibit any type of residential use of the Subject Property whatsoever.

3. No action shall be taken, allowed, suffered, or omitted on the Subject Property if such action or omission is reasonably likely to create a risk of migration of hazardous or deleterious substances or a potential hazard to public health, safety, or welfare or the environment.

4. (Insert name of property owner) agrees to provide DEQ and its representatives and contractors and all representatives and contractors of any person conducting remedial actions approved by DEQ on the Subject Property access at all reasonable times to the Subject Property.

5. At all times after (insert name of property owner) conveys its interest in all or any portion of the Subject Property and no matter what person or entity holds title to or is in possession of the Subject Property, (insert name of property owner) and its agents shall retain the right to enter the Subject Property at reasonable intervals and at reasonable times of the day in order to inspect for violations of the Restrictive Covenants contained herein. In addition, if (insert name of property owner) conveys all or any portion of its interest in the Subject Property, (insert name of property owner) retains the right and obligation to enforce these Restrictive Covenants as an intended beneficiary.

6. DEQ shall be entitled to enforce these covenants as an intended beneficiary thereof. (Insert name of property owner) specifically agrees that the remedy of "specific performance" shall be available to DEQ in such proceedings.

7. The provisions of this Declaration governing the use restrictions of the Subject Property shall run with the land and bind all holders, owners, lessees, occupiers, and purchasers of all or any portion of the Subject Property. These restrictive covenants apply in perpetuity and every subsequent instrument conveying an interest in all or any portion of the Subject Property shall include these Restrictive Covenants.

8. (Insert name of property owner) shall cause the requirements of these Restrictive Covenants to be placed in all instruments that convey an interest in the Subject Property and shall file this document with the county clerk and recorder in Missoula, Montana.

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

IN WITNESS WHEREOF, (insert name of property owner) has executed this Declaration of Restrictive Covenants on Real Property as of the first date written above.

(insert name of property owner)

____
By:

State of Montana)
:ss.
County of Missoula)

On this __ day of ________, 2015, personally appeared _____________, before me, a Notary Public for the State of Montana, known to me to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same, as _________ of the (insert name of property owner).

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

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

DECLARATION OF RESTRICTIVE COVENANTS ON REAL PROPERTY
[City park property]

THIS DECLARATION OF RESTRICTIVE COVENANTS ON REAL PROPERTY is made by (insert name of property owner) as of ____________, 2015.

RECITALS

WHEREAS, (insert name of property owner) is the owner of certain real property (the Subject Property) located in Missoula, Montana, more particularly described as:

[insert property description here]

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

WHEREAS, DEQ, under the authority of the Montana Comprehensive Environmental Cleanup and Responsibility Act, §§ 75-10-701 et seq., MCA, has selected a remedy to abate the imminent and substantial endangerment posed by the hazardous or deleterious substances.

WHEREAS, the selected remedy requires that (insert name of property owner) restrict use of the Subject Property in order to mitigate the risk to the public health, safety or welfare or the environment and DEQ requires that such restrictions be recorded as provided for in § 75-10-727, MCA:

NOW, THEREFORE, (insert name of property owner) hereby agrees and declares:

1. No wells may be drilled within the boundaries of the Subject Property without the express prior written approval of DEQ. With the exception of the existing irrigation wells on the Subject Property, groundwater within the Subject Property may not be used for any purpose other than for remediation purposes (including but not limited to monitoring) without the express prior written approval of DEQ. The integrity of any monitoring and irrigation wells must be maintained and no seals may be removed on any closed wells.

2. Use of the property shall be limited to open space/park/recreational use. No commercial, industrial, or residential use of any kind shall be allowed on the property.

3. No action shall be taken, allowed, suffered, or omitted on the Subject Property if such action or omission is reasonably likely to create a risk of migration of

hazardous or deleterious substances or a potential hazard to public health, safety, or welfare or the environment.

4. (Insert name of property owner) agrees to provide DEQ and its representatives and contractors and all representatives and contractors of any person conducting remedial actions approved by DEQ on the Subject Property access at all reasonable times to the Subject Property.

5. At all times after (insert name of property owner) conveys its interest in all or any portion of the Subject Property and no matter what person or entity holds title to or is in possession of the Subject Property, (insert name of property owner) and its agents shall retain the right to enter the Subject Property at reasonable intervals and at reasonable times of the day in order to inspect for violations of the Restrictive Covenants contained herein. In addition, if (insert name of property owner) conveys all or any portion of its interest in the Subject Property, (insert name of property owner) retains the right and obligation to enforce these Restrictive Covenants as an intended beneficiary.

6. DEQ shall be entitled to enforce these covenants as an intended beneficiary thereof. (Insert name of property owner) specifically agrees that the remedy of "specific performance" shall be available to DEQ in such proceedings.

7. The provisions of this Declaration governing the use restrictions of the Subject Property shall run with the land and bind all holders, owners, lessees, occupiers, and purchasers of the Subject Property. These restrictive covenants apply in perpetuity and every subsequent instrument conveying an interest in all or any portion of the Subject Property shall include these Restrictive Covenants.

8. (Insert name of property owner) shall cause the requirements of these Restrictive Covenants to be placed in all instruments that convey an interest in the Subject Property and shall file this document with the county clerk and recorder in Missoula, Montana.

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

IN WITNESS WHEREOF, (insert name of property owner) has executed this Declaration of Restrictive Covenants on Real Property as of the first date written above.

(insert name of property owner)

____

By:

State of Montana)
:ss.
County of Missoula)

On this __ day of ________, 2015, personally appeared ______________, before me, a Notary Public for the State of Montana, known to me to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same, as _________ of the (insert name of property owner).

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

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

DECLARATION OF RESTRICTIVE COVENANTS ON REAL PROPERTY
[Scott Street, LLP property]

THIS DECLARATION OF RESTRICTIVE COVENANTS ON REAL PROPERTY is made by (insert name of property owner) as of ____________, 2015.

RECITALS

WHEREAS, (insert name of property owner) is the owner of certain real property (the Subject Property) located in Missoula, Montana, more particularly described as:

[insert property description here]

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

WHEREAS, DEQ, under the authority of the Montana Comprehensive Environmental Cleanup and Responsibility Act, §§ 75-10-701 et seq., MCA, has selected a remedy to abate the imminent and substantial endangerment posed by the hazardous or deleterious substances.

WHEREAS, the selected remedy includes construction, operation, and maintenance of a land treatment unit to treatment contaminated soil and that treatment unit is or will be located on the western portion of the Subject Property.

WHEREAS, the selected remedy requires that (insert name of property owner) restrict use of the Subject Property in order to mitigate the risk to the public health, safety or welfare or the environment and DEQ requires that such restrictions be recorded as provided for in § 75-10-727, MCA:

NOW, THEREFORE, (insert name of property owner) hereby agrees and declares:

1. No wells may be drilled within the boundaries of the Subject Property without the express prior written approval of DEQ. Groundwater within the Subject Property may not be used for any purpose other than for remediation purposes (including but not limited to monitoring) without the express prior written approval of DEQ. The integrity of any monitoring wells must be maintained and no seals may be removed on any closed wells.

2. The Subject Property has been surveyed to identify the eastern portion of the property that is or will be remediated to be protective of potential future residential use. That surveyed area (referred to as the “Surveyed Area”) is more particularly described as follows:

[insert eastern portion of property where residential use is allowed]

3. On the western portion of the property outside the Surveyed Area, no residential development or use shall occur, including but not limited to construction of homes; accommodations for caretakers, watchmen, or custodians; any permanent or temporary structures which allow overnight use; or any temporary or permanent mobile home or camper. It is (insert property owner's name)'s intention that this restriction be interpreted as broadly as possible to prohibit any type of residential use of the western portion of the Subject Property whatsoever.

4. On the western portion of the property outside the Surveyed Area, a land treatment unit has been constructed to treat soils impacted by pentachlorophenol and other hazardous or deleterious substances. The portion of the Subject Property containing the land treatment unit (referred to as the "Land Treatment Unit Area" has been surveyed and is more particularly described as follows:

   [insert surveyed LTU property description here]

5. The Land Treatment Unit Area is or will be fenced, locked, and contain warning signs that are required to be maintained while the land treatment unit is in place, until site-specific cleanup levels are met. Until DEQ determines that site-specific cleanup levels are met, DEQ will require maintenance of the fence with locking access gates and warning signs on the access controlled fence. Until DEQ determines that site-specific cleanup levels are met, neither the locked fence nor the warning signs may be removed without the express prior written approval of DEQ.

6. During the time that the land treatment unit is operating, no building, excavation (except for excavation associated with tilling and/or removing a lift of soil), or any development whatsoever may occur within the Land Treatment Unit Area. Activity within the Land Treatment Unit Area is limited to those activities necessary for operation and maintenance of the land treatment unit. It is (insert the property owner's name)'s intent that this prohibition be applied as broadly as possible to ensure that there is no use or development of the Land Treatment Unit Area whatsoever in order to ensure the integrity and effectiveness of the remedy during the time that the land treatment unit is in place. This includes but is not limited to a prohibition on the installation of utilities to the greatest extent allowed by law and any excavation within the Land Treatment Unit Area (except for excavation associated with operation or maintenance of the land treatment unit) during the time that the land treatment unit is operating. It is (insert property owner's name)'s intention that this restriction be interpreted as broadly as possible to prohibit any operation within or development of the Land Treatment Unit Area whatsoever, except for those activities necessary for operation and maintenance of the land

treatment unit.

7. No action shall be taken, allowed, suffered, or omitted on the Subject Property if such action or omission is reasonably likely to create a risk of migration of hazardous or deleterious substances or a potential hazard to public health, safety, or welfare or the environment. This includes, but is not limited to, not interfering or allowing any interference with the operation and maintenance of the land treatment unit.

8. (Insert name of property owner) agrees to provide DEQ and its representatives and contractors and all representatives and contractors of any person conducting remedial actions approved by DEQ on the Subject Property access at all reasonable times to the Subject Property.

9. (Insert property owner's name) agrees that it may not transfer any portion of its interest in the Land Treatment Unit Area of the Subject Property during the time that the land treatment unit is operating. Once treatment of the impacted soil is complete and DEQ approves closure of the land treatment unit, (insert property owner's name) may transfer its interest in all or any portion of the Land Treatment Unit Area of the Subject Property.

10. At all times after (insert name of property owner) conveys its interest in all or any portion of the Subject Property and no matter what person or entity holds title to or is in possession of all or any portion of the Subject Property, (insert name of property owner) and its agents shall retain the right to enter the Subject Property at reasonable intervals and at reasonable times of the day in order to inspect for violations of the Restrictive Covenants contained herein. In addition, if (insert name of property owner) conveys all or any portion of its interest in the Subject Property, (insert name of property owner) retains the right and obligation to enforce these Restrictive Covenants as an intended beneficiary.

11. DEQ shall be entitled to enforce these covenants as an intended beneficiary thereof. (Insert name of property owner) specifically agrees that the remedy of "specific performance" shall be available to DEQ in such proceedings.

12. The provisions of this Declaration governing the use restrictions of the Subject Property shall run with the land and bind all holders, owners, lessees, occupiers, and purchasers of all or any portion of the Subject Property. These restrictive covenants apply in perpetuity and every subsequent instrument conveying an interest in all or any portion of the Subject Property shall include these Restrictive Covenants.

13. (Insert name of property owner) shall cause the requirements of these Restrictive Covenants to be placed in all instruments that convey an interest in the Subject Property and shall file this document with the county clerk and recorder in

Missoula, Montana.

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

IN WITNESS WHEREOF, (insert name of property owner) has executed this Declaration of Restrictive Covenants on Real Property as of the first date written above.

(insert name of property owner)

____
By:

State of Montana)
:ss.
County of Missoula)

On this __ day of _______, 2015, personally appeared ____________, before me, a Notary Public for the State of Montana, known to me to be the person whose name is subscribed to the within instrument and acknowledged to me that he executed the same, as ________ of the (insert name of property owner).

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

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

Appendix C

Selected Remedy Cost Estimates

Table C-1
Cost Estimate - Site-Wide Elements
Missoula White Pine Sash Facility

CAPITAL COSTS					
Item	Unit	Unit Cost	Quantity	Cost	Source
Zoning/Restrictive Covenants Administrative Costs	LS	$5,000.00	1	$5,000	Engineer Estimate
			SUBTOTAL	$5,000	
Contingencies		25%		$1,250	10% Scope, 15% Bid
			SUBTOTAL	$6,250	
			TOTAL CAPITAL COSTS	**$6,250**	
ANNUAL OPERATION AND MAINTENANCE COSTS					
Item	Unit	Unit Cost	Quantity	Cost	Source
Long-Term Monitoring & Reporting (per event)					
Soil Vapor Monitoring					
Equipment	LS	$1,340.00	1	$1,340	MWPS History
Analytical suite	ea	$425.00	15	$6,375	Lab Quote
Labor	mhour	$100.00	40	$4,000	MWPS History
Misc	LS	$1,000.00	1	$1,000	MWPS History
Groundwater Monitoring					
Equipment Rental	LS	$1,500.00	1	$1,500	MWPS History
Sampling/Inspection Labor	mhour	$100.00	60	$6,000	MWPS History
Misc.	LS	$2,000.00	1	$2,000	MWPS History
Analytical suite	per well	$1,480.00	32	$47,360	MWPS History, lab prices
Semi-annual Monitoring/Inspection Report	LS	$800.00	1	$800	MWPS History
			SUBTOTAL	$70,375	
O&M Contingencies		25%		$17,594	10% Scope, 15% Bid
			PER-EVENT SITE-WIDE ELEMENTS COST	$87,969	
			INITIAL YEARLY SITE-WIDE ELEMENTS COST	**$175,938**	

Notes:

ls = lump sum   mhour = man hour

Present Value	**3%**
30 years	$1,954,751

Assumptions:

1. Monitoring includes sampling and analysis of 30 groundwater wells in Missoula and shallow aquifer systems, using a bladder pump and completion of semi-annual sampling of soil-vapor monitoring points for 5 years
2. Analytical suite for groundwater monitoring includes Mass EPH/VPH, 8270 BNA, 8260 long list, 8151, 8290, and dissolved metals.
3. Labor per monitoring well includes 2 hours per well to include preparation, sampling, and packing/shipment of samples.
4. Misc. for groundwater monitoring includes shipping costs, consumables (ice, packing materials)
5. The restrictive covenants can be implemented for $5000, regardless of their scope and content. This consists of attorneys fees and recording costs.
6. Annual inspection and reporting is estimated at $800/year, which includes the labor to conduct the inspection and to prepare a report of sampling and inspection activities for submittal to DEQ.
7. Groundwater sampling and inspection is estimated to be twice per year for 10 years, then annually for 20 more years.
8. Soil-vapor monitoring is estimated to be twice per year for 5 years.
9. Soil-vapor sampling includes Modified TO-15 SIM Air Phase Hydrocarbons and Fixed Gases
10. Labor per vapor monitoring point is 2.5 hours to include preparation, sampling, and packing/shipment of samples.
11. Misc. includes shipping costs and consumables (packing materials)

Table C-2

Cost Estimate - Excavation and Offsite Disposal of Dioxin Soil, Methane-Containing Soil, and Ash

Missoula White Pine Sash Facility

	Unit	Unit Cost	Quantity	Cost	Source
Mobilization	LS	$22,190.70	1	$22,191	Engineers Estimate, 10% of construction
Excavate and loading dioxin-contaminated soils (SSLLP & Stoddard St.)	CY	$5.50	4949	$27,220	Engineers Estimate
Excavate and loading methane-containing soils and ash	CY	$5.50	16185	$89,018	Engineers Estimate
Replace with clean soil, haul, backfill, & compact	CY	$5.00	21134	$105,670	Ibey Nursery/Landscaping
Confirmation Sampling	EA	$895.00	50	$44,750	Lab Prices
Disposal as Non Hazardous Waste	CY	$30.00	23308	$699,240	Missoula Landfill
			SUBTOTAL	$988,088	
Construction Contingencies		25%		$247,021.93	10% Scope, 15% Bid
			SUBTOTAL	$1,235,110	
Project Management		6%		$74,106.58	EPA Cost Guidance
Remedial Design		12%		$148,213.16	EPA Cost Guidance
Construction Management		8%		$98,808.77	EPA Cost Guidance
			SUBTOTAL	$321,129	
			TOTAL CAPITAL COSTS	**$1,556,238**	

Present Value	**3%**
1year	$1,556,238

Notes:

EA = each

CY = cubic yard

LS = lump sum

Number of confirmation samples based on one sample for each 500 CY to verify no SSCL exceedances, analytical suite includes PCP, dioxins, and VPH

Confirmation sampling quantity assume 10% of locations will require more than one sample to meet SSCLs

Table C-3
Cost Estimate - Excavation and Ex-Situ Enhanced Bioremediation
Missoula White Pine Sash Facility

	Unit	Unit Cost	Quantity	Cost	Other Direct Cost Factor	Adjusted Cost	Source
Sheet Pile Installation in Former Treatment Area							
Sheet pile contractor mobilization	LS	$1,970.00	1	$1,970	1.65	$3,251	Muth Engineering
Sheet Piling Costs - Area 1 Fomer Treating Area	CY		9908				
PZC 18 Sheet Pile (188 sheets)	LB	$0.65	379008	$246,355	1.65	$406,486	Muth Engineering
Wales (772 linear feet)	LB	$0.62	56356	$34,941	1.65	$57,652	Muth Engineering
Anchors	EA	$3,500.00	56	$196,000	1.65	$323,400	Muth Engineering
Thread & Drive	HR	$410.00	40	$16,400	1.65	$27,060	Muth Engineering
Build Template	HR	$360.00	322	$115,920	1.65	$191,268	Muth Engineering
Utility Move	LS	$13,750.00	1	$13,750	1.65	$22,688	Muth Engineering
Traffic Control	LS	$15,000.00	0	$0	1.65	$0	Muth Engineering
				SUBTOTAL for one area per Muth		$1,031,804.27	
					Cost per CY	$104.14	
Actual Volume to be excavated in former treating area			4347	**Cost to Shore Impacted Soil**		$452,690.06	
Excavation and Backfill							
Excavation and loading of Former Treatment Area soil	CY	$5.50	4347	$23,909	1.00	$23,908.50	Muth Engineering
Replace clean soil, haul, backfill compact - all soils	Ton	$5.00	4347	$21,735	1.00	$21,735.00	Ibey Nursery/Landscaping
Abandon Monitoring Wells	EA	$500.00	12	$6,000	1.00	$6,000.00	Engineering Estimate
Confirmation Sampling(1)	EA	$895.00	40	$35,800	1.00	$35,800.00	MWPS History
					SUBTOTAL	$87,443.50	
On-Site Treatment							
Stripping	SF	$0.96	86000	$82,560	1.00	$82,560.00	Cost Works 2013
Construct/compact berms	CY	$2.06	2500	$5,150	1.00	$5,150.00	Cost Works 2013
Fine Grading	SF	$0.10	58700	$5,870	1.00	$5,870.00	Cost Works 2013
60 mil Liner w/ geotextile above and below	SF	$2.37	58700	$139,119	1.00	$139,119.00	Cost Works 2013
Leachate collection (drainage layer w/ piping)	SF	$1.02	58700	$59,874	1.00	$59,874.00	Luttrell Respository Estimate
Sump, discharge, pump tank	LS	$51,290.00	1	$51,290	1.00	$51,290.00	Engineering estimate
Cushion layer, 1 ft. gravel w/ geotextile separation	SF	$1.29	58700	$75,723	1.00	$75,723.00	Engineer's estimate and Cost Works 2013
Transport soil to LTU and spread	CY	$4.00	4347	$17,388	1.00	$17,388.00	Engineering estimate
Amend soil with fertilizer	Acre	$800.00	1.35	$1,080	1.00	$1,080.00	AEI
Install sprinkler system -- Kifco water reel	LS	$10,000.00	1	$10,000	1.00	$10,000.00	AEI
Install water line from Mountain Water Co.	LS	$15,000.00	1	$15,000	1.00	$15,000.00	AEI
Mobilization for construction of the LTU	LS		1	$55,050		$55,049.75	Engineer's Estimate, 10% of Construction
					SUBTOTAL	$463,054	
Construction Contingencies		25%				$250,796.89	10% Scope, 15% Bid
					SUBTOTAL	**$1,253,984.45**	
Project Management		6%				$75,239.07	EPA Cost Guidance
Remedial Design		12%				$150,478.13	EPA Cost Guidance
Construction Management		8%				$100,318.76	EPA Cost Guidance
				TOTAL CAPITAL COSTS		**$1,580,020**	
Annual Operations and Maintenance Costs (4)	Unit	Unit Cost	Quantity	Cost	Other Direct Cost Factor	Adjusted Cost	Source
Weekly tilling and watering during summer months	LS	$15,000.00	1	$15,000	1.00	$15,000.00	AEI
Water (70 gpm, 4 hrs/day, 5 days/wk, 4 mo/yr)	1000 gal	$1.95	1344	$2,621	1.00	$2,620.80	AEI and Mountain Water
Project manager	Mhr	$140.00	100	$14,000	1.00	$14,000.00	Engineering Estimate
Annual confirmation sampling	EA	$1,200.00	25	$30,000	1.00	$30,000.00	Lab prices
					SUBTOTAL	$61,620.80	
O&M Contingencies		25%				$15,405.20	
				TOTAL YEARLY O&M COSTS		**$77,026.00**	
Closure of Land Treatment Unit							
LTU post-treatment confirmation sampling (3)	EA	$895.00	25	$22,375	1.00	$22,375.00	Engineering estimate
Excavate and transport dioxin soils, liner, gravel bed, leachate collection system. (2 ft. of gravel)	CY	$5.50	4347	$39,182	1.00	$23,908.50	Engineering estimate
Disposal of dioxins soils, etc., as Non-Hazardous Waste	CY	$30.00	4347	$130,410	1.00	$130,410.00	Missoula Landfill
Replace clean soil, haul, backfill compact - all soils	CY	$5.00	4347	$43,560	1.00	$21,735.00	Ibey Nursery/Landscaping
				Subtotal Closure Costs		$176,053.50	
O&M Contingencies		25%				$44,013.38	
Project management		6%				$10,563.21	
Remedial design		12%				$0.00	
Construction management		8%				$14,084.28	
				TOTAL CLOSURE COSTS		**$244,714.37**	

Notes:

CY= cubic yards — LS = lump sum

SF = square feet — Mhr = man hour

EA = each — gal = gallon

Present Value	**3%**
4 years	$2,487,334

(1) - Confirmation samples based on 8151 and 8290 for most, then final confirmation samples for EPH/VPH, 8270BNA, and 8260 long list

(2) Initial baseline confirmation sampling is included with the annual confirmation sampling (initial and prior to start of second year of treatment) and consists of 10 randomly placed samples.

(3) LTU post-treatment confirmation sampling assumes one 5-point composite sample per 50x50 foot grid with sampling for PCP, dioxins/furans, and EPH

(4) Annual confirmation sampling to include PCP by Method 8151, dioxins/furans by Method 8290, petroleum by Mass. EPH, soil nutrient analysis

O&M costs, including weekly tilling in summer, fertilizing, watering, and equipment rental based on landfarm experience at Libby, MT Superfund Site - Arrowhead Engineering (AEI)

Water usage costs are based on water usage at Libby, MT Superfund site landfarm and Mountain Water Co. rates

Assumes construction the first year, followed by four years of treatment.

Table C-4

Cost Estimate - In-Situ Chemical Oxidation of Former Treatment Area and AST Area Soils

Missoula White Pine Sash Facility

CAPITAL COSTS					
Item: Former Treatment Area and AST Area	Unit	Unit Cost	Quantity	Cost	Source
Cost per yard treatment, Cool-Ox™, injecting from 15 to 30 ft bgs in Treatment Area and from Surface in AST Area	CY	$63.65	8956	$570,049	DTI
Confirmation soil sampling	EA	$970.00	75	$72,750	Engineering estimate and lab prices
			SUBTOTAL	$642,799	
Construction Contingencies		100%		$642,799	100% of Capital Costs
			SUBTOTAL	**$1,285,599**	
Project Management		6%		$77,136	EPA Cost Guidance
Remedial Design		12%		$154,272	EPA Cost Guidance
Construction Management		8%		$102,848	EPA Cost Guidance
			SUBTOTAL	**$334,256**	
			TOTAL CAPITAL COSTS	**$1,619,854**	

Notes:

CY = cubic yards

EA = each

DTI = Deep Earth Technologies, vendor for Cool-Ox™

Present Value	**3%**
1 year	$1,619,854

Assumptions:

1. Assumes treatment in-place from 15 to 30 feet below ground surface in the former treatment area and surface to 19 feet bgs in AST area via injections
2. Confirmation soil borings to be installed in former treating and AST areas.
3. Soil samples to include Methods 8151, 8290, and Mass. EPH/VPH.
4. Assume treatment insitu with borings on 7 foot centers, injecting oxidant every 5 feet vertically, approximately 380 gallons/boring
5. Assume direct push technology could reach 30 feet of depth, but this is doubtful based on experience.
6. Contingency includes provision for sonic drilling and/or horizontal drilling to reach impacted soil.
7. Unit price for treatment based on detailed estimate by Deep Earth Technologies, Inc., 6/13/13, which includes the following:

9000	square feet	7	ft injection spacing
10,000	cubic yards	7	gallons per cubic yard oxidant
184	injection points	34	days to complete
70000	gallons oxidant	$636,458	total cost
30	ft depth to GW	$63.65	cost/cy

Table C-5
Cost Estimate - In-Situ Chemical Oxidation of Groundwater
Missoula White Pine Sash Facility

CAPITAL COSTS					
Item	Unit	Unit Cost	Quantity	Cost	Source
Treat 20 existing perched aquifer wells with Cool-Ox™	gallons	$5.91	30000	$177,300	DTI cost estimate
Repeat treatment on 20 different or same existing perched aquifer wells with Cool-Ox™	gallons	$5.91	30000	$177,300	DTI cost estimate
Install 10 new monitoring/injection wells	each	$8,000.00	10	$80,000	MWPS history
			SUBTOTAL	$434,600	
Construction Contingencies		25%		$108,650	10% Scope, 15% Bid
			SUBTOTAL	**$543,250**	
Project Management		6%		$26,076	EPA Cost Guidance
Remedial Design including Pilot Testing		12%		$52,152	EPA Cost Guidance
Construction Management		8%		$34,768	EPA Cost Guidance
			SUBTOTAL	**$112,996**	
		TOTAL CAPITAL COSTS		**$656,246**	

Notes:
CY = cubic yards

Present Value	**3%**
1 year	$656,246

Basis:
1) Assume injection of 1500 gallons of Cool-Ox™ into 20 perched aquifer wells, concentrated in the former treating area. The other perched aquifer wells, and some of the injection wells themselves if they can be adequately purged, would be used for monitoring the impacts. Two mobilizations and two applications of 20 wells each are assumed.
2) Ten new perched aquifer wells are included, to be used for monitoring and injection, if necessary.
3) Groundwater monitoring and reporting included in site wide elements
4) Since this treatment would happen in the first year or two, the NPV is approximately the same as the capital cost total