



**Operable Unit 7 – Plainwell Mill
Allied Paper, Inc./Portage Creek/Kalamazoo River
Superfund Site**

Plainwell, Allegan County, Michigan

Record of Decision



U.S. Environmental Protection Agency Region 5

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LIST OF ACRONYMS AND ABBREVIATIONS

95% UCL	95 Percent Upper Confidence Limit
AMSL	Above Mean Sea Level
ARAR	Applicable or Relevant and Appropriate Requirement
AST	Above-ground Storage Tank
BERA	Baseline Ecological Risk Assessment
bgs	below ground surface
BHHRA	Baseline Human Health Risk Assessment
BTEX	Benzene, Toluene, Ethylbenzene, and Xylenes
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CDI	Chronic Daily Intake
CFR	Code of Federal Regulations
CL	Cleanup Level
COC	Contaminants of Concern
COPECs	Constituents of Potential Ecological Concern
CRA	Conestoga-Rovers & Associates
Csat	Soil Saturation Concentration Screening Level
CSM	Conceptual Site Model
cy	Cubic Yard
DCC	Direct Contact Criteria
DWC	Drinking Water Criteria
DWPC	Drinking Water Protection Criteria
EPA	United States Environmental Protection Agency
EPC	Exposure Point Concentration
FS	Feasibility Study
GSIC	Groundwater Surface Water Interface Criteria
GSIPC	Groundwater Surface Water Interface Protection Criteria
HI	Hazard Index
HMW	High Molecular Weight
HQ	Hazard Quotient
IC	Institutional Control
IEUBK	Integrated Exposure Uptake Biokinetic
LOAEL	Lowest Observed Adverse Effects Level
MCL	Maximum Contaminant Level
MDEQ	Michigan Department of Environmental Quality
mg/kg	milligrams per kilogram
mg/l	milligrams per liter
NCP	National Contingency Plan
ND	Non-Detect
NHPA	National Historic Preservation Act
NOAEL	No Observed Adverse Effect Level
NRDAR	Natural Resource Damage Assessment and Restoration
NRDA	Natural Resource Damage Assessment

O&M	Operation and Maintenance
OU	Operable Unit
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PRG	Preliminary Remediation Goal
PRP	Potentially Responsible Party
PSIC	Particulate Soil Inhalation Criteria
RAO	Remedial Action Objective
RBC	Risk-Based Concentration
RBSL	Risk-based Screening Level
RfD	Reference Dose
RI	Remedial Investigation
ROD	Record of Decision
SDBL	State Default Background Level
SF	Slope Factor
SLERA	Screening Level Ecological Risk Assessment
State	The State of Michigan
SVIAC	Soil Volatilization to Indoor Air Inhalation Criteria
SVOC	Semi-volatile Organic Compounds
TSCA	Toxic Substances and Control Act
TT	Treatment Technique
µg/dL	micrograms per deciliter
UU/UE	Unlimited Use and Unrestricted Exposure
VSIC	Volatile Soil Inhalation Criteria
VOC	Volatile Organic Compounds
Weyerhaeuser	Weyerhaeuser Company

Record of Decision – OU7 – Allied Paper, Inc./Portage Creek/Kalamazoo River Site

Plainwell, Michigan

This Record of Decision (ROD) documents the remedy selected for the Plainwell Mill, Operable Unit 7 (OU7), of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site in Plainwell, Allegan County, Michigan. This is the final ROD for contaminated soil at OU7. The ROD is organized into three sections: Part I contains the *Declaration* for the ROD, Part II contains the *Decision Summary*, and Part III contains the *Responsiveness Summary*.

PART I – DECLARATION

This section summarizes the information presented in the ROD and includes the authorizing signature of the United States Environmental Protection Agency (EPA) Region 5 Superfund Division Director.

1.1 - Site Name and Location

Operable Unit 7 – Plainwell Mill
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site
EPA ID# MID006007306
Plainwell Mill, Allegan County, Michigan

1.2 - Statement of Basis and Purpose

This decision document presents the Selected Remedy for the cleanup of contaminated soil at OU7 of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site in Plainwell, Allegan County, Michigan. The remedy was developed in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). Specifically, this decision document has been prepared in compliance with CERCLA Section 117 and NCP Section 300.430(f). This decision document explains the factual and legal basis for selecting the remedy for OU7. This decision is based on the Administrative Record file for OU7. The Administrative Record file is available for review at the EPA Region 5 Records Center, 77 West Jackson Boulevard, Chicago, Illinois, and at the following information repositories:

Kalamazoo Public Library
315 South Rose
Kalamazoo, MI

Allegan Public Library
331 Hubbard Street
Allegan, MI

Waldo Library
Western Michigan University
1903 West Michigan Avenue
Kalamazoo, MI

Otsego District Library
219 South Farmer Street
Otsego, MI

Charles Ransom Library
180 South Sherwood
Plainwell, MI

Saugatuck-Douglas Library
10 Mixer Street
Douglas, MI

The State of Michigan has indicated concurrence with the Selected Remedy. The State concurrence letter will be added to the Administrative Record upon receipt.

1.3 - Assessment of Site

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

1.4 - Description of Selected Remedy

EPA's Selected Remedy addresses the low-level threat waste at OU7 by excavation and off-site disposal of contaminated soil and will be the final remedial action for contaminated soil at OU7. The major components of the Selected Remedy for OU7 consist of:

- Pre-remedial design delineation of the vertical and horizontal extent of soil contamination exceeding the cleanup levels (CLs);
- Pre-excavation activities which include, but are not limited to, the following: erosion control measures, purging the remaining buried fuel oil line from a former above-ground storage tank (AST) located in Mixed Residential/Commercial Area 2, removal of fuel oil within an old coal tunnel located in Mixed Residential/Commercial Area 2, abandonment of monitoring wells located in excavation areas, structural evaluation of the buildings to be affected by excavation activities, and limited asbestos abatement around the former coal tunnel and the exterior piping outside former Mill Buildings;
- Excavation of soil exceeding CLs (an estimated 95 cubic yards (cy) of metals-contaminated soil would remain in place and safely contained beneath existing building concrete slabs);
- Off-site disposal of contaminated soil – except for contaminated soils underlying existing concrete slabs that are currently located within buildings at OU7;
- Removal of coal tunnel and associated former fuel oil AST lines, along with any adjacent contaminated materials at concentrations above the CLs;
- Off-site disposal of removed fuel oil, fuel oil lines, coal tunnel, and associated contaminated material above CLs;
- Verification soil sampling to confirm that CLs were met;
- Backfilling of excavation areas with clean fill;
- Restoration of excavated areas and other areas impacted by cleanup activities, as appropriate;
- Monitoring and maintenance of engineering controls of concrete slabs; and
- Institutional controls (ICs) prepared and implemented consistent with the future land use plan for each redevelopment area. The ICs would include, but not be limited to, the following:

- Zoning and/or land use restrictions at OU7 consistent with future anticipated land use, including: (1) the requirement that certain existing building foundations/slabs remain in place as a barrier to contamination beneath them, unless addressed by an approved Soil Management Plan; and (2) the development of Soil Management Plans for each area being redeveloped as necessary;
- Implementation of a restrictive covenant for contamination remaining in place above Part 201 Generic Residential Cleanup Criteria pursuant to Michigan Consolidated Laws 324.20120b; and
- Installation of permanent markers on the property identifying depth to which digging is prohibited, and enrollment of property in a state-wide utility-location program to identify areas where digging is prohibited.

This response action addresses only OU7 and does not address any of the other OUs of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site. Each OU is being addressed separately. With the exception of ensuring that continuing sources of polychlorinated biphenyls (PCBs) to the Kalamazoo River are controlled prior to cleaning up the contaminated sediments in OU5 (which consists of the Kalamazoo River and a portion of Portage Creek), the cleanup schedules for the various site OUs do not depend on each other. If contaminants are present in the groundwater at OU7 at concentrations that present a risk to human health and the environment, then a groundwater cleanup remedy may be required, but that remedy will be addressed under a separate EPA action.

1.5 - Statutory Determinations

1.5.1 Statutory Requirement

The Selected Remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action (unless justified by a waiver), is cost-effective, and utilizes permanent solutions and alternative treatment (or resource recovery) technologies to the maximum extent practicable.

1.5.2 Statutory Preference for Treatment

The Selected Remedy does not satisfy the statutory preference for treatment as a principal element of the remedy (i.e., reducing the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants through treatment), because the soil contamination that is being addressed in this remedy does not lend itself to any cost-effective treatment. Also, the soil contains relatively low levels of contamination.

1.5.3 Five-Year Review

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure (UU/UE), a statutory review will be conducted within five years after initiation of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment and periodically every five years subsequent. The five-year review process for the entire Allied Paper, Inc./Kalamazoo River/Portage Creek Site began in 2007, and includes OU7. The five-year review for OU7 will continue in its current five-year cycle, with the next five-year review occurring in 2017.

1.5.4 Special Findings

The Toxic Substances and Control Act (TSCA) and its regulations at 40 Code of Federal Regulations (CFR) Part 761 apply to the selected remedy because some of the on-site PCB-contaminated material is PCB remediation waste. Based on site-specific human health risk-assessments, EPA finds that the PCB remediation waste remaining on-site will not pose an unreasonable risk of injury to human health and the environment.

1.6 - Data Certification Checklist

The following information is included in the *Decision Summary* section of this ROD. Additional information can be found in the Administrative Record file for this site.

Information Item	Sections in ROD
Contaminants of concern (COCs) and their respective concentrations	Section 2.5.4, Attachment 2
Baseline risk represented by the COCs	Section 2.7, Attachment 2
CLs established for COCs and the basis for these levels	Section 2.12.4, Attachment 2
How source materials constituting principal threats are addressed	Section 2.11
Current and reasonably-anticipated future land use assumptions and current and potential future beneficial uses of groundwater use in the baseline risk assessment and ROD	Sections 2.6 and 2.12.4
Potential land and groundwater use that will be available at OU7 as a result of the Selected Remedy	Sections 2.6 and 2.12.4
Estimated capital, annual operation and maintenance (O&M), and total present worth costs, discount rate, and the number of years over which the remedy cost estimates are projected	Sections 2.10, 2.12.3, 2.13, and Attachment 2
Key factor(s) that led to selecting the remedy (that is, describe how the Selected Remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision)	Sections 2.10 and 2.13

1.7 - Authorizing Signatures

EPA, as the lead agency for OU7 of the Allied Paper, Inc./Portage Creek/Kalamazoo River site (MID006007306), formally authorizes this ROD.



for Richard C. Karl, Director
Superfund Division
EPA, Region 5

Date 9/23/2015

PART II – DECISION SUMMARY

2.1 - Site Name, Location, and Brief Description

OU7 is located at 200 Allegan Street in Plainwell, Allegan County, Michigan, and is part of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund National Priorities List site (MID006007306). The location of OU7 is shown on Figure 1. OU7 is approximately 35.6 acres in size, includes the former Plainwell, Inc. mill property and buildings, and is currently zoned as a central business district.

EPA is serving as the lead agency for all environmental response actions taken at OU7 by the potentially responsible party (PRP), Weyerhaeuser Company (Weyerhaeuser), who undertook the Remedial Investigation and Feasibility Study (RI/FS or RI and FS) at OU7. The Michigan Department of Environmental Quality (MDEQ) is serving as the support agency for OU7 activities. EPA anticipates that the PRP will implement the Selected Remedy.

2.2 - Site History and Enforcement Activities

Papermaking operations began at OU7 as early as 1884 as the Lyon Paper Mill. Buildings currently on the property were constructed between 1906 and 1995 and are shown on Figure 2.

Paper mill operations at OU7 included the manufacturing of paper products and recycling of paper materials (which included the process of de-inking and use of caustic chemicals such as calcium carbonate), paper sludge dewatering, wastewater treatment, waste storage, raw materials storage, storage of coal, storage of fuel and hydraulic oils, and general manufacturing-related activities. Available information indicates the mill produced "coated and uncoated book and cover release base and technical specialty paper products." Wastewater sludge was created during the papermaking processes. The sludge was processed through a series of clarifiers before entering the wastewater settling lagoons in order to allow for the settling of further waste residuals before decanting and discharge of the treated effluent. Beginning in the late 1950s, paper that was de-inked and recycled at the mill included carbonless copy paper containing PCBs and inks containing heavy metals which may have included arsenic. Processed wastewater was treated in the on-site wastewater treatment plant, and paper waste from mill operations was treated in what was referred to as the Sludge Dewatering Building (the Public Safety Building on Figure 2). These operations were located in the central portion of OU7. The historical operation of railroad tracks and below grade product delivery systems also occurred on OU7.

The western portion of OU7 along the riverbank was historically occupied by the former wastewater settling lagoons. Most of the waste residuals have been dredged from the lagoons and the excavated areas were backfilled with soil. The excavated waste residuals from various settling lagoons were consolidated into the four westerly lagoons, which are currently covered with soil and vegetation. The dredged lagoons were filled to approximately the adjacent grade. A vacant wooded lot is present on the southwestern portion of the property. A significant portion of OU7 is covered with buildings or concrete slabs or asphalt pavement, but there are areas, primarily along the riverbank, where vegetation is present.

OU7 Investigations

Weyerhaeuser completed an RI in 2013 under EPA oversight. The RI identified COCs that pose potential risks to human health and the environment, including metals, semi-volatile organic compounds (SVOCs), volatile organic compounds (VOCs), PCBs, cyanide (total), nitrate, and phosphorus. The primary COC at OU7 is arsenic.

The United States and Weyerhaeuser entered into a Consent Decree, effective February 2005, for the design and implementation of certain response actions at OU4 and OU7 of the Allied Paper, Inc./Portage Creek/Kalamazoo River site. The OU7 RI was conducted in a phased approach from November 2009 to February 2013. The significant findings and conclusions from the characterization activities completed during the RI are summarized below. The Final FS Report was approved by EPA in May 2015. Additional details are provided in the Final RI and FS Reports, which are part of the Administrative Record for OU7.

The results of the RI were evaluated relative to anticipated future land use scenarios based on the current redevelopment plan, which includes 11 primary redevelopment areas as listed below and shown on Figure 3.

OU7 Redevelopment Areas
Residential Area 1
Residential Area 2
Residential Area 3
Residential Area 4
Waterfront Plaza
Mixed Residential/Commercial Area 1
Mixed Residential/Commercial Area 2
Commercial Area 1
Commercial Area 2
Commercial Area 3
Commercial Area 4

Previous Response Actions Adjacent to OU7

From 2007-2009, under EPA oversight, Weyerhaeuser conducted emergency response actions at the southern banks of the Kalamazoo River adjacent to the OU7 property. The response actions were part of OU5 of the Allied Paper, Inc./Portage Creek/Kalamazoo River site and conducted concurrently with a time-critical removal action at the Plainwell Impoundment, also part of OU5. The Plainwell Mill riverbank action had three objectives: 1) remove or contain visible paper residuals and address previously-identified areas with PCB concentrations greater than 50 milligrams per kilogram (mg/kg) in soils and/or sediments along the riverbank to a target concentration of 4 mg/kg or 1 mg/kg, respectively; 2) reconstruct the riverbank, as needed, to minimize future releases of PCBs; and 3) reconfigure the banks to limit upland cutbacks into the former Plainwell Mill property and place erosion controls to provide stability comparable to pre-excavation conditions. Excavation activities were conducted in four stages (Zone A through Zone D), each stage addressing a separate section of the adjacent riverbank. Zones A through D were selected based on similar bank and/or river conditions and are depicted in Figure 4.

2.3 - Community Participation Activities

The RI Report, FS Report, Proposed Plan, and other site-related documents for OU7 were made available to the public in June 2015. The documents can be found in the Administrative Record file and in the information repositories indicated in the Statement of Basis and Purpose Section. The notice of the availability of these documents was published in the *Allegan County News* and *The Commercial Record* on June 4, 2015, the *Kalamazoo Gazette* on June 7, 2015, and the *Union Enterprise* on June 8, 2015. An initial public comment period was held from June 8 to July 8, 2015. An extension to the public comment period was requested. As a result, it was extended to August 8, 2015. In addition, a public meeting was held on June 16, 2015 to present the Proposed Plan to a broader community audience than those that had already been involved at OU7. At this meeting, EPA representatives answered questions about OU7 and the remedial alternatives. A transcript of the June 16, 2015 public meeting was produced and is a part of the Administrative Record. EPA's responses to the comments received during the public comment period are included in the *Responsiveness Summary*, which is part of this ROD.

2.4 - Scope and Role of Response Action

This ROD addresses the first and final action for contaminated soil at OU7 and will meet all of the remedial action objectives (RAOs) described later in this document. EPA expects that this action will be the final action for contaminated soil at OU7. The response action selected by EPA is Alternative 3B, and is described later in this document.

This response action addresses only contaminated soils at OU7 and does not address any of the other OUs of the Allied Paper, Inc./Portage Creek/Kalamazoo River site. Each OU is being addressed separately. With the exception of ensuring that continuing sources of PCBs to the Kalamazoo River are controlled prior to cleaning up the contaminated sediments in OU5 (which consists of the Kalamazoo River and a portion of Portage Creek), the cleanup schedules for the various site OUs do not depend on each other.

EPA's overall strategy for this OU7 cleanup is to excavate the majority of the contaminated soils to protective levels and dispose of them off-site in order to significantly reduce future risks to human health and the environment. The remaining contaminated soils will remain controlled in place beneath existing concrete slabs currently located under buildings at OU7. This response action does not address groundwater. Once the soil remedy is completed, EPA will evaluate groundwater to determine if any unacceptable risks remain at OU7. If groundwater at OU7 continues to pose an unacceptable risk, a separate remedy for groundwater will be evaluated.

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (40 CFR 300.430(a)(1)(iii)(A)). In general, EPA considers principal threat wastes to be source materials that are highly toxic or highly mobile, which generally cannot be contained in a reliable manner or would present a significant risk to human health and the environment should exposure occur. There are no principal threat source materials at OU7 and, therefore, the Selected Remedy described here does not include treatment.

2.5 - Site Characteristics

This ROD addresses contaminated soil only. Groundwater is not part of the ROD; however, information on groundwater is provided below for background purposes.

2.5.1 Conceptual Site Model for OU7

The conceptual site model (CSM) provides an understanding of OU7 based on the sources of COCs, potential transport pathways, and environmental receptors. Based on the nature and extent of contamination and the fate and transport mechanisms described in the RI and FS reports, the refined CSM for OU7 identified the following COCs for human health and ecological receptors:

- The following were identified as COCs for human health exposures at OU7:
 - VOCs: benzene, ethylbenzene, methylene chloride, tetrachloroethene, toluene, 1,1,1-trichloroethane, trichloroethene, 1,2,4-trimethylbenzene, and xylenes (total);
 - SVOCs: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, carbazole, 4-chloro-3-methylphenol, dibenz(a,h)anthracene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, 2-methylnaphthalene, 4-methylphenol, naphthalene, pentachlorophenol, phenanthrene, and 2,4,6-trichlorophenol;
 - metals: aluminum, antimony, arsenic, barium, cadmium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, selenium, silver, sodium, thallium, vanadium, and zinc; and
 - other: PCBs, cyanide (total), nitrate, and phosphorus; and
- Carbazole, high molecular weight (HMW) polycyclic aromatic hydrocarbons (PAHs), cadmium, copper, lead, mercury, selenium, and zinc were identified as COCs for ecological receptors at OU7.

A graphical depiction of the CSM for the OU7-specific Baseline Human Health Risk Assessment (BHHRA) is shown in Figure 5, and Figure 6 shows the CSM for the Screening Level Ecological Risk Assessment (SLERA).

2.5.2 Site Overview

OU7 is approximately 35.6 acres in size and is located in the southeast $\frac{1}{4}$ of the northeast $\frac{1}{4}$ of Section 30, Town 1 North, Range 11 West, in the City of Plainwell, Allegan County, Michigan. The property address is 200 Allegan Street in Plainwell, Michigan, and is currently zoned as a central business district. OU7 is bordered by the following properties:

- North: by the Kalamazoo River to the top of the bank, and beyond by residential and commercial properties;
- East: by the Mill Race (a surface water body) to the top of the bank, and beyond by commercial properties and Main Street North;
- South: by Allegan Street/M-89, and beyond by residential and commercial properties; and
- West: by residential properties and the City of Plainwell Water Renewal Plant, and beyond by US-131.

During the time of papermaking operations, 1884 (at least) to 2000, ownership of the property and facilities comprising OU7 passed between various entities. The last operating owner,

Plainwell, Inc., filed for bankruptcy in 2000, and the City of Plainwell subsequently purchased the property in August 2006 with the objective of redeveloping the property.

As part of the ongoing property redevelopment activities, portions of the former Mill Buildings (buildings 3A, 9A, 9B, 9C, 9D, 9E, 9F, 23, 25, and 28; see Figure 2) were razed in 2012 and 2013. The Quality Products Building, sludge dewatering tank, Specialty Minerals Building, Fuel Oil #6 AST, and Wastewater Treatment Plant were also demolished as part of the on-going redevelopment activities. A portion of the former Mill Buildings (Buildings 1, 2, 3, 10, 11, 11A, 12, 15, 16, 17, 18, 19, 20, 26, 27, and 29; see Figure 2) are registered on the National Register of Historic Places and considered historical by the National Historic Preservation Act (NHPA). At this time, those buildings that are considered historical will remain on site. Buildings 1A, 4, 4A, 5, 5A, 5B, 6, 6A, 7, 9, 14, and the train shed (see Figure 2) are non-historical and planned for demolition. The former Sludge Dewatering Building was renovated for use by the City of Plainwell Public Safety Department, with occupancy in late 2012.

On July 18, 2011, ownership of the eastern portion of OU7, including Building 17 and Building 18, was transferred to Conestoga-Rovers and Associates 200 Allegan Street LLC (CRA). (CRA merged with GHD and is now called GHD.) CRA conducted renovation activities on offices and access ways. In March 2012, CRA moved its Kalamazoo, Michigan, office staff into Building 17 and now occupies the top floor of this building.

The City of Plainwell renovated Building 19 for City Hall operations, which began at that location in June 2014. Additionally, the City of Plainwell currently utilizes portions of the property for fire hose assessments, ambulance driver testing, and storage of various seasonal decorative supplies.

2.5.3 Geologic/Hydrogeologic Setting

The regional geology consists of unconsolidated glacial materials deposited during the last advance/retreat of the Laurentide Ice Sheet during the Wisconsin Glacial Stage. These deposits consist of various amounts of gravel, sand, silt, and clay and are approximately 200 feet thick in this region. OU7 is located within the Kalamazoo River valley, which was likely formed as large amounts of water drained from the ice sheet. Underlying the glacial deposits are the consolidated bedrock formations of the Michigan Basin (a bowl-shaped structure with its approximate center located well to the northeast of this region). The immediate bedrock formation underlying the glacial deposits is the Mississippian Coldwater Shale. The Coldwater Shale consists predominantly of gray to bluish-gray shale and is approximately 800 feet thick in this region.

The unconsolidated deposits beneath the OU7 property consist of various amounts of fill material (e.g., debris, clay, and sand) and native unconsolidated glacial material and recent alluvium (sands, gravels, silts, and clay). The entire area consists predominantly of poorly graded fill material of fine to coarse grained sand, with fine to coarse grained gravel. Interbedded within the fill material are discontinuous lenses of concrete and brick debris, paper residuals, and sandy clay. Generally, within 10 to 15 feet below ground surface (bgs) across the property, native materials consist of poorly graded, fine to medium sand with fine to coarse gravel and lenses of poorly graded fine to coarse grained gravel with sand.

Groundwater is encountered in the uppermost, unconfined water-bearing zone between 5 and 17 feet bgs across OU7, with elevations ranging from approximately 713 to 714 feet above mean sea level (AMSL) (east side of OU7) to 711 to 712 feet AMSL (west side of OU7). At one location, the native sand and gravel at OU7 was found to be underlain by a layer of silt and clay at approximately 32 feet bgs. Previous production supply wells once utilized in the manufacturing process also encountered this silt and clay unit at approximately 30 to 40 feet bgs. The groundwater discussion in this ROD is limited to the uppermost, unconfined water bearing zone.

Hydraulically, the Mill Race is approximately six feet higher than the Kalamazoo River. Based on information collected and presented in the RI Report, the uppermost, unconfined, water table aquifer present on the east side of OU7 appears to be recharged by the surface water within the Mill Race as a result of the dam located east of OU7. Groundwater flow within this water table aquifer is predominantly to the west from the Mill Race (flowing sub-parallel to the flow of the Kalamazoo River) across OU7. The hydraulic gradient along the northwestern portion of OU7, at times of higher groundwater elevations, appears to be discharging to the Kalamazoo River.

The actual groundwater-surface water interaction is a more complicated dynamic system at a local scale, with interactions to some degree where surface water and the groundwater are likely mixing. This can be inferred near monitoring well MW-7, where it appears there may be local groundwater discharge to the Kalamazoo River on an intermittent basis. More detailed information regarding groundwater flow is presented in the RI and FS Reports. Figure 7 provides the April 2014 groundwater flow contours for the uppermost aquifer across OU7 and shows the location of all site monitoring wells. Other groundwater figures can be found in the RI Report.

Vertical hydraulic gradients within the aquifer itself are minimal, with a slight upward component at monitoring wells MW-4S/D and MW-12S/D and a slight downward gradient at monitoring wells MW-21S/D.

Current and Past Groundwater Use in the Mill Area

The groundwater below OU7, including the uppermost aquifer, is classified as a drinking water aquifer but is not currently used as a source of drinking water. The City of Plainwell provides potable water to the surrounding area via three wells which draw groundwater from the deeper regional aquifer.

Mill operations were historically supplied by seven on-site groundwater wells, including four process water wells, two wells for fire suppression purposes, and one well for non-sanitary purposes, located near the wastewater treatment system. Based on observations during on-site activities, two of the process wells are no longer present. No documentation regarding the abandonment of these wells was available. One of the two fire suppression wells could not be located.

2.5.4 Extent of Contamination

The OU7 RI, completed in 2013 by Weyerhaeuser under EPA oversight, identified COCs that pose potential risks to human health and the environment including metals, VOCs, SVOCs, PCBs, cyanide (total), nitrate, and phosphorus. The significant findings and conclusions from the

site characterization activities completed during the RI are summarized below. Additional detail about site characteristics is provided in the Final RI Report.

Soil

Soil sample results generated during the pre-RI activities and the RI were evaluated against the following Generic Residential and Non-Residential Cleanup Criteria and Screening Levels established in Part 7 of the Michigan Administrative Rules (effective December 30, 2013) pursuant to Part 201, Environmental Remediation, 1994 PA 451, as amended:

- State Default Background Level (SDBL) (as applicable);
- Drinking Water Protection Criteria (DWPC);
- Groundwater Surface Water Interface Protection Criteria (GSIPC);
- Soil Volatilization to Indoor Air Inhalation Criteria (SVIAC);
- Volatile Soil Inhalation Criteria (VSIC);
- Particulate Soil Inhalation Criteria (PSIC);
- Direct Contact Criteria (DCC); and
- Soil Saturation Concentration Screening Levels (Csat).

Additionally, PCB soil sample results were evaluated against the TSCA standard of 1 mg/kg found at 40 CFR 761.61(a)(4)(i)(A). The 1 mg/kg standard in 40 CFR 761.61(a)(4)(i)(A) is referred to in this document as the Cleanup Level for Bulk PCB Remediation Waste in High Occupancy Areas (Without Further Conditions).¹

Based on observations during development of the property and subsurface RI activities, fill materials of various compositions (i.e., various soil types, brick, concrete, coal, fly ash, etc.) are present in numerous areas of the property. A number of metals exceeding Part 201 Generic Residential and Non-Residential Cleanup Criteria were found in soil samples, which may be attributed to the fill material. Additionally, at a number of locations, soil concentrations of metals exceed the Michigan SDBLs as well as county-specific background values for Allegan County found on the United States Geological Survey website. The majority of the exceedances in soil are located within or immediately below various areas of fill materials.

Table 1 lists the OU7 COCs for soil and shows the maximum concentrations exceeding Part 201 Generic Residential and Non-Residential Cleanup Criteria for soil in each redevelopment area. In general, the majority of the exceedances in soil are limited to the Part 201 DWPC and GSIPC. These protection criteria relate to the groundwater pathway and are not relevant to this ROD. The remaining exceedances in soil are as follows: (1) benzene exceeds its Part 201 SVIAC; (2) benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenz(a,h)anthracene, indeno(1,2,3-cd)pyrene, total PCBs, arsenic, and lead exceed their Part 201 DCC; and (3) arsenic and manganese exceed their Part 201 PSIC. Table 1B is a simplified version of Table 1 which lists the OU7 COCs for soil and shows the maximum concentrations exceeding Part 201 Generic Residential and Non-Residential Cleanup Criteria for soil excluding the groundwater protection criteria (Part 201 DWPC and GSIPC) for each redevelopment area.

¹ 40 CFR 761.61(a)(4)(i)(A) also contains a cleanup standard of 10 mg/kg, referred to in this document as the Cleanup Level for Bulk PCB Remediation Waste in High Occupancy Areas (With Further Conditions). The TSCA cleanup standards will be discussed in more detail in the "Preliminary Remediation Goals" section of this ROD.

Groundwater

Groundwater sample results were evaluated against the following Part 201 Generic Residential and Non-Residential Cleanup Criteria:

- Drinking Water Criteria (DWC);
- Groundwater Surface Water Interface Criteria (GSIC);
- Groundwater Volatilization to Indoor Air Inhalation Criteria;
- Groundwater Contact Criteria;
- Acute Inhalation Screening Levels;
- Flammability and Explosivity Screening Level; and
- Water Solubility Limits.

The groundwater exceedances in monitoring wells are shown in Figure 8. Groundwater contaminant concentrations exceed only the Part 201 DWC and GSIC. The relevant criteria are presented in the upper right-hand corner of Figure 8. Arsenic exceeds Part 201 DWC and GSIC at MW-7 and MW-12S, located along the Kalamazoo River at the northeastern and northwestern portions, respectively, of OU7. Iron and manganese exceed Part 201 DWC at numerous monitoring wells throughout OU7 (see Figure 8). Aluminum and lead exceed Part 201 DWC only at MW-3 in the northeastern portion of OU7.

EPA has established primary drinking water standards for arsenic and lead. The standard for arsenic, known as a maximum contaminant level (MCL), and the standard for lead, known as treatment technique (TT) action level, are shown on Figure 8. The arsenic MCL is the same as the Part 201 DWC and GSIC. The lead TT action level is higher (less stringent) than the Part 201 DWC. There are no MCLs or TT action levels for aluminum, iron, or manganese, but EPA has established secondary MCLs for these constituents. Secondary MCLs are related to aesthetic qualities of groundwater rather than being health-based standards.

2.6 - Current and Potential Future Land and Resource Uses

OU7 is currently owned by the City of Plainwell, except for a portion which is owned by CRA. It is currently zoned as a central business district, and the City of Plainwell has selected a multi-phase redevelopment plan, of which portions have been implemented. The remaining planned redevelopment areas are shown in Figure 3 and consist of residential, mixed residential/commercial, commercial, and recreational (Waterfront Plaza). Land use adjacent to the OU7 is commercial on the east and southeast and residential on the west and southwest. The north side of the property is bordered by the Kalamazoo River. Institutional controls such as zoning ordinances and land use restrictions will be established as part of the Selected Remedy and will be consistent with the City of Plainwell's redevelopment plan.

The groundwater below, including the uppermost aquifer, is classified as a drinking water aquifer but is not currently used as a source of drinking water. The City of Plainwell provides potable water to the surrounding area via three wells which draw groundwater from the regional aquifer. The use of groundwater as a future potential drinking water source is highly unlikely. However, the groundwater below OU7 is considered a potential drinking water source.

Therefore, the future use of groundwater will be as a potential drinking water source for the community once safe CLs have been achieved. The Selected Remedy does not address groundwater. However, the preferred soil alternative may result in reducing the risks associated with future exposure to groundwater to acceptable levels. Once the soil remedy is completed, EPA will evaluate groundwater to determine if any unacceptable risks remain at OU7. If groundwater at OU7 continues to pose an unacceptable risk, a separate remedy for groundwater will be evaluated.

2.7 - Summary of Site Risks

As part of the OU7 RI, an OU7-specific BHHRA was conducted to evaluate the risks to humans associated with current and potential future exposure to OU7 contaminants in soil and groundwater. In 2003, a baseline ecological risk assessment was conducted for the entire Allied Paper, Inc./Portage Creek/Kalamazoo River site (2003 BERA). An OU7 specific SLERA was conducted as a location specific supplement to the 2003 BERA. The SLERA assessed risks to ecological receptors in terrestrial habitats adjacent to the Kalamazoo River that are within the operable unit boundaries of OU7.

EPA believes that the response action selected in this ROD is necessary to protect the human health and the environment from actual or threatened releases of hazardous substances into the environment.

2.7.1 Human Health Risks

The OU7 BHHRA evaluated the potential risks and hazards associated with exposure to site-related COCs. The baseline risk assessment estimates what risks OU7 poses if no action were taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action.

The OU7 BHHRA evaluated the potential for adverse risks for residents, trespassers, commercial workers, construction workers, utility workers, and recreation workers associated with exposure to contaminants in surface soil, soil, and groundwater from OU7 under both current and planned future uses.

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

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

where:

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

These risks are probabilities that usually are expressed in scientific notation (e.g., 1×10^{-6}). An excess lifetime cancer risk of 1×10^{-6} indicates that an individual experiencing the reasonable maximum exposure estimate has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure. This is referred to as an "excess lifetime cancer risk" because it would be in addition to the risks of cancer individuals face from other causes such as smoking or exposure to too much sun. The chance of an individual's developing cancer from all other causes has been estimated to be as high as one in three. EPA's generally-acceptable risk range for site-related exposures is 10^{-4} to 10^{-6} .

The potential for non-carcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., life-time) with a reference dose (RfD) derived for a similar exposure period. An RfD represents a level that an individual may be exposed to that is not expected to cause any deleterious effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). An $HQ < 1$ indicates that a receptor's dose of a single contaminant is less than the RfD, and that toxic non-carcinogenic effects from that contaminant are unlikely. The Hazard Index (HI) is generated by adding the HQs for all COCs that affect the same target organ (e.g., liver) or that act through the same mechanism of action within a medium or across all media to which a given individual may reasonably be exposed. An $HI < 1$ indicates that, based on the sum of all HQ's from different contaminants and exposure routes, toxic non-carcinogenic effects from all contaminants are unlikely. An $HI > 1$ indicates that site-related exposures may present a risk to human health.

The HQ is calculated as follows:

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

where:

CDI = Chronic daily intake

RfD = reference dose

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

The OU7 BHRRA evaluated the RI sample results and identified the COCs in the various media that pose a current and/or future potential risk to human receptors. A contaminant was carried through the risk assessment if it was within or greater than EPA's acceptable risk range of 1×10^{-4} (1 in 10,000 chance) to 1×10^{-6} (1 in 1,000,000 chance) for cancer risks or exceeded an HI of 1 for non-cancer risks. The calculated cancer risks and non-cancer hazards greater than EPA's risk range (1×10^{-4} or $HI = 1$) are shown by redevelopment area in Table 2 and Table 3 for soil and groundwater, respectively. These tables show there is an excess lifetime risk at OU7 exceeding the upper bound of EPA's acceptable risk range for cancer risks (1×10^{-4}) or having an $HI > 1$ for non-cancer risks, therefore, providing a basis for this ROD. The Waterfront Plaza, Commercial Area 1, and Commercial Area 2 do not present a risk from soil greater than EPA's risk range. The Waterfront Plaza, Commercial Area 1, Commercial Area 2, Commercial Area 3, and Commercial Area 4 do not present a risk from groundwater greater than EPA's risk range.

Table 4 presents the COCs and exposure point concentrations (EPCs) for each of the COCs detected in each exposure pathway (i.e., the concentration that was used to estimate the exposure and risk from each COC in that media). The table includes the maximum concentrations detected for each COC, as well as the frequency of detection (i.e., the number of times the contaminant was detected in the samples collected at the site), the EPC, and how the EPC was derived.

Table 5 provides carcinogenic risk information that is relevant to the COCs in both soil and groundwater. At this time, slope factors are not available for the dermal route of exposure. Thus, the dermal slope factors used in the assessment have been extrapolated from oral values. An adjustment factor is sometimes applied in such instances, and is dependent upon how well the contaminant is absorbed via the oral route. Adjustments are particularly important for contaminants with less than 50 percent absorption via the ingestion route. However, adjustment is not necessary for the chemicals evaluated at this site. Therefore, the same values presented above were used as the dermal carcinogenic slope factors for these contaminants. Several of the COCs are also considered carcinogenic via the inhalation route and are presented in Table 5 with their associated inhalation unit risk.

Table 6 provides non-carcinogenic risk information that is relevant to the COCs in both soil and groundwater. Several of the COCs have toxicity data indicating their potential for adverse non-carcinogenic health effects in humans. The chronic toxicity data available for the COCs for oral exposures have been used to develop oral RfDs. The oral RfDs along with their primary target organs are presented in Table 6. As was the case for the carcinogenic data, dermal RfDs can be extrapolated from the oral RfDs applying an adjustment factor, as appropriate. Antimony, cadmium, chromium III, chromium VI, manganese, thallium, and vanadium were the COCs where an adjustment factor was necessary. For the other COCs, no adjustment was necessary, and the oral RfDs discussed were used as the dermal RfDs for these contaminants. Inhalation reference concentrations were applicable for several COCs and are presented in Table 6.

The Integrated Exposure Uptake Biokinetic (IEUBK) model for lead in children was used to evaluate the risks posed to young children as a result of the lead contamination at OU7. Because lead does not have a nationally-approved RfD, slope factor, or other accepted toxicological factor which can be used to assess risk, standard risk assessment methods cannot be used to evaluate the health risks associated with lead contamination. The IEUBK model was run using site-specific data to predict a lead soil level that will be protective of children and other residents. Site-specific soil and groundwater lead concentrations, as detailed in the summary tables for the COCs in this ROD, were used in place of model default values. The IEUBK model output provides an estimate of the percentage of the exposed population that would have blood levels that exceed EPA's "safe" level of 10 micrograms per deciliter ($\mu\text{g}/\text{dL}$). EPA considers exposures to be acceptable as long as no more than 5 percent of the exposed population of children will exceed that level. The IEUBK model was used to determine the blood lead level within a child resident exposed to lead within Residential Area 1 groundwater, Residential Area 2 groundwater, Residential Area 3 groundwater, Residential Area 4 soil, and Mixed Commercial/Residential Area 2 groundwater and soil. Lead was also identified for Commercial Area 1 groundwater and Commercial Area 4 soil and groundwater; however, residents are not expected to be present following the future redevelopment of Commercial Area 1 and Commercial Area 4. The IEUBK

model outputs indicated that the percent of young children that could have a blood lead level greater than 10 µg/dL for Residential Area 1, Residential Area 2, Residential Area 3, Residential Area 4, and Mixed Residential/Commercial Area 2 ranged from 0.000 to 0.103, which is less than the target of 5 percent. Therefore, Residential Area 1 groundwater, Residential Area 2 groundwater, Residential Area 3 groundwater, Residential Area 4 soil, and Mixed Residential/Commercial Area 2 groundwater and soil do not pose an unacceptable risk to residents from lead exposure.

The method for determining hazards associated with non-residential adult exposures to lead-impacted soil and water was based on the adult lead exposure equation based on EPA guidance. The parameters used in the equation are detailed in the RI Report. The estimated 95th percentile for fetal blood lead levels for future female adult commercial workers, construction workers, and utility workers (as applicable) in Residential Area 1, Residential Area 2, Residential Area 3, Residential Area 4, Mixed Commercial/Residential Area 2, Commercial Area 1, and Commercial Area 4 are presented in Table 7. Lead was not identified as a soil or groundwater COC for Mixed Residential/Commercial Area 1, Commercial Area 2, Commercial Area 3, or Waterfront Plaza and, therefore, adult lead exposure was not evaluated or required for these areas of OU7. As shown in Table 7, none of the 95th percentile fetal blood levels for a future female adult commercial worker, construction worker, or utility worker are above the EPA recommended fetal blood lead of 10 µg/dL.

For each chemical reported in each medium associated with the exposure areas, comparisons were made to Michigan's Part 201 cleanup criteria and Part 213 risk-based screening levels (RBSLs) presented in an operational memoranda for MDEQ's Remediation and Redevelopment Division. *Operational Memorandum No. 1* includes cleanup criteria and RBSLs for multiple exposure pathways. For soils, the screening values that were used for COC selection were based on the minimum cleanup criterion and/or RBSL protective of the direct contact, groundwater protection (drinking water), groundwater protection (direct contact), ambient air, indoor air, and soil saturation exposure pathways for soil. In general, the Part 201 criteria are chemical concentrations that correspond to a cancer risk of 1×10^{-5} (1 in 100,000 chance) or a non-cancer HI of 1. COCs were identified as constituents that had one or more exceedances of the Part 201 criteria. A summary of the COCs that showed exceedances of Part 201 are presented in Table 1 (by redevelopment area) for soil and in Figure 8 for groundwater.

2.7.2 Ecological Risks

As discussed above, a OU7-specific SLERA was performed for ecological receptors in the terrestrial habitats adjacent to the Kalamazoo River near Plainwell Mill. The OU7 SLERA evaluated the terrestrial areas up to the top of the riverbank.

The SLERA consisted of Step 1 (screening level problem formulation) and Step 2 (screening level exposure estimation and risk calculation). A refinement of chemical constituents identified in the SLERA as constituents of potential ecological concern (COPECs) for OU7 was performed. The refinement process is Step 3 of the 8-step process for conducting ecological risk assessment under guidance developed by the EPA and is summarized below for OU7.

Because the majority of OU7 terrestrial habitat adjacent to the Kalamazoo River is anticipated to be redeveloped for residential and/commercial use, only the riparian corridor along the

Kalamazoo River was evaluated for ecological risk. The re-screening retained two VOCs (acetone and isopropylbenzene), three BTEX constituents (benzene, toluene, and xylenes), one SVOC (carbazole), HMW PAHs, total PCBs, and 13 inorganic constituents [antimony, arsenic, barium, cadmium, chromium, copper, lead, manganese, mercury, selenium, vanadium, zinc, and cyanide (total)] as COPECs.

The refinement process focused on avian and mammalian wildlife. Refinement consisted of a two-phase process. In the first phase, 95 percent upper confidence limit (95% UCL) concentrations of the COPECs were compared to ecological benchmarks (i.e., soil concentrations) specific to avian and/or mammalian wildlife. A constituent was carried forward to the second phase if the 95% UCL concentration was greater than the ecological benchmark or if an ecological benchmark was not available. This phase eliminated total PCBs, antimony, arsenic, barium, chromium, manganese, and vanadium as COPECs. The refinement of the COPECs and their concentrations in soil are listed in Table 8 for avian wildlife and Table 9 for mammalian wildlife.

The second phase of the refinement process involved use of food chain models to assess the potential for risk to avian and mammalian wildlife. The food chain models identified a potential for risk to avian insectivores exposed to lead at both a no observed adverse effect level (NOAEL) and lowest observed adverse effect level (LOAEL), and mammalian wildlife exposed to lead at the LOAEL. The food chain models also identified a potential for risk to avian and/or mammalian wildlife exposed to carbazole, HMW PAHs, cadmium, copper, mercury, selenium, and zinc at the NOAEL but not the LOAEL.

Thus, the SLERA identified a potential for risk to avian and/or mammalian wildlife from the following site-related contaminants in the riparian corridor of OU7: carbazole, HMW PAHs, cadmium, copper, lead, mercury, selenium, and zinc. The assessment and measurement endpoints for ecological risk by exposure route are presented in Table 10.

2.8 - Remedial Action Objectives

RAOs are goals for protecting human health and the environment from risks associated with current or potential future exposures. RAOs were developed for OU7 based in part on the contaminant levels and exposure pathways that present future unacceptable risk to human health and the environment.

The RAOs to address soil at OU7 are as follows:

- RAO 1 - Prevent unacceptable human direct contact (incidental ingestion, dermal contact, and ambient air inhalation) exposure to soil impacted with VOCs, SVOCs, PCBs, metals, and other inorganics;
- RAO 2 - Mitigate the potential for unacceptable human inhalation exposure to indoor air vapors resulting from contaminated soil;
- RAO 3 - Prevent unacceptable avian and mammalian receptor exposure to surface soil in wooded riparian areas along the Kalamazoo River; and

- RAO 4 - Protect surface water and sediments by mitigating the potential for erosion of soil to the Kalamazoo River and Mill Race.

This ROD includes RAOs and cleanup alternatives for soil only. Since there is some groundwater contamination at OU7 with associated risks exceeding the acceptable risk range, additional groundwater monitoring and, if necessary, groundwater risk evaluations, will be conducted after the soil remedial action is implemented. The soil remedial action may result in reducing the risks associated with future exposure to groundwater to acceptable levels. However, if determined to be necessary based on the results of the additional groundwater evaluation, groundwater will be addressed in an FS Addendum and separate Proposed Plan and ROD.

2.9 - Description of Alternatives

Remedial alternatives for soil at OU7 are presented below. The alternatives are numbered to correspond with the numbering used in the 2015 FS Report. Additional details about the alternatives are provided in the FS Report. A comparison of the major remedy components of the various alternatives can be found in Table 11.

Exceedances of Part 201 soil criteria protective of the groundwater pathway, such as the DWPC and GSIPC, were not specifically or separately used in the evaluation of soil volumes that would be addressed under each remedial alternative because protection of groundwater is outside the scope of this ROD. The estimated soil volumes were based on the COCs and exceedances in soil shown in Table 1B.

Preliminary Remediation Goals

The sub-alternatives evaluated in the FS varied mainly by their preliminary remediation goals (PRGs). PRGs are based on risk or chemical-specific applicable or relevant and appropriate requirements (ARARs) to develop and evaluate potential cleanup alternatives for a site. PRGs are considered “preliminary” until final CLs are established in a ROD. EPA developed the PRGs for OU7 soil based both on protective risk-based calculations in the BHHRA/SLERA and a review of the potential federal and state ARARs. The ARARs are provided in Table 12.

With the exception of arsenic and PCBs, the soil CL for each COC in each specific redevelopment area is the appropriate Part 201 residential or non-residential cleanup criterion, based on the anticipated future land use of each redevelopment area. The Part 201 soil criteria for the OU7 COCs are presented in Table 13.

In addition to the Michigan Part 201 criteria, risk-based concentrations (RBCs) for arsenic and PCBs and cleanup standards for PCBs found in federal regulations were evaluated as PRGs. OU7-specific RBCs were developed based on the target cancer risk levels of 1×10^{-6} , 1×10^{-5} , and 1×10^{-4} and the target non-cancer $HQ=1.0$ for individual chemicals. The 10^{-4} RBCs were dropped from consideration because they do not meet the Part 201 ARARs and were not considered viable PRGs. The TSCA self-implementing cleanup standards found at 40 CFR 761.61(a)(4)(i)(A) were considered as PRGs for PCBs for some of the cleanup alternatives. Specifically, 40 CFR 761.61(a)(4)(i)(A) states that the cleanup level for bulk PCB remediation waste in high occupancy areas is ≤ 1 mg/kg without further conditions. It goes on to say that high occupancy areas where bulk PCB remediation waste remains at concentrations >1 mg/kg and

≤10 mg/kg shall be covered with a cap which meets the requirements of paragraphs (a)(7) and (a)(8) of that same section of the regulations. As an alternative to using the self-implementing cleanup standards, the TSCA regulations at 40 CFR 761.61(c) allow for risk-based disposal approval, without further conditions, if it can be demonstrated that such an approach will not pose an unreasonable risk of injury to health or the environment. Risk-based cleanup numbers developed in accordance with CERCLA can, therefore, be used without the requirement for capping or other restrictions, in accordance with 40 CFR 761.61(c).

The following results were obtained from the PRG evaluation:

- The RBC calculated value for arsenic at the 10^{-6} risk level with an HQ of 1.0 was below the Part 201 SDBL of 5.8 mg/kg. If cleanup to those risk levels was selected, the SDBL would be the CL, since it is not practicable to clean up a site to below background levels;
- The RBC calculated value for arsenic at the 10^{-5} risk level is 6.4 mg/kg for residential land use and 27 mg/kg for non-residential/commercial land use;
- The RBC calculated value for PCBs at the 10^{-6} risk level with an HQ of 1.0 was below the TSCA Cleanup Level for Bulk PCB Remediation Waste in High Occupancy Areas (Without Further Conditions) of 1 mg/kg. Some of the remedial alternatives, therefore, use the following CLs for PCBs:
 - Residential Areas – 1 mg/kg based on TSCA Cleanup Level for Bulk PCB Remediation Waste in High Occupancy Areas (Without Further Conditions);
 - Non-Residential/Commercial Areas – 10 mg/kg based on TSCA Cleanup Level for Bulk Remediation Waste in High Occupancy Areas (With Further Conditions); and
- The RBC calculated value for PCBs at the 10^{-5} risk level is 2.5 mg/kg for residential land use and 9.1 mg/kg for non-residential/commercial land use.

Table 14 shows the CLs by redevelopment area for each remedial alternative, including the CLs for arsenic and PCBs.

Common Elements

Components that are common to all the alternatives except the “no-action” alternative (or other alternatives as noted below) are presented here to limit redundancy in the subsequent discussion of the individual alternatives. These common components are:

- Pre-remedial design delineation of the vertical and horizontal extent of soil contamination in each area exceeding the CLs;
- Pre-excavation activities which include, but are not limited to, the following: erosion control measures, purging the remaining buried fuel oil line from a former AST located in Mixed Residential/Commercial Area 2 to prepare for excavation activities, removal of fuel oil within an old coal tunnel located in Mixed Residential/Commercial Area 2 to prepare for excavation activities, abandonment of monitoring wells located in excavation areas, structural evaluation of the buildings to be affected by excavation activities, and limited asbestos abatement around the former coal tunnel and the exterior piping outside former Mill Buildings;

- Excavation of areas impacted above the CLs for soil;
- Removal of coal tunnel and associated former fuel oil AST lines, along with any adjacent contaminated materials at concentrations above the CLs;
- Off-site disposal of removed fuel oil, fuel oil lines, coal tunnel, and associated contaminated material above CLs;
- Verification soil sampling to confirm that CLs were met;
- Backfilling of excavation areas with clean fill;
- Restoration of excavated areas and other areas impacted by cleanup activities, as appropriate;
- Monitoring and maintenance of engineering controls such as cap/cover and/or existing concrete slabs, as appropriate (this would not be needed for Alternative 3A); and
- Institutional controls (this would not be needed for Alternative 3A).

ICs will be prepared and implemented consistent with the future land use plan for each redevelopment area. The ICs would include, but not be limited to, the following:

- Zoning and/or land use restrictions at OU7 consistent with future anticipated land use, including: (1) the requirement that certain existing building foundations/slabs remain in place as a barrier to contamination beneath them, unless addressed by an approved Soil Management Plan; and (2) the development of Soil Management Plans for each area being redeveloped as necessary. A Soil Management Plan will be developed for OU7 addressing each area being redeveloped to ensure that soils that exceed CLs and remain at OU7 following completion of the remedial action cleanup work either: (1) remain in place and are properly contained, (2) are relocated at similar locations/depths and are properly contained, or (3) are disposed off-site in an appropriately licensed disposal facility;
- Implementation of a restrictive covenant for contamination remaining in place above Part 201 Generic Residential Cleanup Criteria pursuant to Michigan Consolidated Law 324.20120b, which would include, among other prohibitions, a prohibition of digging in areas not remediated to Part 201 Generic Residential Cleanup Criteria without proper training and protective measures and a prohibition of gardens in certain areas (designation of an area for use as a raised bed community garden for residential properties); and
- Installation of permanent markers on the property identifying depth to which digging is prohibited, and enrollment of property in a state-wide utility-location program to identify areas where digging is prohibited.

Alternative 1: No Action

Regulations governing the Superfund program require that the “no action” alternative be evaluated generally to establish a baseline for comparison. Under this alternative, no action would be taken at OU7 to prevent exposure to contaminated soil.

Alternative 1 Costs

Estimated Capital Cost: \$0

Estimated Annual O&M Cost: \$0

Estimated Present Worth Cost: \$0

Alternative 2 Series: Excavation and On-Site Consolidation, with Some Off-Site Disposal

The Alternative 2 Series generally consists of the following: on-site consolidation/soil relocation for soils with inorganic concentrations greater than residential CLs but less than non-residential/commercial CLs; excavation and off-site disposal of soils with inorganic concentrations greater than non-residential/commercial CLs or residential PSIC; excavation and off-site disposal of soils with VOCs, SVOCs, or PCBs at concentrations greater than CLs; and off-site disposal of materials containing coal or coal debris. Any consolidation/relocation of soils would be on a designated non-residential/commercial land use portion of OU7, and a gravel cover system would be placed over consolidated materials.

The Alternative 2 Series includes four different sub-alternatives, 2A, 2B, 2C, and 2D, which vary based on CL type (i.e., Part 201 criteria, TSCA regulations, and/or OU7-specific risk-based CLs) and land use considerations. The CLs for each sub-alternative and OU7 redevelopment area are summarized in Table 6. The four sub-alternatives are described below.

Alternative 2A

Alternative 2A would use residential-based CLs for all areas of OU7, regardless of land use (i.e., it would assume that all areas of OU7 were residential), to determine which soils need to be addressed and to estimate soil volumes. Contaminated soils under existing concrete slabs would be identified and excavated under this alternative. The Alternative 2A CLs (see Table 14) would include:

- Part 201 Generic Residential Cleanup Criteria for all COCs except PCBs;
- TSCA Cleanup Level for Bulk PCB Remediation Waste in High Occupancy Areas (Without Further Conditions), 1 mg/kg total PCBs; and
- CLs for all COCs would be met at all sampling locations throughout OU7.

Since Alternative 2A would require the excavation of all soils exceeding residential CLs and assumes all areas of OU7 are residential, there would be no suitable area for consolidation and capping of soils (i.e., there would be no designated non-residential/commercial portion of OU7). Because of this, Alternative 2A is not implementable and does not meet the general intent of the Alternative 2 Series (i.e., on-site consolidation). Therefore, Alternative 2A was dropped from consideration and will not be discussed further in this ROD.

Alternative 2B

Alternative 2B would consider the land use of each individual redevelopment area. Existing concrete slabs would stay in place and engineering controls would be required to ensure any contamination under the slabs remain covered by the slabs. Except for PCBs, the CLs would be based on Part 201 criteria. The CLs for PCBs would be based on OU7-specific risk-based calculations. Under Alternative 2B, the following CLs would be used (see Table 14) to determine which soils need to be addressed and to estimate soil volumes:

- Part 201 Generic Residential Cleanup Criteria for all COCs except PCBs would be applied to redevelopment areas with residential land use;

- Part 201 Generic Non-Residential Cleanup Criteria for all COCs except PCBs would be applied to redevelopment areas with non-residential land use;
- Risk-based CLs for PCBs would be applied as follows:
 - Redevelopment areas with residential land use, 2.5 mg/kg total PCBs;
 - Redevelopment areas with non-residential land use, 9.1 mg/kg total PCBs;
- CLs for all COCs except arsenic would be met at all sampling locations throughout OU7; and
- The Part 201 arsenic CLs would be met using an iterative cleanup approach so that the EPC within each exposure unit (i.e., each redevelopment area²) would meet the appropriate residential (7.6 mg/kg) or non-residential (37 mg/kg) CL, based on the direct contact criteria in Part 201.

The iterative approach for arsenic would essentially excavate the soils at sampling locations with the highest concentrations of arsenic until the arsenic EPC within each redevelopment area met the CL. Each redevelopment area at OU7 represents a separate exposure unit, and the EPC is a conservative estimate of the average concentration³ of arsenic in soil to which a receptor may be exposed within that exposure unit. Under this approach, the arsenic CL would not necessarily be met at all individual sampling locations throughout OU7, but the average concentration of arsenic in soil within each exposure unit would meet the CL.

Alternative 2B Costs and Volumes

Estimated Capital Cost: \$4,319,869

Estimated Annual O&M Cost: \$9,600

Estimated Present Worth Cost: \$4,462,820

Estimated Metals-Impacted Soils Left In Place Under Concrete Slabs: 95 cy

Estimated Soil Consolidated on OU7: 3,668 cy

Estimated Capping Material: 2,300 cy fill, 475 cy gravel

Estimated Soil Excavation: 20,807 cy

Estimated Construction Time: 4 months

Alternative 2C

Similar to Alternative 2B, Alternative 2C would consider the land use of each individual redevelopment area. Existing concrete slabs would stay in place and engineering controls would be required to ensure any contamination under the slabs remain covered by the slabs. Except for PCBs and arsenic, the CLs would be based on Part 201 criteria. The CLs for PCBs and arsenic would be based on OU7-specific risk-based calculations. Under Alternative 2C, the following CLs would be used (see Table 14) to determine which soils need to be addressed and to estimate soil volumes:

- Part 201 Generic Residential Cleanup Criteria for all COCs except PCBs and arsenic would be applied to redevelopment areas with residential land use;

² The details of the iterative approach will be developed in the Remedial Design. The approach will need to consider compliance with residential criteria on a ¼-acre exposure unit basis.

³ The EPC for each exposure area represents the 95% UCL of the mean concentration within each redevelopment area, calculated using EPA's ProUCL 5.0 statistical software.

- Part 201 Generic Non-Residential Cleanup Criteria for all COCs except PCBs and arsenic would be applied to redevelopment areas with non-residential land use;
- Risk-based CLs for PCBs would be applied as follows:
 - Redevelopment areas with residential land use, 2.5 mg/kg total PCBs;
 - Redevelopment areas with non-residential land use, 9.1 mg/kg total PCBs;
- Risk-based CLs for arsenic would be applied as follows:
 - Redevelopment areas with residential land use, 6.4 mg/kg;
 - Redevelopment areas with non-residential land use, 27 mg/kg;
- CLs for all COCs except arsenic would be met at all sampling locations throughout OU7; and
- The arsenic CLs would be met using an iterative cleanup approach as described in Alternative 2B.

Alternative 2C Costs and Volumes

Estimated Capital Cost: \$4,855,244

Estimated Annual O&M Cost: \$9,600

Estimated Present Worth Cost: \$4,998,195

Estimated Metals-Impacted Soils Left In Place Under Concrete Slabs: 185 cy

Estimated Soil Consolidated on OU7: 4,700 cy

Estimated Capping Material: 3,050 cy fill, 610 cy gravel

Estimated Soil Excavation: 26,514 cy

Estimated Construction Time: 5 months

Alternative 2D

Similar to Alternative 2B, Alternative 2D would consider the land use of each individual redevelopment area. Existing concrete slabs would stay in place and engineering controls would be required to ensure any contamination under the slabs remain covered by the slabs. Except for PCBs and arsenic, the CLs would be based on Part 201 criteria. The CLs for PCBs would be based on TSCA Cleanup Levels for Bulk PCB Remediation Waste in High Occupancy

Areas and the CL for arsenic would be based on state-wide background levels. Under Alternative 2D, the following CLs would be used (see Table 14) to determine which soils need to be addressed and to estimate soil volumes:

- Part 201 Generic Residential Cleanup Criteria for all COCs except PCBs and arsenic would be applied to redevelopment areas with residential land use;
- Part 201 Generic Non-Residential Cleanup Criteria for all COCs except PCBs and arsenic would be applied to redevelopment areas with non-residential land use;
- TSCA Cleanup Level for Bulk PCB Remediation Waste in High Occupancy Areas (Without Further Conditions), 1 mg/kg total PCBs, would be applied to redevelopment areas with residential land use and to the Waterfront Plaza redevelopment area;
- TSCA Cleanup Level for Bulk PCB Remediation Waste in High Occupancy Areas (With Further Conditions), 10 mg/kg total PCBs, would be applied to all other redevelopment areas with non-residential land use; a cap would be required for areas where PCBs were left in place at concentrations between 1 mg/kg and 10 mg/kg, and deed restrictions requiring cap maintenance also would be required;
- The arsenic CL for all redevelopment areas would be the SDBL, 5.8 mg/kg;

- CLs for all COCs except arsenic would be met at all sampling locations throughout OU7; and
- The arsenic CLs would be met using an iterative cleanup approach as described in Alternative 2B.

Since Alternative 2D would require the excavation of all soils exceeding background concentrations of arsenic, this alternative would require the excavation of all areas of OU7. As a result, there would be no suitable area for consolidation and capping of soils because the arsenic concentrations in the excavated materials would not be allowed to remain on site. Because of this, Alternative 2D is not implementable and does not meet the general intent of the Alternative 2 Series (i.e., on-site consolidation). Therefore, Alternative 2D was dropped from consideration and will not be discussed further in this ROD.

Alternatives 3 Series: Excavation and Off-Site Disposal

The Alternative 3 Series generally consists of excavation and off-site disposal of contaminated soils. As opposed to the Alternative 2 Series, which includes on-site consolidation of some inorganics, no on-site consolidation would occur under the Alternative 3 Series. The following materials would be excavated and transported off-site for disposal under the Alternative 3 Series: soils with inorganics, VOCs, SVOCs, and PCBs at concentrations greater than CLs; and material that contains coal or coal debris.

Similar to the Alternative 2 Series, the Alternative 3 Series includes four different sub-alternatives, 3A, 3B, 3C, and 3D, which vary based on CL type (i.e., Part 201 criteria, TSCA regulations, and/or OU7-specific risk-based CLs) and land use considerations. The CLs for each sub-alternative and OU7 redevelopment area are summarized in Table 14. The four sub-alternatives are described below.

Alternative 3A

Alternative 3A would use residential-based CLs for all areas of OU7, regardless of land use (i.e., it would assume that all areas of OU7 were residential), to determine which soils need to be addressed and to estimate soil volumes. Contaminated soils under existing concrete slabs would be identified and excavated under this alternative. The Alternative 3A CLs would include:

- Part 201 Generic Residential Cleanup Criteria for all COCs except PCBs;
- TSCA Cleanup Level for Bulk PCB Remediation Waste in High Occupancy Areas (Without Further Conditions), 1 mg/kg total PCBs; and
- CLs for all COCs would be met at all sampling locations throughout OU7.

Alternative 3A Costs and Volumes

Estimated Capital Cost: \$9,388,744

Estimated Annual O&M Cost: \$2,400

Estimated Present Worth Cost: \$9,424,482

Estimated Metals-Impacted Soils Left In Place Under Concrete Slabs: not applicable (N/A)

Estimated Soil Consolidated On OU7: N/A

Estimated Capping Material: N/A

Estimated Soil Excavation: 56,446 cy
Estimated Construction Time: 11 months

Alternative 3B

Alternative 3B would consider the land use of each individual redevelopment area. Existing concrete slabs would stay in place and engineering controls would be required to ensure any contamination under the slabs remain covered by the slabs. Except for PCBs, the CLs would be based on Part 201 criteria. The CLs for PCBs would be based on OU7-specific risk-based calculations. Under Alternative 3B, the following CLs would be used (see Table 14) to determine which soils need to be addressed and to estimate soil volumes:

- Part 201 Generic Residential Cleanup Criteria for all COCs except PCBs would be applied to redevelopment areas with residential land use;
- Part 201 Generic Non-Residential Cleanup Criteria for all COCs except PCBs would be applied to redevelopment areas with non-residential land use;
- Risk-based CLs for PCBs would be applied as follows:
 - Redevelopment areas with residential land use, 2.5 mg/kg total PCBs;
 - Redevelopment areas with non-residential land use, 9.1 mg/kg total PCBs;
- CLs for all COCs except arsenic would be met at all sampling locations throughout OU7; and
- The Part 201 arsenic CLs would be met using an iterative cleanup approach so that the EPC within each exposure unit (i.e., each redevelopment area) would meet the appropriate residential (7.6 mg/kg) or non-residential (37 mg/kg) CL. (See description of Alternative 2B for more information about the iterative cleanup approach.)

Alternative 3B Costs and Volumes

Estimated Capital Cost: \$4,328,119

Estimated Annual O&M Cost: \$2,400

Estimated Present Worth Cost: \$4,363,857

Estimated Metals-Impacted Soils Left In Place Under Concrete Slabs: 95 cy

Estimated Soil Consolidated On OU7: N/A

Estimated Capping Material: N/A

Estimated Soil Excavation: 20,807 cy

Estimated Construction Time: 4 months

Alternative 3C

Similar to Alternative 3B, Alternative 3C would consider the land use of each individual redevelopment area. Existing concrete slabs would stay in place and engineering controls would be required to ensure any contamination under the slabs remain covered by the slabs. Except for PCBs and arsenic, the CLs would be based on Part 201 criteria. The CLs for PCBs and arsenic would be based on OU7-specific risk-based calculations. Under Alternative 3C, the following CLs would be used (see Table 14) to determine which soils need to be addressed and to estimate soil volumes:

- Part 201 Generic Residential Cleanup Criteria for all COCs except PCBs and arsenic would be applied to redevelopment areas with residential land use;

- Part 201 Generic Non-Residential Cleanup Criteria for all COCs except PCBs and arsenic would be applied to redevelopment areas with non-residential land use;
- Risk-based CLs for PCBs would be applied as follows:
 - Redevelopment areas with residential land use, 2.5 mg/kg total PCBs;
 - Redevelopment areas with non-residential land use, 9.1 mg/kg total PCBs;
- Risk-based CLs for arsenic would be applied as follows:
 - Redevelopment areas with residential land use, 6.4 mg/kg;
 - Redevelopment areas with non-residential land use, 27 mg/kg;
- CLs for all COCs except arsenic would be met at all sampling locations throughout OU7; and
- The arsenic CLs would be met using an iterative cleanup approach (as described earlier).

Alternative 3C Costs and Volumes

Estimated Capital Cost: \$4,839,494

Estimated Annual O&M Cost: \$2,400

Estimated Present Worth Cost: \$4,875,232

Estimated Metals-Impacted Soils Left In Place Under Concrete Slabs: 185 cy

Estimated Soil Consolidated On OU7: N/A

Estimated Capping Material: N/A

Estimated Soil Excavation: 26,514 cy

Estimated Construction Time: 5 months

Alternative 3D

Similar to Alternative 3B, Alternative 3D would consider the land use of each individual redevelopment area. Existing concrete slabs would stay in place and engineering controls would be required to ensure any contamination under the slabs remain covered by the slabs. Except for PCBs and arsenic, the CLs would be based on Part 201 criteria. The CLs for PCBs would be based on TSCA Cleanup Level for Bulk PCB Remediation Waste in High Occupancy Areas and the CL for arsenic would be based on state-wide background levels. Under Alternative 3D, the following CLs would be used (see Table 14) to determine which soils need to be addressed and to estimate soil volumes:

- Part 201 Generic Residential Cleanup Criteria for all COCs except PCBs and arsenic would be applied to redevelopment areas with residential land use;
- Part 201 Generic Non-Residential Cleanup Criteria for all COCs except PCBs and arsenic would be applied to redevelopment areas with non-residential land use;
- TSCA Cleanup Level for Bulk PCB Remediation Waste in High Occupancy Areas (Without Further Conditions), 1 mg/kg total PCBs, would be applied to redevelopment areas with residential land use and to the Waterfront Plaza redevelopment area;
- TSCA Cleanup Level for Bulk PCB Remediation Waste in High Occupancy Areas (With Further Conditions), 10 mg/kg total PCBs, would be applied to all other redevelopment areas with non-residential land use; a cap would be required for areas where PCBs were left in place at concentrations between 1 mg/kg and 10 mg/kg, and deed restrictions requiring cap maintenance also would be required;
- The arsenic CL for all redevelopment areas would be the SDBL, 5.8 mg/kg;

- CLs for all COCs except arsenic would be met at all sampling locations throughout OU7; and
- The arsenic CLs would be met using an iterative cleanup approach (as described earlier).

Alternative 3D Costs and Volumes

Estimated Capital Cost: \$7,334,250

Estimated Annual O&M Cost: \$9,600

Estimated Present Worth Cost: \$7,477,202

Estimated Metals-Impacted Soils Left In Place Under Concrete Slabs: 800 cy

Estimated Soil Consolidated On OU7: N/A

Estimated Capping Material: N/A

Estimated Soil Excavation: 48,763 cy

Estimated Construction Time: 8 months

All of the above alternatives, except No Action (Alternative 1), Alternative 2A, and Alternative 2D meet ARARs and RAOs for soil.

2.10 - Comparative Analysis of Alternatives

As required by CERCLA, nine criteria were used to evaluate the different remediation alternatives individually and against each other in order to select a remedy. This section of the ROD profiles the relative performance of each alternative against the nine criteria, noting how it compares to the other options under consideration. The nine evaluation criteria are discussed below. The “Detailed Analysis of Alternatives” can be found in the FS Report. Table 15 provides a summary of this evaluation.

The nine criteria fall into three groups: threshold criteria, primary balancing criteria, and modifying criteria. Threshold criteria, which include overall protection of human health and the environment and compliance with ARARs, are requirements that each alternative must meet in order to be eligible for selection. Primary balancing criteria, which include long-term effectiveness and permanence; reduction of toxicity, mobility, or volume of contaminants through treatment; short-term effectiveness; implementability; and cost are used to weigh major trade-offs among alternatives. Modifying criteria, which include state/support agency acceptance and community acceptance, can be fully considered only after public comment is received on the Proposed Plan; therefore, modifying criteria were not evaluated in the FS. In the final balancing of trade-offs between alternatives, upon which the final remedy selection is based, modifying criteria are of equal importance to the balancing criteria.

Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether each alternative provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled, through treatment, engineering controls, and/or ICs. Table 15 summarizes the evaluation of each alternative against this criterion.

Alternative 1, the “No Action” alternative, does not provide adequate protection because it does not address the risks to human health and the environment identified in the BHRA and the

SLERA. The retained Alternative 2 and Alternative 3 Series alternatives – 2B, 2C, 3A, 3B, 3C, and 3D – would provide adequate protection of human health and the environment by eliminating, reducing, or controlling risk through excavation, cover, engineering controls, and/or ICs.

Alternative 3A would not require the use of ICs because all contaminated soil above health-based limits would be excavated and shipped off-site for disposal. In Alternatives 2B, 2C, 3B, 3C, and 3D, exposure to contaminated soils remaining on site would be mitigated by the cover systems. The cap system with liner and existing concrete slabs would serve as cover systems for Alternatives 2B and 2C. Existing concrete slabs would serve as cover systems in Alternatives 3B, 3C, and 3D, and the slabs would be covering a relatively small volume of contaminated material. The cover systems, in conjunction with the ICs, would prevent direct contact with the impacted soils.

Because the “No Action” alternative (Alternative 1) is not protective of human health and the environment, it will not be discussed further under the remaining eight criteria.

Compliance with Applicable or Relevant and Appropriate Requirements

Section 121(d) of CERCLA and NCP Section 300.430(f)(1)(ii)(B) require that remedial actions at CERCLA sites at least attain legally applicable or relevant and appropriate Federal and State requirements, standards, criteria, and limitations which are collectively referred to as “ARARs,” unless such ARARs are waived under CERCLA Section 121(d)(4). Table 15 summarizes the evaluation of each alternative against this criterion.

Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that, while not “applicable” to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are identified in a timely manner and are more stringent than federal requirements may be applicable or relevant and appropriate.

Compliance with ARARs addresses whether a remedy will meet all of the applicable or relevant and appropriate requirements of federal and state environmental statutes or provides a basis for invoking a waiver. Table 15 summarizes the evaluation of each alternative against this criterion.

All retained action alternatives would meet the ARARs from federal and state laws. A list of the potential ARARs for OU7 is provided in Table 4. Table 15 summarizes the evaluation of each alternative against this criterion. The major differences between the alternatives regarding compliance with ARARs are discussed below.

For compliance with the TSCA PCB cleanup standards at 40 CFR 761.61, Alternatives 2B, 2C, 3A, 3B, and 3C would not require a cap to be installed over the PCB concentrations remaining on site since the CLs are either 1 mg/kg (Alternative 3A) or a risk-based value based on the appropriate residential or non-residential/commercial land use for each redevelopment area (Alternatives 2B, 2C, 3B, and 3C). Appropriate property use restrictions would be required for redevelopment areas with non-residential/commercial land use. Alternative 3D would include deed restrictions and require maintenance of a cap in any of the commercial redevelopment areas where soil PCB concentrations between 1 and 10 mg/kg would remain in place.

Alternatives 2B and 2C include relocation of soils at OU7. Handling of the impacted soil would require extra efforts to control fugitive dust from the stockpiled material. Alternative 3A would also include limited asbestos abatement activities prior to excavating within/beneath some of the buildings. None of the other alternatives include indoor excavation activities where asbestos emissions will need to be controlled and monitored.

Portions of the Main Mill building are registered on the National Register of Historic Places and any remedial action would need to comply with the NHPA. All alternatives would be implemented to comply with the NHPA. Alternative 3A presents the most risk of damage to buildings due to the excavation of contaminated soils underlying existing concrete slabs at historic and non-historic buildings. Restoration activities for Alternative 3A would require the use of materials consistent with historic preservation of the structures affected and would, therefore, comply with NHPA.

Long-term Effectiveness and Permanence

Long-term effectiveness and permanence refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once CLs have been met. This criterion includes the consideration of residual risk that will remain on-site following remediation and the adequacy and reliability of controls. Table 15 summarizes the evaluation of each alternative against this criterion.

The Alternative 3 Series options would result in a greater degree of long-term effectiveness and permanence than the Alternative 2 Series because, under the Alternative 3 Series, substantially more contaminated soils would be permanently removed from OU7 and substantially less contaminated soil would require on-site management. Alternative 3A would achieve the greatest degree of long-term effectiveness because all soils above health-based limits would be excavated and shipped off-site for disposal. Alternatives 2B and 2C would rely on engineering controls and ICs to ensure long-term effectiveness, since contaminated soils would remain on site in a designated consolidation area and under existing concrete slabs. Alternatives 3B, 3C, and 3D would also rely on engineering controls and ICs for long-term effectiveness, since some contaminated soils would remain on site beneath existing concrete slabs, and under Alternative 3D some soils with PCB concentrations between 1 and 10 mg/kg would need to be managed under a cap.

Redevelopment of OU7 could modify the effectiveness of the engineering controls (concrete slabs) depending on the management of contaminated soils during and following redevelopment activities. Most of the impacted soils that would remain in place beneath concrete slabs,

however, are under historical buildings not slated for demolition under current redevelopment plans.

The long-term effectiveness and permanence of Alternatives 2B and 2C is dependent on the effective design, operation, maintenance, and monitoring of the containment system and compliance with ICs. Consolidation and capping are considered reliable technologies and offer long-term effectiveness at reducing the risk to human health and the environment. The amount of soil relocated, consolidated, and capped on site varies between Alternatives 2B and 2C. Alternative 2B assumes 3,225 cy of soil would be capped on site, and Alternative 2C assumes 5,050 cy of soil would be capped on site. The residual risk would be slightly greater for Alternative 2C, since more impacted soil would remain on site. Monitoring efforts would not vary between the two options since the volume of soil is not significantly different, and the consolidation/capped area would be in the same location under both alternatives.

ICs are prescribed under all action alternatives except for Alternative 3A. The purpose of the ICs under Alternatives 2B, 2C, 3B, 3C, and 3D is: (1) to prevent future potential human disturbances of the engineering controls; (2) to prohibit future residential use on the non-residential/commercial areas; (3) to designate an area for use as a raised bed community garden for residential properties and prohibit gardens in other areas; and (4) to prohibit digging in areas not remediated to Part 201 Generic Residential Cleanup Criteria without proper training and protective measures. For Alternative 3D, the ICs would also serve to maintain and prevent disturbance of caps for areas with PCB contamination remaining in place at concentrations between 1 and 10 mg/kg.

The long-term effectiveness of the containment and/or engineering components of the various alternatives would be easily monitored. Evaluations of remedy performance would be included in periodic reports, the frequency and content of which would be established during remedial design. Where impacted material would remain on site (Alternatives 2B, 2C, 3B, 3C, and 3D), five-year reviews would be required to determine if the selected alternative is functioning as intended and continuing to provide adequate protection. See CERCLA Section 121(c), 42 U.S.C. Section 9621(c), and 40 CFR 300.430(f)(4)(ii).

Considering the above information, the remedial alternatives achieve long-term effectiveness and permanence in descending order as follows: 3A, 3D, 3C, 2C, 3B, and 2B.

Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment

Reduction of toxicity, mobility, or volume through treatment refers to the anticipated performance of the treatment technologies that may be included as part of a remedy. Table 15 summarizes the evaluation of each alternative against this criterion.

None of the alternatives would use treatment to reduce the toxicity, mobility, or volume of contaminated media. The contaminated soils present on site are considered low-level threat wastes for which removal/off-site disposal and/or consolidation/capping on site are appropriate. Treatment of these soils is impracticable and not cost-effective.

Short-term Effectiveness

Short-term effectiveness addresses the period of time needed to implement the remedy and any adverse impacts that may be posed to workers, the community, and the environment during construction and operation of the remedy until CLs are achieved. Table 15 summarizes the evaluation of each alternative against this criterion.

All of the alternatives pose some risks to cleanup workers or the community associated with the construction work (e.g., dust, noise, transportation, emissions associated with excavation of waste). These risks can be readily mitigated through use of personal protective equipment, dust control practices, restricted work hours, engineering controls, compliance with United States Department of Transportation regulations, and air monitoring. Risks to workers and the community can also be reduced by adherence to the "Superfund Green Remediation Strategy" and "Green Remediation: Best Management Practices for Excavation and Surface Restoration." Construction safety practices would be followed as recommended in the site-specific health and safety plan. The duration of any short-term impacts would be less than one year for all of the alternatives (see estimated construction timeframes in the "Summary of Remedial Alternatives" section above).

The environmental impacts to OU7 in the short term would include uncovering additional impacted soils or sediments during remedial activities. Best management practices would be implemented including, but not limited to, silt fences, turbidity curtains, and dust control measures (using potable water). The alternatives assume that the majority of the soils targeted for off-site disposal would be direct-loaded into trucks and not staged on site. Excavation along Mill Race would require the temporary divergence of part of the Mill Race (the methodology would be determined during the pre-design investigation). The turbidity of water in the Mill Race would be monitored during excavation activities adjacent to the Kalamazoo River and/or Mill Race. Preparation of the consolidation area for the Alternative 2 Series options would require the excavation of previously-imported gravel material and temporary placement of this material on the Mill property. The temporarily-staged gravel would be placed either on pavement or visqueen plastic sheeting and surrounded with silt fence, hay bales, or other erosion/sedimentation control methods to prevent sediment runoff from entering the City of Plainwell stormwater system.

Alternatives 2B and 3B would have the shortest period of short-term impacts to workers and the community, as the estimated time to complete construction work under these alternatives is approximately 4 months. Alternative 2B would have more excavation work than Alternative 3B since the consolidation area would need to be constructed, and soils slated for consolidation would be handled twice. Alternative 3B would have more trucking/transportation of the excavated soils than Alternative 2B, since the soils would be shipped to an off-site disposal facility.

Similarly, Alternatives 2C and 3C would be completed in roughly the same amount of time, estimated at approximately 5 months. Alternative 2C would result in more exposure to on-site workers due to consolidation area construction and double-handling of contaminated soils, and Alternative 3C would require more off-site trucking.

Construction activities for Alternative 3D are anticipated to require approximately 8 months to complete. Alternative 3A would require the greatest construction period, estimated at 11 months, and would require the greatest amount of off-site disposal and associated short-term traffic impacts.

Short-term effectiveness of the alternatives decreases as more soil is excavated and as more soil cover materials must be brought on site. Greater amounts of off-site soil disposal will result in greater amounts of community disturbance related to transporting contaminated soil off-site and greater potential for worker injury. Because of this, the on-site disposal alternatives are more effective in the short term than the off-site disposal alternatives. Alternatives with soil covers present short-term effectiveness issues associated with transporting the fill and gravel on site and installing the covers.

Implementability

Implementability addresses the technical and administrative feasibility of a remedy from design through construction and operation. Factors such as availability of services and materials, administrative feasibility, and coordination with other governmental entities are also considered. Table 15 summarizes the evaluation of each alternative against this criterion.

All of the alternatives can be readily implemented. Alternative 3A is the most complex due to the many excavation areas located under existing occupied and unoccupied buildings. Alternative 3D would be less complicated to implement than Alternative 3A because there would be no excavation under existing buildings; however, due to the low arsenic CL, many of the excavations extend deeper than 10 feet bgs and would require significant shoring measures. Alternatives 3B and 3C would generally be equal to each other in terms of excavation and complexity, and would be the least complex of the Alternative 3 Series to implement. The excavation portion of the Alternative 2 Series would have the same complexity as Alternatives 3B and 3C, but overall the Alternative 2 Series would be more difficult to implement due to consolidation and capping on site. The manufactured materials needed for construction of a designated consolidation and capping area under the Alternative 2 Series are readily available.

Cost

The total present worth costs for the OU7 alternatives range from zero to \$9.42 million. Alternative 3A is the most costly at \$9.42 million. The "No Action" alternative is the least expensive, and Alternative 3B, at \$4.36 million, is the least expensive alternative among those requiring some cleanup action. The remaining alternatives range in cost from \$4.46 million to \$7.48 million. The total capital cost, O&M, and total present worth costs for all the remedial alternatives can be found in Table 16, and detailed cost summaries for all alternatives can be found in the FS Report, which is part of the Administrative Record. The remedial alternatives requiring action, listed in order of decreasing cost, are as follows: 3A (\$9.42 million), 3D (\$7.48 million), 2C (\$5.00 million), 3C (\$4.88 million), 2B (\$4.46 million), and 3B (\$4.36 million).

State/Support Agency Acceptance

The State of Michigan supports the preferred alternative, Alternative 3B.

Community Acceptance

During the public comment period, the community generally expressed its support for either Alternative 3A, 3B, and/or 3C, while a few people expressed support for Alternative 1. In general, the community did not prefer the 2 Series Alternatives due to waste remaining on-site.

2.11 - Principal Threat Waste

The NCP establishes an expectation that EPA will use treatment to address the principal threats posed by a site wherever practicable (NCP Section 300.430(a)(1)(iii)(A)). Identifying principal threat wastes combines concepts of both hazard and risk. In general, principal threat wastes are those source materials considered to be highly toxic or highly mobile which generally cannot be contained in a reliable manner or would present a significant risk to human health and the environment should exposure occur. Conversely, low-level threat wastes are those source materials that generally can be reliably contained and that would present only a low risk in the event of exposure. The manner in which principal threats are addressed generally will determine whether the statutory preference for treatment as a principal element is satisfied.

At OU7, the contaminants are low-level threat wastes. The 2 and 3 Series Alternatives all involve containing and covering the low-level threat waste and/or off-site disposal of the low-level threat waste from OU7 so that future risk to human health and the environment is significantly reduced to protective levels.

2.12 - Selected Remedy

The Selected Remedy for contaminated soil at OU7 is Alternative 3B. The remedy consists of: 1) pre-design delineation and pre-excavation activities; 2) excavation and off-site disposal of contaminated soil, except for contaminated soils underlying existing concrete slabs; 3) containment beneath existing concrete slabs of a small amount of contaminated soil; 4) removal and off-site disposal of a former coal tunnel and associated former fuel oil lines; 5) backfill of excavation areas with clean fill; 6) restoration, as appropriate; and 7) ICs and engineering controls.

2.12.1 Summary of Rationale for the Selected Remedy

In EPA's judgment, Alternative 3B provides the best balance of the evaluation criteria among the alternatives evaluated in the FS. Alternative 3B is protective of human health and the environment, meets all federal and state ARARs, and will achieve all of the RAOs.

Alternative 3B provides long-term and permanent protection against exposure to site-related contaminants by the combination of soil excavation, containment, and cover, coupled with appropriate ICs. Alternative 3B does not reduce the toxicity, mobility, or volume of the contamination through treatment; however, effective alternative treatment technologies or resource recovery technologies are not practical for soil containing low levels of contamination. Alternative 3B provides short-term effectiveness when proper health and safety measures are taken. Alternative 3B is implementable. Finally, Alternative 3B meets the evaluation criteria at a lower cost than the other alternatives, and is, therefore, cost-effective.

2.12.2 Description of the Selected Remedy

The following are the major components of the remedy selected in this ROD:

- Pre-remedial design delineation of the vertical and horizontal extent of soil contamination exceeding the CLs;
- Pre-excavation activities which include, but are not limited to, the following: erosion control measures, purging the remaining buried fuel oil line from a former AST located in Mixed Residential/Commercial Area 2, removal of fuel oil within an old coal tunnel located in Mixed Residential/Commercial Area 2, abandonment of monitoring wells located in excavation areas, structural evaluation of the buildings to be affected by excavation activities, and limited asbestos abatement around the former coal tunnel and the exterior piping outside former Mill Buildings;
- Excavation of soil exceeding CLs (an estimated 95 cy of metals-contaminated soil would remain in place and safely contained beneath existing building concrete slabs);
- Off-site disposal of contaminated soil – except for contaminated soils underlying existing concrete slabs that are currently located within buildings at OU7;
- Removal of coal tunnel and associated former fuel oil AST lines, along with any adjacent contaminated materials at concentrations above the CLs;
- Off-site disposal of removed fuel oil, fuel oil lines, coal tunnel, and associated contaminated material above CLs;
- Verification soil sampling to confirm that CLs were met;
- Backfilling of excavation areas with clean fill;
- Restoration of excavated areas and other areas impacted by cleanup activities, as appropriate;
- Monitoring and maintenance of engineering controls of concrete slabs; and
- ICs prepared and implemented consistent with the future land use plan for each redevelopment area. The ICs would include, but not be limited to, the following:
 - Zoning and/or land use restrictions at OU7 consistent with future anticipated land use, including: (1) the requirement that certain existing building foundations/slabs remain in place as a barrier to contamination beneath them, unless addressed by an approved Soil Management Plan; and (2) the development of Soil Management Plans for each area being redeveloped as necessary;
 - Implementation of a restrictive covenant for contamination remaining in place above Part 201 Generic Residential Cleanup Criteria pursuant to Michigan Consolidated Laws 324.20120b, which would include, among other prohibitions, a prohibition of digging in areas not remediated to Part 201 Generic Residential Cleanup Criteria without proper training and protective measures and a prohibition of gardens in certain areas (designation of an area for use as a raised bed community garden for residential properties); and
 - Installation of permanent markers on the property identifying depth to which digging is prohibited, and enrollment of property in a state-wide utility-location program to identify areas where digging is prohibited.

Figure 9 presents the conceptual area of materials impacted above the CLs that would be addressed by Alternative 3B. In addition to materials present above the CLs, the areas shown on Figure 9 include materials anticipated to be remediated based on operational history and future redevelopment plans, including the coal tunnel, the former fuel oil AST lines from the former tank to the boiler house, and an area identified to be impacted during the installation of a storm sewer line by Michigan Department of Transportation.

The specific actions prescribed under the Selected Remedy include the following:

Pre-Design Investigation

A pre-design investigation would be completed to evaluate the vertical and horizontal extent of impacts identified in soil during the RI to meet the CLs. The delineated areas will be utilized to determine the final areas to be excavated and volumes/concentrations of media to be addressed. In addition to the removal of materials impacted above the CLs, the coal tunnel and former fuel oil AST lines will be evaluated and removed, along with any identified impacted adjoining materials at concentrations above the CLs. Specific details regarding excavation areas and specific assumptions used to estimate the costs are presented in the cost summary and the cost summary notes in Table 17 and Table 17B, respectively.

Excavation and Removal

The soil excavation volume for the Selected Remedy was calculated utilizing a strict comparison to the Part 201 Residential and Non-Residential Cleanup Criteria (not including the DWPC and GSIPC) or the RBC for PCBs proposed for all CLs, with the exception of arsenic, which was calculated utilizing an iterative approach. The iterative approach for arsenic entails excavating the soils at sampling locations with the highest concentrations of arsenic until the arsenic EPC within each redevelopment area met the CL. Each redevelopment area at OU7 represents a separate exposure unit, and the EPC is a conservative estimate of the average concentration⁴ of arsenic in soil to which a receptor may be exposed within that exposure unit. Under this approach, the arsenic CL would not necessarily be met at all individual sampling locations throughout OU7, but the average concentration of arsenic in soil within each exposure unit would meet the CL. The individual sample locations excavated based on the iterative approach are presented in Table 18 and shown in Figure 10. More details can be found in Appendix A of the FS Report. Approximately 95 cy of soil above the CL for arsenic would remain in place under existing building concrete slabs for Alternative 3B. This material is not being considered for removal because of its location under historically designated buildings and/or the level of difficulty to access the area. The estimated volume of material to be excavated under Alternative 3B is 20,807 cy.

Soil verification sampling will be conducted in accordance with applicable regulations and guidance documents regarding sampling methodology, as required, to meet the CLs. In instances where the iterative approach will be implemented, soil verification samples will be collected in accordance with applicable regulations and guidance documents regarding sampling

⁴ The EPC for each exposure area represents the 95% UCL of the mean concentration within each redevelopment area, calculated using EPA's ProUCL 5.0 statistical software. The exact details of the iterative approach will be determined in the Remedial Design. The approach will need to consider compliance with residential criteria on ¼-acre exposure unit basis.

methodology, as required, to meet the specified CL. Areas will be backfilled with clean imported fill and restoration completed, as necessary. Materials containing VOCs, SVOCs, metals, and/or PCBs at concentrations above the CLs will be disposed of off-site at an appropriately-licensed facility.

ICs and Engineering Controls

The ICs are listed above under “Description of Selected Remedy” and detailed in Table 20. Deed restrictions in conjunction with the existing engineering barriers/concrete slabs would be put in place to address the impacted soils left in place. The integrity of the concrete slabs will be maintained to ensure protectiveness. The buildings where the slabs need to remain in place and would be considered engineering controls include Buildings 4A, 5, 5B, 6, 7, 9, and 10 and are shown in Figure 11 for Mixed Residential/Commercial Area 2 and Figure 12 for Commercial Area 4. The existing slabs in Buildings 4A, 5, 5B, 6, and 7 will remain in place due to arsenic impacts above CLs under the iterative approach (see Figure 10). Three other locations where metals are present above the CLs where existing slabs would remain in place due to historical designation/current occupancy include SB-243 in Building 7 where lead was detected at 428 mg/kg at 0 to 1-foot bgs, SB-258 in Building 9 where lead was detected at 1720 mg/kg at 0.8 to 3 feet bgs, and SB-274 in Building 10 where manganese was detected at 3900 mg/kg at 0 to 1-foot bgs. These locations are shown in Figures 11 and 12. These areas under existing concrete slabs are not being considered for removal because of their location under historically designated buildings and/or the level of difficulty to access the area. The concrete slabs identified above and shown in Figures 11 and 12 are considered engineering controls and cannot be removed without the prior written approval of EPA and MDEQ or an approved Soil Management Plan. The Soil Management Plans will ensure that soils that exceed CLs and that remain at OU7 following completion of the remedial action cleanup work either: (1) remain in place and are properly contained; (2) are relocated at similar locations/depths and properly contained; or (3) are disposed off-site in an appropriately-licensed disposal facility.

A restrictive covenant will be implemented for contamination remaining in place above Part 201 Generic Residential Cleanup Criteria pursuant to Michigan Consolidated Laws 324.20120b, which would include, but not be limited to: (1) a prohibition of digging in areas not remediated to Part 201 Generic Residential Cleanup Criteria without proper training and protective measures; and (2) a prohibition of gardens in certain areas. An area for use as a raised bed community garden for residential properties will be designated, if necessary. Permanent markers will be installed on the property identifying depth to which digging is prohibited. Affected property will be required to enroll in a state-wide utility-location program to identify areas where digging is prohibited.

ICs will also include land use restrictions on OU7 consistent with future anticipated land use as shown in Figure 3. The placement of the necessary ICs will follow EPA guidance documents “Land Use in CERCLA Remedies” and “Institutional Controls: A Guide to Planning, Implementing, Maintaining, and Enforcing Institutional Controls at Contaminated Sites” (OSWER 9355.0-89, November 2010). As part of the routine O&M inspections, areas with ICs will be inspected to ensure that the land use is in compliance with the IC restrictions and engineering controls are maintained. If the future anticipated land use changes from what is shown in Figure 3 to a more restrictive land use, the risk to human health and the environment

will need to be evaluated, and EPA and MDEQ approval will be needed before the land use and land use IC can be changed.

2.12.3 Summary of Estimated Remedy Costs

The estimated cost of implementing the Selected Remedy at OU7 is \$4.6 million. This is based upon anticipated capital costs of \$4.3 million and O&M costs of approximately \$35,000. A detailed cost estimate for the Selected Remedy is included in Table 17. The information in this cost estimate is based on the best available information regarding the anticipated scope of the remedial alternative. A refined cost estimate will be developed if new information and data are collected during the engineering design of the remedial alternative. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost. Major changes to the cost information may be documented in the form of a memorandum in the Administrative Record file, an Explanation of Significant Differences, or a ROD amendment.

2.12.4 Expected Outcomes of Selected Remedy

The primary objectives for the Selected Remedy are to reduce the potential for direct exposure to affected soils, mitigate potential indoor air exposure, prevent COCs from being transported from source materials to other areas or media via storm water runoff, and mitigate the potential for erosion of soil to the Kalamazoo River and the Mill Race.

At the completion of this remedial action (i.e., when excavation and off-site disposal are complete), OU7 will be subject to zoning and/or land use restrictions based on future anticipated land use and the requirement that existing building foundations/slabs remain in place as a barrier to contamination beneath them, unless addressed by an approved Soil Management Plan. Future human health and ecological risks will be reduced to acceptable levels once construction of the remedy is complete (estimated to take 4 months).

After completion of the remedial action, portions of OU7 will be available for potential residential use. The anticipated future land use is shown in Figure 3.

Final Cleanup Levels

Final CLs for the Selected Remedy are presented in Tables 19 and 20. These levels were the PRGs developed in the FS. PRGs are considered preliminary until the final CLs are defined in the ROD, when a remedy is selected for the site. The final CLs for OU7 are based on both protective risk-based calculations and a review of the federal and state ARARs.

CLs for Soils to Protect Human Health

With the exception of PCBs, the soil cleanup level for each COC in each specific redevelopment area is the appropriate Part 201 residential or non-residential cleanup criterion, based on the anticipated future land use of each redevelopment area. As an alternative to using the self-implementing cleanup standards, the TSCA regulations at 40 CFR 761.61(c) allow for risk-based disposal approval, without further conditions, if it can be demonstrated that such an approach will not pose an unreasonable risk of injury to health or the environment (see Attachment 3 for risk-based disposal approval). Risk-based cleanup numbers developed in accordance with CERCLA can, therefore, be used without the requirement for capping or other restrictions, in accordance with 40 CFR 761.61(c). Therefore, in addition to the Michigan

Part 201 criteria, a RBC was selected as the cleanup level for PCBs for direct contact based on the target cancer risk level of 1×10^{-5} . For redevelopment areas with residential land use, the direct contact cleanup level is 2.5 mg/kg for total PCBs. For redevelopment areas with non-residential land use, the direct contact cleanup level is 9.1 mg/kg for total PCBs. The details of the development of the RBCs for PCBs can be found in the FS Report.

Table 19 shows the CLs for residential and non-residential land use criteria in soil to protect human health. Note that for the Mixed Residential/Commercial Area 1 and Mixed Residential/Commercial Area 2, the CL level will default to the more stringent level of the Part 201 Residential and Non-Residential Cleanup Criteria. For most cases, this will be the Part 201 Residential Criteria, except for some contaminants where the Part 201 PSIC Non-Residential Criteria is more stringent.

CLs for Soils to Protect the Environment

The CLs for each COPEC within the riparian corridor along the Kalamazoo River were developed consistent with EPA guidance to address potential risks to ecological receptors (see Table 20). As shown in Table 20, the 95% UCL concentration of each COPEC at OU7 was compared to its ecological CL. The 95% UCL concentrations for carbazole, HMW PAHs, cadmium, copper, mercury, selenium, and zinc are below their ecological CLs. For these seven COPECs, the 95% UCL is less than 50 percent of the CL. This indicates that, for the soil in the riparian corridor along the Kalamazoo River, concentrations of carbazole, HMW PAHs, cadmium, copper, mercury, selenium, and zinc are protective of avian and mammalian wildlife, and risk management is not required for these COPECs.

For lead, a range of potential CLs was evaluated due to the uncertainty associated with the concentrations at which lead affects avian receptors. The lower end and upper range CLs are 140 mg/kg and 812 mg/kg, respectively. The 95% UCL lead concentration in the areas of potential ecological exposure is 181 mg/kg, which falls between the lower end and upper end CLs. The 95% UCL is 22 percent of the upper end CL, so action would not be required to achieve the upper range CL for lead. The maximum detected concentration of lead in the riparian corridor dataset is 990 mg/kg.

RAO 3 was developed to address the potential ecological risks identified in the SLERA. The remedial alternatives that were developed to meet the RAOs that address human health impacts (i.e., RAO 1 and RAO 2) will address the sample location with the highest concentration of lead in the riparian corridor, as well as the three other locations within the riparian corridor with lead concentrations exceeding the lower end CL. Therefore, unique remedial alternatives to address RAO 3 were not developed because ecological risks will be managed as a result of the remedial measures associated with addressing human health risks.

Anticipated Community Impacts

Implementation of the Selected Remedy will reduce the current and future risks to human health and the environment posed by OU7. Implementation of the Selected Remedy will also make available the entire OU for reuse and redevelopment, which could positively impact the local economy. Potential short-term impacts during implementation of the remedy are discussed in Section 2.10 of this ROD, under "Short-Term Effectiveness."

2.13 - Statutory Determinations

Under CERCLA Section 121 and the NCP, the lead agency must select remedies that are protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes as a principal element and a bias against off-site disposal of untreated wastes. The following sections discuss how the Selected Remedy meets these statutory requirements.

Protection of Human Health and the Environment

The Selected Remedy, Alternative 3B, provides overall protection of human health and the environment from impacted soils. Protection of human health and the environment will be achieved through excavation and off-site disposal of low-level threat waste. Institutional controls will be implemented to restrict site use. The Selected Remedy will reduce exposure levels to protective ARAR or risk-based CLs, reducing risks to within EPA's generally acceptable risk range of 10^{-4} to 10^{-6} for carcinogenic risk and below the HI of 1 for non-carcinogens. The Selected Remedy also will provide adequate protection of the environment.

No unacceptable short-term risks are anticipated by implementation of the remedy. Some short-term risks will be created by excavation activities, but these risks can be minimized through proper mitigative measures during construction. In addition, no adverse cross-media impacts are expected from the Selected Remedy.

Compliance with Applicable or Relevant and Appropriate Requirements

The Selected Remedy, Alternative 3B, will comply with all federal and state ARARs. The ARARs are presented in detail in Table 12.

Cost-Effectiveness

In EPA's judgment, the Selected Remedy is cost-effective and represents a reasonable value for the money to be spent. In making this determination, the following definition was used: "A remedy shall be cost-effective if its costs are proportional to its overall effectiveness." (NCP Section 300.430(f)(1)(ii)(D)). This was accomplished by evaluating the "overall effectiveness" of those alternatives that satisfied the threshold criteria (i.e., were both protective of human health and the environment and ARAR-compliant). Overall effectiveness was evaluated by assessing three of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; and short-term effectiveness). Overall effectiveness was then compared to costs to determine cost-effectiveness. The relationship of the overall effectiveness of this remedial alternative was determined to be proportional to its costs and hence this alternative represents a reasonable value for the money to be spent.

EPA has determined that this remedy will be fully protective of human health and the environment. Alternative 3B, at an estimated present worth cost of \$4,363,857 is the least-costly, protective alternative. The Selected Remedy provides the greatest effectiveness proportional to its cost as compared to the other alternatives that meet all threshold criteria.

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

EPA has determined that the Selected Remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the Site. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA has determined that the Selected Remedy provides the best balance of trade-offs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element and bias against off-site treatment and disposal and considering State and community acceptance.

The Selected Remedy excavates and disposes the contaminated soils off-site providing a permanent solution for the low-level threat waste at OU7. Excavating and disposing of the soil off-site will effectively reduce the mobility of and potential for direct contact with contaminants remaining on site. The Selected Remedy does not present short-term risks different from the other alternatives. There are no special implementability issues that set the Selected Remedy apart from any of the other alternatives evaluated.

Preference for Treatment as a Principal Element

The Selected Remedy does not satisfy the statutory preference for treatment as a principal element of the remedy (i.e., reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants through treatment), because the low volume of relatively low-level soil contamination being addressed in this remedy does not lend itself to any cost-effective treatment.

Five-Year Review Requirements

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for UU/UE, a statutory review will be conducted within five years after initiation of the remedial action, and each five years subsequent, to ensure that the remedy is, or will be, protective of human health and the environment.

2.14 - Documentation of Significant Changes

The Proposed Plan for OU7 was released for public comment in June 2015. The Proposed Plan identified Alternative 3B as the Preferred Alternative. EPA reviewed all written and verbal comments submitted during the public comment period. It was determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary or appropriate.

PART III – RESPONSIVENESS SUMMARY

The Proposed Plan for OU7 was released for public comment on June 8, 2015. A public meeting was held in Plainwell, Michigan, on June 16, 2015 to describe the Proposed Plan, answer questions about the different cleanup alternatives, and to provide an opportunity for public comments on the Proposed Alternative. Public comments were accepted by EPA until August 8, 2015. Two verbal sets of comments were received at the public meeting. In addition, six sets of comments were provided in writing to EPA during the comment period.

EPA is required to consider and address only those comments that are pertinent and significant to the remedial action being selected. EPA is not required to address comments which pertain to the allocation of liability for the remedial action, nor potential enforcement action to implement the remedial action, as these matters are independent of the selection of the remedial action and EPA's Proposed Plan.

EPA is not required to reprint the comments of the commenter verbatim and may paraphrase where appropriate. In this responsiveness summary, EPA has included large segments of the original comment. However, persons wishing to see the full text of the comment should refer to the commenter's submittal to EPA, which has been included in the Administrative Record.

The comments EPA received are shown below in normal text, and EPA's response is shown in italics.

Comment: Without site specific test results, I am forced to accept your engineering proposal that this cleanup will protect the land for foreseeable uses. In your summary of needs, you state that arsenic is the site's main contaminant and yet your favored remedy (3B) does not address arsenic - why? With no other criteria/testing available, it seems you must switch to 3C and remove arsenic as well.

Response: EPA's Selected Remedy. Alternative 3B, does address arsenic. It will cleanup arsenic contamination based on Michigan Part 201 Generic Residential and Non-Residential Cleanup Criteria. Site specific sampling for arsenic and other contaminants was conducted during the RI, and the results can be found in the RI Report, which is a part of the Administrative Record.

Comment: Please leave this site alone. The excavation and removal of the dirt and anything else will make an even bigger mess than there is now. Stirring up the contaminants is the wrong thing to do – leave them alone.

Response: Alternative 1 (No Action) is not protective of human health and the environment and, therefore, cannot be selected as the OU7 soil remedy. During remediation, fugitive dust from the work areas will be controlled through the use of misters or water spraying for worker protection and to prevent air-borne migration of contamination via dust to the surrounding community. Air monitoring will also be conducted to ensure there are no unacceptable air emissions during the cleanup.

Comment: 1) I am perplexed why EPA would ask for the public comment on a 50 page Proposed Plan dated June 8, 2015 and provide no Table of Contents. The lack of Table of Contents made the document difficult to review. 2) I am also perplexed on why EPA would prefer remedy, 3B, that will have Site Use Restrictions and Institutional Controls in Michigan that has never passed a Uniform Environmental Covenants Act that would regulate brownfield lands when real estate is transferred from one owner to another. This seems like this is a serious short coming on protecting the environment and human health. 3) The site is only 36 acres in size, but has 11 Primary Redevelopment Areas. The mix is residential or commercial or both, with an average size per unit of 3.25 acres. The plan lacks any formal discussion on how the areas will be segregated. It seems difficult to envision children living in a small residential portion of the site being told don't cross that line and play in the commercial area or you may develop cancer. Who would want to raise a family under that type of weird scenario? Based on that, it would seem easier and common sense to either classify the site as either all residential or commercial. I cannot support Remedy 3B but I could and do support Remedy 3A, which would clean the entire site up to residential standards. It would be much better for the community of Plainwell in the long run. Weyerhaeuser owes that much to the City of Plainwell. 4) After several hours of study of the proposed plan I couldn't figure out where the concrete slabs were located on the site. I reviewed Figure 7, but it was impossible to review on my iPad. I couldn't figure out where for Remedy 3B, where the 95 cubic yards of soil will remain in place. Again asking for public input on a proposed plan when it is impossible to determine what is going to occur and where at the site seems to be a serious short coming. I have worked on Superfund projects for over 25 years and I had a very difficult time determining what was going to occur at the site. I can't image someone with limited Superfund experience could review EPA's proposed plan. 5) Why didn't EPA use newer environmental forensic analytical techniques to determine if the arsenic levels at the site are naturally occurring or from past contamination. Shaw Environmental pioneered these techniques years ago and using site back ground levels is an older antiquated technique. This information would have provided much more detailed information on what clean up levels should have been for arsenic levels at the site.

Response: 1) Comment is noted. A Table of Contents is included in this ROD. 2) ICs required as part of the Selected Remedy will be placed on the property and any restrictive covenant will run with the land so that transfer of ownership will not compromise the IC. 3) The anticipated future land use is shown in Figure 3. The majority of current and planned commercial areas are expected to be paved or have buildings on them which will provide additional protection against remaining contaminants in the soil in those areas. Further, children are not likely to spend appreciable time playing on commercial areas. 4) The areas where arsenic will remain in place under existing slabs is discussed in Section 2.12.2 and detailed in Figures 11 and 12. 5) Weyerhaeuser conducted the sampling and investigation using an EPA approved Work Plan and Field Sampling Plan, which included EPA's sampling methods.

Comment: Plainwell is a wonderful city and full of potential. I think the old paper mill would help the city in many ways if it was cleaned both inside and out and sold in quantity and made into a small shopping mall, filled with different stores and or various fun activities for families. I believe that if this would happen that it would be very helpful to the Plainwell community and bring in a lot of tourists. That is my option and thank you.

Response: *Comment is noted. The City of Plainwell is working on redeveloping the area. A formal plan is not yet in place.*

Comment: The EPA has demonstrated that there is arsenic in all areas on the site. And the recommended clean-up level may be adequate, but I remain very concerned about that. And I understand that it's a cost benefit decision that has to be made, and so potentially the double cost to remove all of the arsenic from all areas at the residential level will be considered and unlikely to be negotiated adequately. However, the difference between 3B and 3C is twelve percent. It is \$510,000. And so I would urge that 3C be chosen in preference to 3B. Secondly, I remain concerned about the perpetuity and protection of those concrete slabs. And so I would urge a remedy that actually removes the arsenic from below those concrete slabs or that negotiates so that money remains so that if those concrete slabs do deteriorate, the money is already there, negotiated in advance, and not have to be negotiated in the future.

Response: *Alternative 3B cleans up OU7 to the Michigan Part 201 Residential and Non-Residential Cleanup Criteria and below Part 201 criteria for PCBs. In general, the Part 201 criteria are chemical concentrations that correspond to a cancer risk of 1×10^{-5} (1 in 100,000 chance) or a non-cancer HI=1. A Consent Decree was signed between PRP Weyerhaeuser and EPA to conduct the Remedial Action at OU7, as well as O&M of the remedy. O&M will include ensuring that the slabs remain in place and that their integrity is maintained. EPA is already conducting a review of the protectiveness of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site every five years and will continue to do so into the future with evaluation of the protectiveness of the Plainwell Mill remedial action included because contamination above health-based levels will remain on site beneath buildings and slabs.*

Comment: I think this proposal that the EPA has come up with is simply not adequate. I think the only remedy that I would advise the members of our board of directors to support is option 3A which is complete removal with removal of soil down to 201 standards. I think the vagueness of the residential and commercial overlaps and overlays creates unsolvable problems. I think those designations are quite arbitrary. And I think to avoid problems for the city in their redevelopment plans, residential versus commercial, I think we should move to have the complete residential standards met. So we're supporting option 3A. It takes a lot of the guesswork out of the groundwater modeling and groundwater remedy, if there is one. The zoning issues, it leaves that open. If the city wants to grant a variance for commercial zones, they can do that. If it's all residential, I think that would be a good place for the zoning to start or begin again anew. We'll take the time to review in more detail the remedial investigation and the RI/FS and look at some of the data. I'm not satisfied at this point that there's been an adequate study of this site for the 36 acres. It doesn't seem like a lot of samples. If you look at the Operable Unit 1 in Plainwell -- or not Plainwell but the Allied site, there are literally tens of thousands of samples that were taken. That may be an issue. I will have to look at the data and see if it is. But at this point I think unequivocally I think we need to look at option 3A as a solution not just for the Kalamazoo River but for Plainwell as a whole, a community that wants to rebuild and restore their waterfront without issues of contamination and deed restrictions, et cetera. That's just not the way I think the city should go on this. But I'm going to ask as part of the remediation process,

whatever you have to do, before any soil is removed, that you water it down so there is no dust leaving the site. There's a lot of water available. It shouldn't be a hardship. It may be a little heavier, but I think it is important to protect the people across the river as well.

***Response:** The Selected Remedy is based on the anticipated future land use at OU7. At this time, it is not anticipated that Commercial Areas 1-4 will become residential areas. Future land use assumptions allow the baseline risk assessment and the feasibility study to focus on the development of practicable and cost-effective remedial alternatives. After the remedy is selected, if a new proposal changes the land use substantially, EPA will assess that new reuse proposal and evaluate the potential risk. If the evaluation of the new land use leads to unacceptable risk, EPA will work to preserve the protectiveness of the remedy, or require additional cleanup efforts to satisfy the new land use.*

Additional groundwater samples will be gathered at OU7 after the soil remedy is completed in order to determine an appropriate groundwater remedial action. Results of sampling conducted at OU7 to date are detailed in the RI Report, which is a part of the Administrative Record; and sufficient to determine selection of the soil remedial action. Additional sampling will be conducted during remedial design.

During the construction of the remedy, fugitive dust emissions will be controlled and monitored to ensure consistency with Part 55, Air Pollution Control of the Michigan Natural Resources and Environmental Protection Act, Public Act 451. Typical dust control measures may include the use of municipally-supplied water to control dust and wet down haul roads during material transportation.

Comment: Based on EPA's analysis of PRGs to protect avian and mammalian receptors, as presented in the Proposed Plan, the alternatives that meet PRGs for human health impacts should also address ecological risk. Option 3A would maximize the long-term effectiveness of protecting natural resources from exposure to hazardous substances, assuming that the ultimate disposal area would be adequately designed and maintained, and would not require institutional controls for the Site in order to assure protectiveness in perpetuity. The Trustees have a slight preference for this option over the Option 3 variations, even with the increased disturbance from additional excavation and cover, but support EPA's preferred alternative of Option 3B based on EPA's evaluation of the nine criteria. However, none of the Option 3 variations address the Natural Resource Damage Assessment and Restoration (NRDAR) goal of compensating for the years of injury to ecological receptors which may have been occurring since hazardous substances were released there. To resolve this Natural Resource Damage Assessment (NRDA) liability, the PRP would need to address this issue with the Trustees.

Option 3 variations provide opportunities to capitalize on excavations in the floodplain to potentially increase floodway capacity or wetland habitat rather than automatically restoring to existing grade, especially if that existing grade is the result of past fill. Of course, areas subject to inundation would need to meet appropriate criteria for this exposure pathway. The trustees can assist EPA in reviewing these considerations during design.

Site restoration considerations for future residential and recreational development of the property should aim to increase and protect ecological values provided by riparian habitat. The Trustees recommend developing and maintaining a 50-foot wide natural vegetated buffer along with a 200-foot setback for all structures wherever practicable along the Kalamazoo River. The 50-foot vegetated buffer and 200-foot setback for structures along the river should be protected by environmental restrictive covenants and easements that run with the land. Other restoration considerations include ensuring that stream banks are not hardened, through the placement of the rip-rap, sheet pile, or otherwise, and ensuring that the width of the Kalamazoo River is not decreased through the addition of fill material to the river or its floodplains.

Enhancement projects such as in-stream and bank restoration projects adjacent to the river should be allowed, as appropriate, and any trails developed on the Site should be built at or beyond the 200-foot setback for structures wherever possible, with occasional spur trails to the water's edge allowed.

***Response:** The PRPs are responsible for addressing NRDAR matters with the natural resources trustees. EPA's Superfund evaluation process does not take into consideration NRDA liability, as it is outside of our jurisdiction. EPA will work with the PRPs and the trustees to attempt to implement your suggestions as part of the implementation of the selected remedy; however, the trustees and PRPs will need to work together to fully address NRDA liability.*

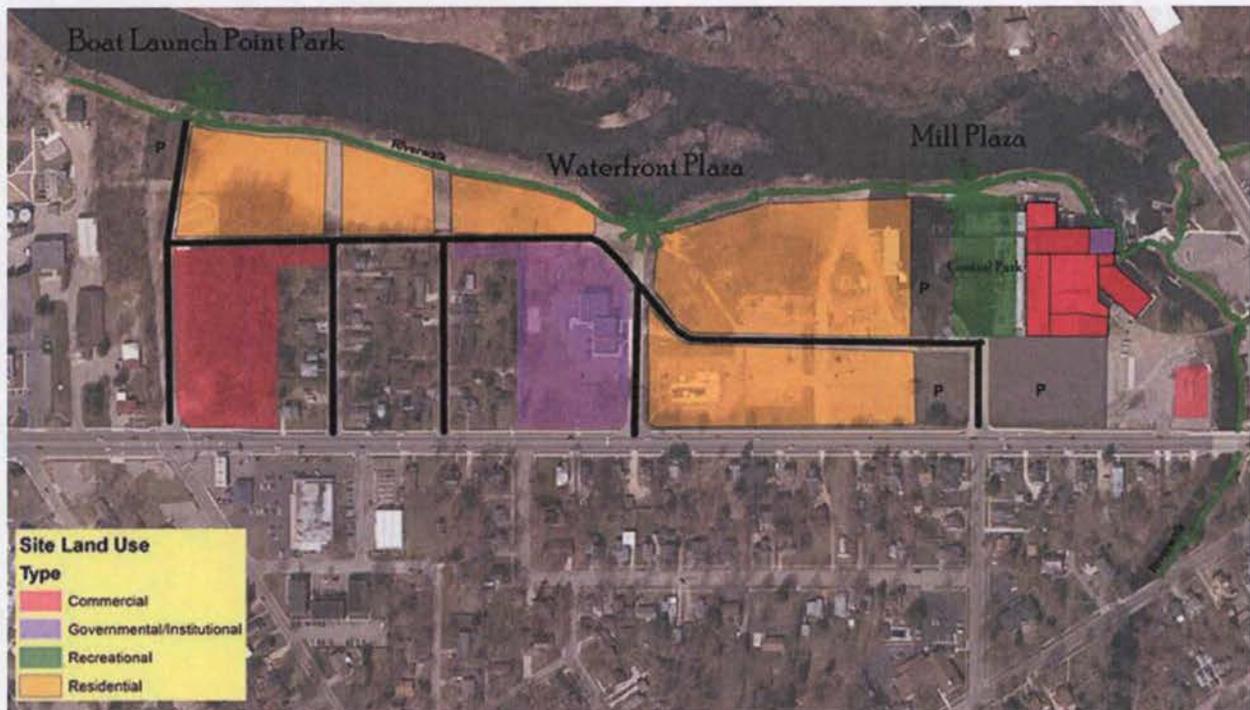
Comment: The Proposed Plan does not designate the river pathway ("river walk") and other park areas that are key to the Site's planned reuse and development. The property occupied by the river walk will be about 50 feet in width. Some of that width will be paved. It is also envisioned to be lighted, landscaped and provided with amenities such as tables, benches, drinking fountains, fitness stations, signage, and, perhaps, restrooms. If this pathway affects conclusions about environmental risks in the riparian area along the River, they should be addressed as part of the remedial action.

***Response:** All of OU7, which would include the area intended as a river walk, is being remediated to either non-residential cleanup criteria or a more stringent criteria (residential cleanup criteria); both of which are protective for recreational use such as a river walk. The majority of the terrestrial habitat adjacent to the Kalamazoo River is planned for redevelopment. Only the riparian corridor will remain available to wildlife, therefore, only that area was evaluated for ecological risk. The results of the ecological risk assessment should not change if a river walk is installed.*

Comment: The Proposed Plan does not fully align with current City intentions for use in certain areas of the Site. To make the EPA record clear, the City has never adopted any Development Plan for the Site. However, in 2007 the City, working in cooperation with Weyerhaeuser's selected planning consultant, developed a vision and concept plan for the Site.

The City's 2007 Concept Plan primarily envisions residential or mixed residential/commercial use with a river walk and several parks. As market conditions have changed since 2007, the City's thoughts have been refined to include more residential in certain areas such as portions of

Commercial Area 3 on EPA's Development Plan and to re-designate areas previously calling for some residential uses on the City's 2007 Concept Plan as commercial use areas, such as Commercial Area 2, where the City's Public Safety Building is now located. These changes are reflected in the plan below.



Please use the current Modified Concept Plan as a basis for the selected option or, at a minimum, include it as an exhibit illustrating the City's (and Site owner's) current vision for Site reuse and redevelopment.

Response: Anticipated future land use in the ROD is based on the City of Plainwell's 2007 Concept Plan. Once future land use at OU7 is firmly determined, the areas of OU7 that will be cleaned up to non-residential standards (Commercial Areas 1-4 and the Waterfront Plaza) may need to be re-evaluated to determine if additional remediation is necessary. Areas remediated to residential criteria would not need to be re-evaluated if they are re-designated as non-residential areas since they will be remediated to a more stringent standard than non-residential criteria.

Comment: Fire protection and other wells should be addressed as soon as possible. The City does not object to bifurcating the remedy selection between soils and groundwater. However, as part of the Proposed Plan for soils, the City believes that the historic production and fire-fighting wells should be properly closed so as not to provide a conduit for groundwater contamination. Please address the existing wells as part of the soils remedy rather than waiting to address it with groundwater remedies.

Response: It is unclear how secured fire and production wells would provide a conduit for groundwater contamination. Based on the data shown in Figure 8, the groundwater

contamination is limited, and the majority of the exceedances are based on aesthetic criteria. The groundwater samples indicate that the contamination levels are relatively steady or decreasing in most areas of OU7. As such, the existing fire protection and other wells are unlikely to be a conduit for groundwater contamination. The fire protection wells will not be addressed under the soil remedy.

ATTACHMENT 1

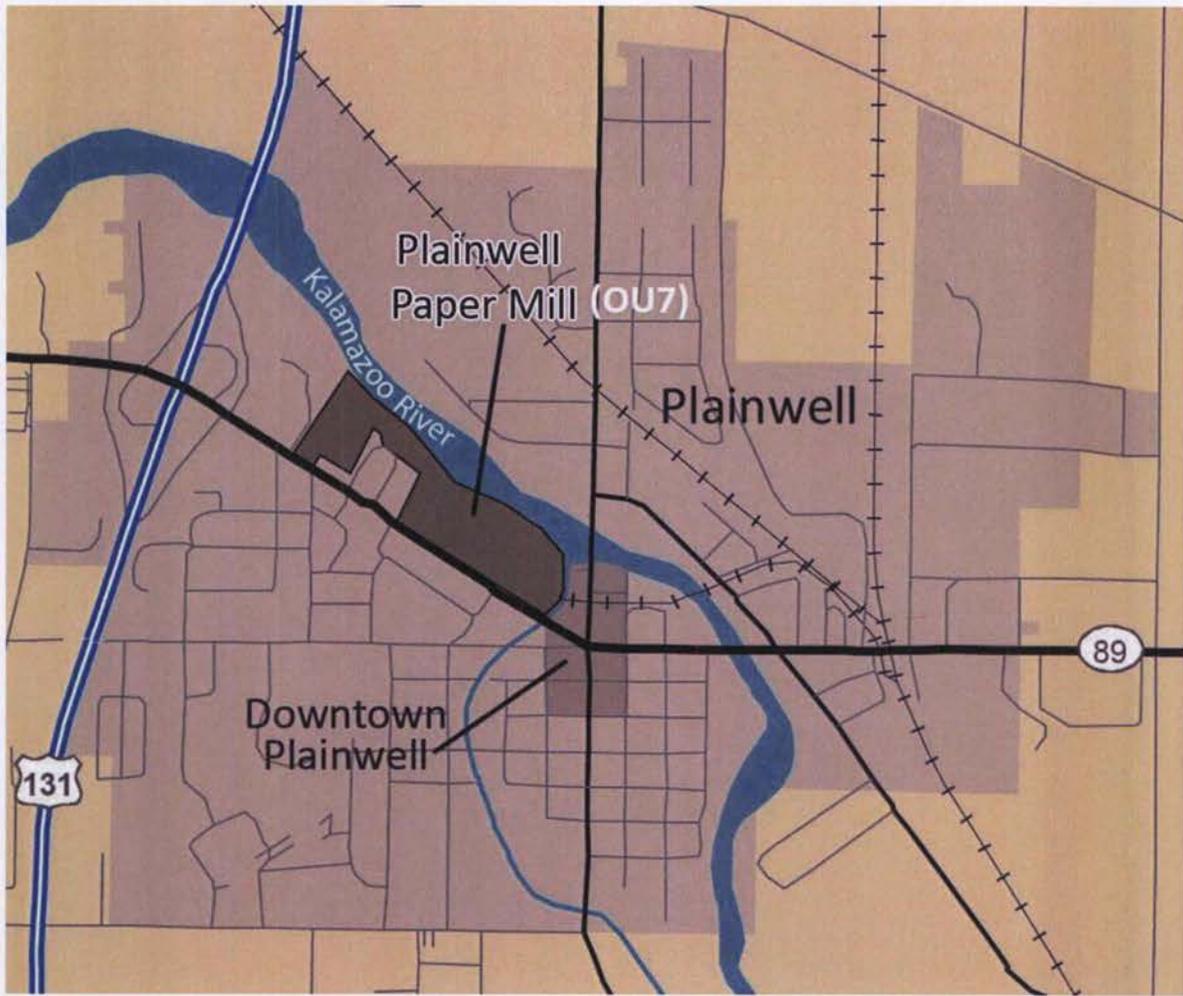
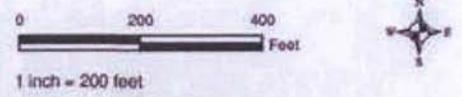


Figure 1: Plainwell Mill/OU7 Location



LEGEND

- FORMER DEWATERING LAGOON AREA
- NORTHCENTRAL PORTION OF THE SITE
- PLAINWELL MILL BUILDINGS AREA
- PROPERTY LIMITS
- FLOODPLAIN AREAS
- SEDIMENT AND WATER TREATMENT AREAS**
- EXCESS MATERIAL STOCKPILE
- HAUL ROAD
- SEDIMENT DEWATERING AREA
- TRUCK WASH
- WASTE WATER TREATMENT AREA



Zone	Bank Length (ft)	Estimated Volume (yd3)
Zone A	600	2,600
Zone B	700	360
Zone C	650	550
Zone D	650	310

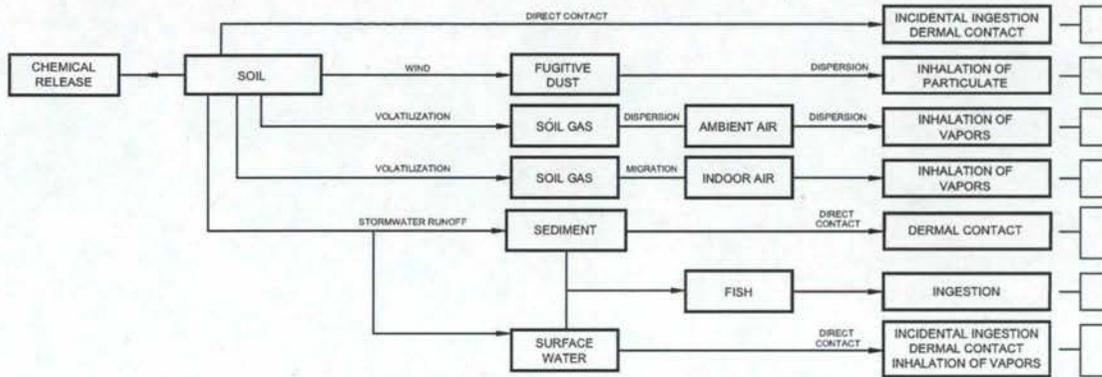
PROJECT: WEYERHAEUSER COMPANY
PLAINWELL MILL EMERGENCY ACTION

SHEET TITLE: PROJECT SITE PLAN
PLAINWELL MILL PROPERTY AND RIVERBANK

DRAWN BY: Pylkase	SCALE: AS NOTED	FIG. NO.: 00-08130-C
CHECKED BY:		FILE NO.: 81900700.mxd
APPROVED BY:	DATE PRINTED:	Figure 4
DATE: JANUARY 2008	1/28/2008	

RMT

100 Ft. Patriot Blvd., Suite 100
Brockton, MA 01909-0000
Phone: 508-679-1212
Fax: 508-679-1222



POTENTIALLY EXPOSED RECEPTORS					
CURRENT/FUTURE				FUTURE	
TRESPASSER (2)	UTILITY (2)	CONSTRUCTION WORKER (3)	COMMERCIAL WORKER (4)	RESIDENT (5)	RECREATIONAL USER (6)
●	●	●	●	●	●
●	●	●	●	●	●
●	●	●	●	●	●
□	□	□	●	●	□
□(1)	□	□	□	□	□(1)
□(1)	□	□	□	□	□(1)
□(1)	□	□	□	□	□(1)

LEGEND

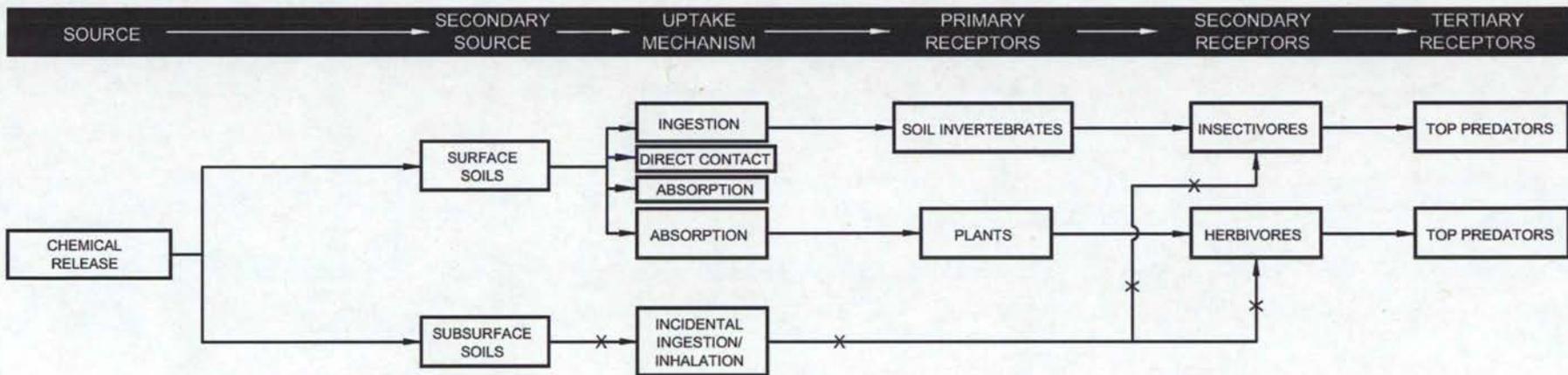
- POTENTIALLY COMPLETE EXPOSURE PATHWAY
- INCOMPLETE EXPOSURE PATHWAY

NOTES

- (1) SEDIMENT AND SURFACE WATER ARE NOT PRESENT ON-SITE. SEDIMENT AND SURFACE WATER OFF-SITE IN THE KALAMAZOO RIVER AND MILL RACE ARE BEING CONSIDERED UNDER SEPARATE SITE.
- (2) CURRENT AND FUTURE SCENARIOS APPLY TO ALL DEVELOPMENT AREAS FOR THE TRESPASSER AND UTILITY WORKER.
- (3) CURRENT SCENARIO APPLIES TO COMMERCIAL AREA 2 AND COMMERCIAL AREA 4 FOR THE CONSTRUCTION WORKER. FUTURE SCENARIO APPLIES TO ALL DEVELOPMENT AREAS FOR THE CONSTRUCTION WORKER.
- (4) CURRENT SCENARIO APPLIES TO COMMERCIAL AREA 4 FOR THE COMMERCIAL WORKER. FUTURE SCENARIO APPLIES TO ALL DEVELOPMENT AREAS FOR THE COMMERCIAL WORKER.
- (5) FUTURE SCENARIO APPLIES TO RESIDENTIAL AREAS 1, 2, 3, AND 4, AND MIXED RESIDENTIAL/COMMERCIAL AREAS 1 AND 2 FOR THE RESIDENT.
- (6) FUTURE SCENARIO APPLIES TO RESIDENTIAL AREAS 1, 2, 3, AND 4, COMMERCIAL AREA 4, WATERFRONT PLAZA, AND MIXED RESIDENTIAL/COMMERCIAL AREAS 1 AND 2 FOR THE RECREATIONAL USER.



FIGURE 5
HUMAN HEALTH CONCEPTUAL SITE MODEL
FEASIBILITY STUDY REPORT
FORMER PLAINWELL, INC. MILL PROPERTY
Plainwell, Michigan



LEGEND

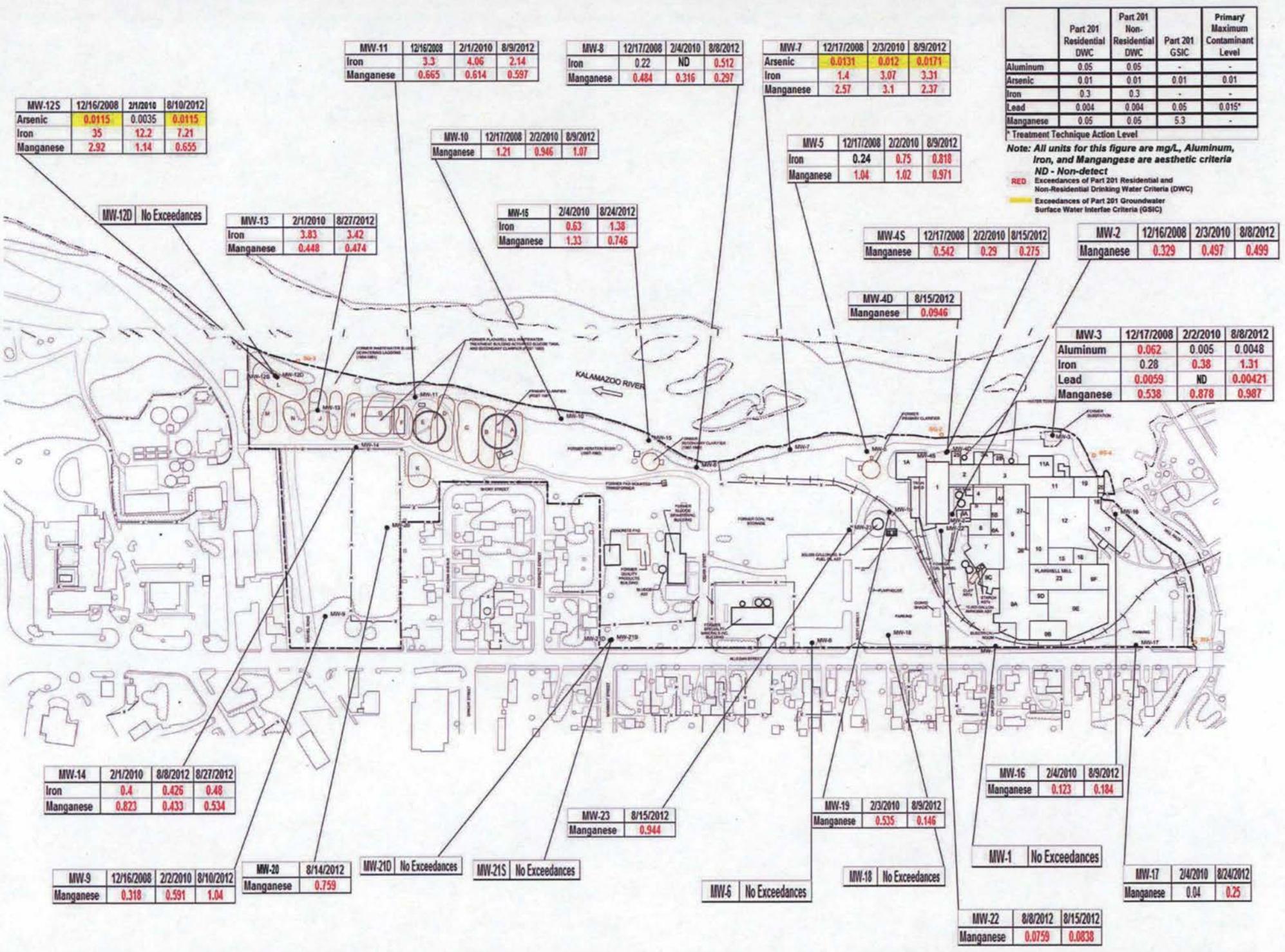
—X— INCOMPLETE OR FUNCTIONALLY INCOMPLETE PATHWAY

NOTES:

SEDIMENT IS NOT PRESENT ON-SITE, SEDIMENT IS CONSIDERED UNDER A SEPARATE SITE/OPERATIONAL UNIT (09).

FIGURE 6
SLERA CONCEPTUAL SITE MODEL
FEASIBILITY STUDY REPORT
FORMER PLAINWELL, INC. MILL PROPERTY
Plainwell, Michigan



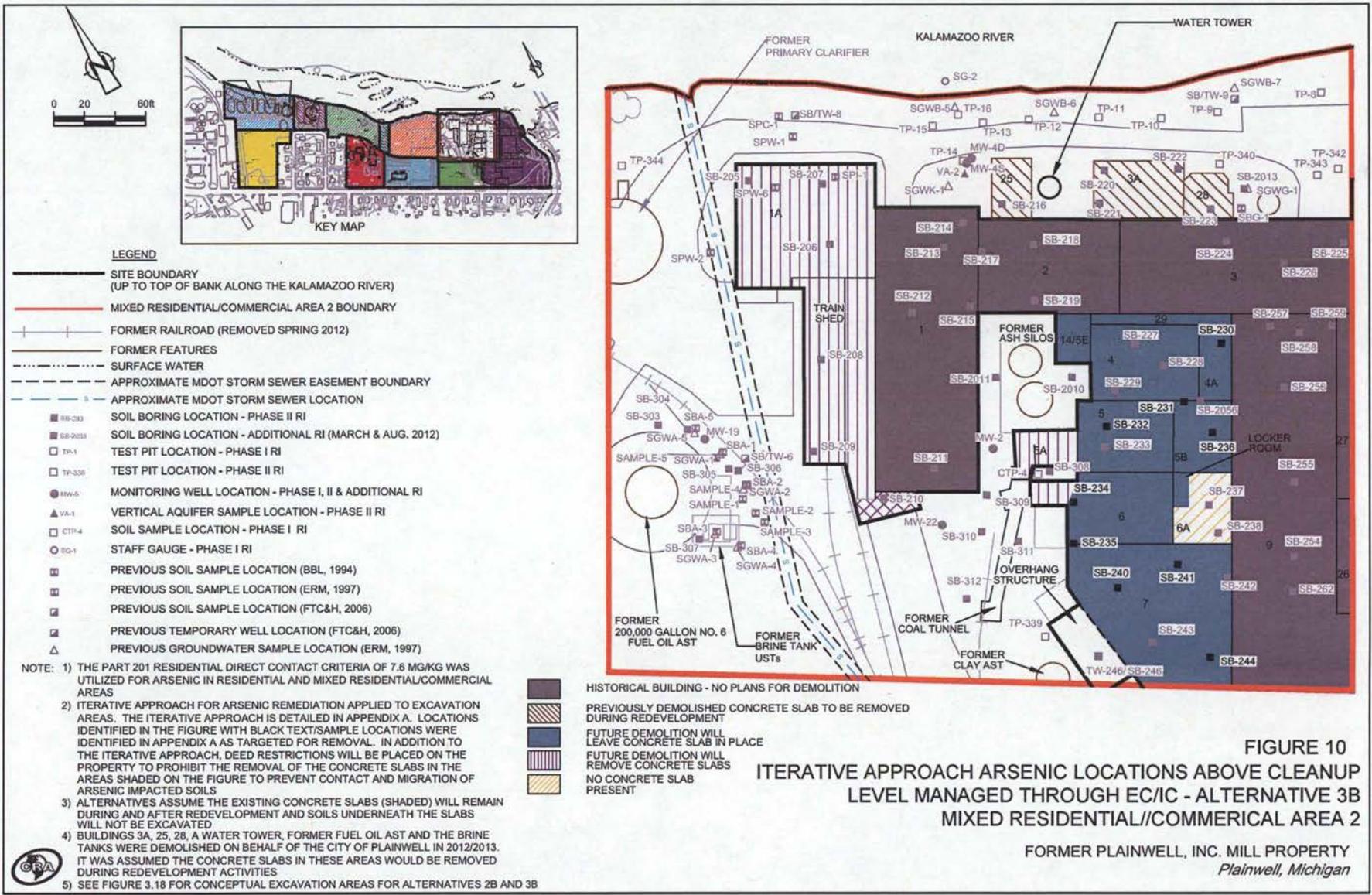


	Part 201 Residential DWC	Part 201 Non-Residential DWC	Part 201 GSIC	Primary Maximum Contaminant Level
Aluminum	0.05	0.05	-	-
Arsenic	0.01	0.01	0.01	0.01
Iron	0.3	0.3	-	-
Lead	0.004	0.004	0.05	0.015*
Manganese	0.05	0.05	5.3	-

* Treatment Technique Action Level

Note: All units for this figure are mg/L, Aluminum, Iron, and Manganese are aesthetic criteria
 ND - Non-detect
 RED Exceedances of Part 201 Residential and Non-Residential Drinking Water Criteria (DWC)
 YELLOW Exceedances of Part 201 Groundwater Surface Water Interface Criteria (GSIC)

Figure 8: Exceedances in Groundwater - Monitoring Wells



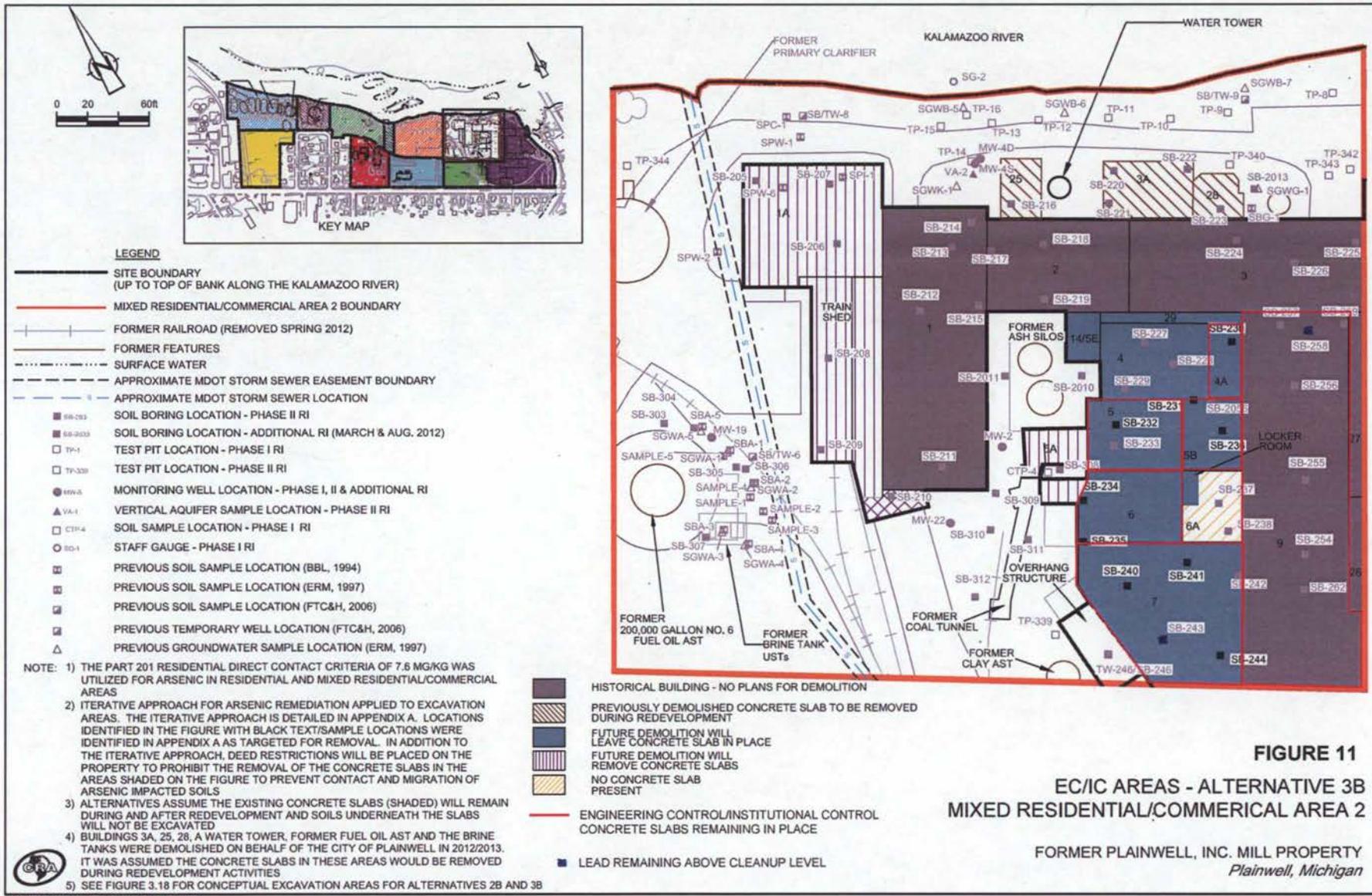
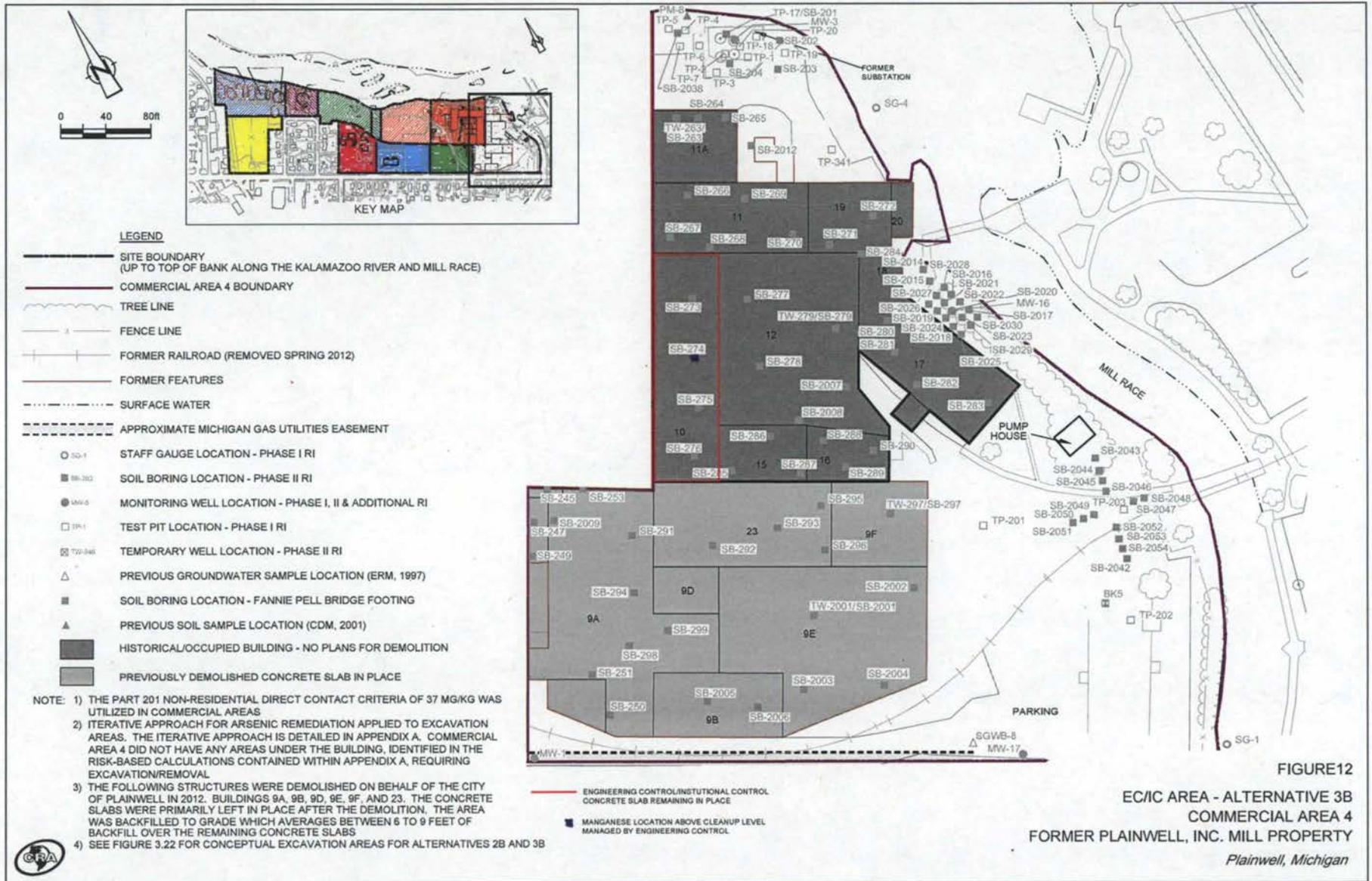


FIGURE 11

**EC/IC AREAS - ALTERNATIVE 3B
MIXED RESIDENTIAL/COMMERCIAL AREA 2**

FORMER PLAINWELL, INC. MILL PROPERTY
Plainwell, Michigan



ATTACHMENT 2

Table 1: Contaminants of Concern and Maximum Concentration of Exceedance of CLs in Soil

Contaminants of Concern (COC)	Residential Area 1 (mg/kg)	Residential Area 2 (mg/kg)	Residential Area 3 (mg/kg)	Residential Area 4 (mg/kg)	Waterfront Plaza (mg/kg)	Mixed Residential/ Commercial Area 1 (mg/kg)	Mixed Residential/ Commercial Area 2 (mg/kg)	Commercial Area 1 (mg/kg)	Commercial Area 2 (mg/kg)	Commercial Area 3 (mg/kg)	Commercial Area 4 (mg/kg)
Volatile Organic Compounds (VOCs)											
Benzene		0.21		3.4^a			0.72			0.13	0.35
Ethylbenzene	0.43			4.3			3.1				
Methylene chloride	0.11		0.18				0.21		0.21	0.23	0.23
Tetrachloroethene	0.43						0.52				4.3
Toluene				25			13				
1,1,1-Trichloroethane											4.1
Trichloroethene						0.14	0.43				0.37
1,2,4-Trimethylbenzene							0.68				
Xylenes (total)	1.39			29			27	1.22		2.62	1.53
Semi-Volatile Organic Compounds (SVOCs)											
Benzo(a)anthracene							45^b				
Benzo(a)pyrene				4.9^b			33^{b,c}				3.1^b
Benzo(b)fluoranthene							39^b				
Carbazole				3.2			9.2				
4-Chloro-3-methylphenol	0.38										
Dibenz(a,h)anthracene				6.4^b			6.1^b				
Dibenzofuran							4.4				
Fluoranthene				24			87				7.7
Fluorene							10				
Indeno(1,2,3-cd)pyrene							22^b				
2-Methylnaphthalene							7.4				
4-Methylphenol	2.8										
Naphthalene	1.5			2.7			7.6				2.4
Pentachlorophenol	0.91	0.21		0.34			0.42				0.36
Phenanthrene	2.6		2.6	19			68				5.8
2,4,6-Trichlorophenol	0.36										
PCBs											
Total PCBs	1.6^b	2.38^b		37.9^{b,c,d,e,f,g,h,i,j}			1.5^b	2.7^{b,h}			53^{b,c,d,e,f,g,h,i,j}
Metals											
Aluminum	16,300	8,800	9,010	17,900		7,980	16,700	8,460	9,340	8,460	15,100
Antimony	16		9.4	47.2			54.5				13.7
Arsenic	92^{b,c,f,g,k}	17.5^{b,f}	26.4^{b,f}	55.8^{b,c,f,j,k}	6.6^f	20^{b,f}	804^{b,c,d,e,f,g,k}	10.6^{b,f}	46.9^{b,c,f,g,k}	18^{b,f}	75.4^{b,c,f,g,k}
Barium				1030							
Cadmium											6.5
Chromium	24	33	60	102	23	44	66	22	20	25	75
Cobalt	8.7		11	14.4		29.6	38.1		7.2	9.7	23.8
Copper		184	139	870			2,550				20,000
Iron	32,400	26,200	33,300	150,000		38,800	63,200	14,900	29,700	16,600	85,200
Lead				2,050^{b,c}			2,330^{b,c}				771^b
Magnesium	63,800	81,100	30,100	73,000	37,400	100,000	57,600	22,900	43,100	26,700	62,400
Manganese	992	729	1,440	1,270		1,880^a	1,100	1,510^a	1,310	1,200	3,900^{d,e}
Mercury	0.45	0.72	2.19	15.5		1.04	4.2	0.24	0.19	4.69	3.3
Selenium	2.6	0.8	2	4.5		2.1	33.3	1.2	1.4	2.6	2.4
Silver				3.4			1.8				10.9
Sodium											3,270
Thallium							8.1				
Vanadium							72.1				
Zinc		415	455	1,710			4,600	789			1,210
General Chemistry											
Cyanide (total)	2.8		2.3	2		1.2	2.5		2.4	2.2	2.4
Nitrite (as N)							349				
Phosphorus				6,580			1,920				3,860

Note: Only COCs with exceedances of Part 201 criteria in soil are listed. Exceedances of DWPC and GSIPC are not bolded. Other exceedances of Part 201 criteria (red bold), as well as, exceedances of TSCA and RBCs (black bold) are noted.

^a - Exceedance of Residential SVIAC

^b - Exceedance of Residential DCC

^c - Exceedance of Non-Residential DCC

^d - Exceedance of Residential PSIC

^e - Exceedance of Non-Residential PSIC

^f - Exceedance of Residential RBC of arsenic at 10⁻⁵ (6.4 mg/kg) and SDBL (5.8 mg/kg)

^g - Exceedance of Residential RBC of PCBs at 10⁻⁵ (2.5 mg/kg)

^h - Exceedance of TSCA (without restrictions) of PCBs (1 mg/kg)

ⁱ - Exceedance of Non-Residential RBC of PCBs at 10⁻⁵ (9.1 mg/kg)

^j - Exceedance of TSCA (with restrictions) of PCBs (10 mg/kg)

^k - Exceedance of Non-Residential RBC of arsenic at 10⁻⁵ (27 mg/kg)

Table 1B: Contaminants of Concern and Maximum Concentration of Exceedance of CLs (except groundwater protection criteria) in Soil

Contaminants of Concern (COC)	Residential Area 1 (mg/kg)	Residential Area 2 (mg/kg)	Residential Area 3 (mg/kg)	Residential Area 4 (mg/kg)	Waterfront Plaza (mg/kg)	Mixed Residential/ Commercial Area 1 (mg/kg)	Mixed Residential/ Commercial Area 2 (mg/kg)	Commercial Area 1 (mg/kg)	Commercial Area 2 (mg/kg)	Commercial Area 3 (mg/kg)	Commercial Area 4 (mg/kg)
Benzene				3.4^a							
Benzo(a)anthracene							43^b				
Benzo(a)pyrene				4.9^b			33^{b,c}				3.1^b
Benzo(b)fluoranthene							39^b				
Dibenz(a,h)anthracene				6.4^b			6.1^b				
Indeno(1,2,3-cd)pyrene							22^b				
Total PCBs	1.6^h	2.38^h		37.9^{b,c,g,h,i,j}			1.5^h	2.7^h			53^{b,c,g,h,i,j}
Arsenic	92^{b,c,f,k}	17.5^{b,f}	26.4^{b,f}	55.8^{b,c,f,k}	6.6^f	20^{b,f}	804^{b,c,d,f,k}	10.6^{b,f}	46.9^{b,c,f,k}	18^{b,f}	75.4^{b,c,f,k}
Lead				2050^{b,c}			2330^{b,c}				771^b
Manganese						1880^e		1510^e			3900^{d,e}

Note: Only COCs with exceedances of Part 201 criteria in soil are listed. Exceedances of DWPC and GSIPC are not listed. Other exceedances of Part 201 criteria (red bold), as well as, exceedances of TSCA and RBCs (black bold) are noted.

^a - Exceedance of Residential SVIAC

^b - Exceedance of Residential DCC

^c - Exceedance of Non-Residential DCC

^d - Exceedance of Residential PSIC

^e - Exceedance of Non-Residential PSIC

^f - Exceedance of Residential RBC of arsenic at 10⁻⁵ (6.4 mg/kg) and SDBL (5.8 mg/kg)

^g - Exceedance of Residential RBC of PCBs at 10⁻⁵ (2.5 mg/kg)

^h - Exceedance of TSCA (without restrictions) of PCBs (1 mg/kg)

ⁱ - Exceedance of Non-Residential RBC of PCBs at 10⁻⁵ (9.1 mg/kg)

^j - Exceedance of TSCA (with restrictions) of PCBs (10 mg/kg)

^k - Exceedance of Non-Residential RBC of arsenic at 10⁻⁵ (27 mg/kg)

Table 2: Human Health Risk in Soil Greater Than EPA's Risk Range

Redevelopment Area	Medium	Receptor	Route	Cancer Risk	Hazard Index	Major Contributor(s)		
						COC	Risk	Hazard Quotient
Residential Area 1	Soil (disturbed)	Resident (Future)	Ingestion Dermal Inhalation	3.2E-05	1.5	Arsenic	3.1E-05	0.6
Residential Area 2	Soil (disturbed)	Resident (Future)	Ingestion Dermal Inhalation	2.3E-05	1.2	Arsenic	2.3E-05	0.4
						Iron	-	0.3
	Indoor Air (from soil)	Resident (Future)	Inhalation	1.5E-04	1.5	Manganese	-	0.4
						Benzene	1.5E-04	1.5
Residential Area 3	Soil (disturbed)	Resident (Future)	Ingestion Dermal Inhalation	3.3E-05	2.1	Arsenic	3.3E-05	0.6
Residential Area 4	Soil (disturbed)	Recreational User (Future)	Ingestion Dermal	2.4E-05	2.7	Total PCBs	8.3E-06	1.6
						Iron	-	0.7
	Soil (disturbed)	Resident (Future)	Ingestion Dermal Inhalation	1.2E-04	14.0	Benzo(a)pyrene	1.9E-05	-
						Dibenzo(a,h)anthracene	2.9E-05	-
						Arsenic	3.2E-05	0.6
						Iron	-	3.5
	Soil (disturbed)	Commercial Worker (Future)	Ingestion Dermal	3.4E-05	1.4	Total PCBs	4.1E-05	8.1
						Total PCBs	1.2E-05	0.9
	Soil (disturbed)	Construction Worker (Future)	Ingestion Dermal Inhalation	1.7E-06	2.0	Cobalt	7.9E-06	0.3
						Total PCBs	5.7E-07	1.0
	Indoor Air (from soil)	Resident (Future)	Inhalation	2.7E-04	22.0	Iron	-	0.4
						Mercury	-	0.2
	Indoor Air (from soil)	Commercial Worker (Future)	Inhalation	4.8E-05	4.8	Mercury	-	18.0
Benzene						2.4E-04	2.4	
Xylenes (total)						-	1.2	
						Ethylbenzene	2.8E-05	0.0
						Mercury	-	4.0
						Benzene	4.3E-05	0.5
Waterfront Plaza	<i>Not greater than EPA's risk range</i>							
Mixed Residential/ Commercial Area 1	Soil (disturbed)	Resident (Future)	Ingestion Dermal Inhalation	2.8E-05	1.7	Manganese	-	0.6
						Arsenic	2.8E-05	0.5
						Cobalt	-	0.3
						Iron	-	0.3
Mixed Residential/ Commercial Area 2	Soil (disturbed)	Recreational User (Future)	Ingestion Dermal	3.8E-05	1.1	Arsenic	2.5E-05	0.4
						Thalium	-	0.4
	Soil (disturbed)	Resident (Future)	Ingestion Dermal Inhalation	1.9E-04	5.3	Arsenic	1.2E-04	2.2
						Thalium	-	1.8
						Benzo(a)pyrene	4.2E-05	-
	Indoor Air (from soil)	Resident (Future)	Inhalation	4.5E-05	4.5	Manganese	-	0.4
						Mercury	-	3.1
						Xylenes (total)	-	0.6
						Tetrachloroethene	1.7E-06	0.4
						Benzene	3.5E-05	0.3
Commercial Area 1	<i>Not greater than EPA's risk range</i>							
Commercial Area 2	<i>Not greater than EPA's risk range</i>							
Commercial Area 3	Indoor Air (from soil)	Commercial Worker (Future)	Inhalation	3.9E-06	4.6	Mercury	-	4.5
Commercial Area 4	Soil (disturbed)	Recreational User (Future)	Ingestion Dermal Inhalation	1.2E-05	1.3	Total PCBs	4.6E-06	0.9
						Arsenic	7.1E-06	0.1

Table 3: Human Health Risk in Groundwater Greater Than EPA's Risk Range

Redevelopment Area	Medium	Receptor	Route	Cancer Risk	Hazard Index	Major Contributor(s)		
						COC	Risk	Hazard Quotient
Residential Area 1, Residential Area 2, Residential Area 3	Groundwater	Resident (Future)	Ingestion Dermal Inhalation	5.1E-04	15.0	Manganese	-	7.4
						Iron	-	2.0
						Arsenic	3.7E-04	3.6
						Chromium VI	1.3E-04	0.6
Residential Area 4, Mixed Residential/ Commerical Area 1	Groundwater	Resident (Future)	Ingestion Dermal Inhalation	3.3E-04	8.7	Arsenic	3.3E-04	3.2
						Manganese		5.4
Mixed Residential/ Commerical Area 2	Groundwater	Resident (Future)	Ingestion Dermal Inhalation	2.3E-04	36.0	Antimony	-	13.0
						Arsenic	2.0E-04	1.9
						Cadmium	-	11.0
						Iron	-	4.5
						Manganese	-	3.4
						Chromium VI	3.4E-05	0.2
Selenium	-	0.9						
Waterfront Plaza, Commercial Area 1, Commerical Area 2, Commercial Area 3, Commercial Area 4	<i>Not greater than EPA's risk range</i>							

Table 4: Summary of Contaminants of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Current/Future									
Redevelopment Area	Exposure Point	Contaminant of Concern	Maximum Concentration	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure	
Residential Area 1	Surface Soil	Arsenic	1.62E+01	mg/kg	27/27	7.30E+00	mg/kg	95% UCL-G	
	Surface and Subsurface Soil	Methylene Chloride	1.10E-01	mg/kg	7/61	4.10E-02	mg/kg	95% UCL-N	
		Pentachlorophenol	9.10E-01	mg/kg	3/56	9.10E-01	mg/kg	95% UCL-N	
		Aluminum	1.63E+04	mg/kg	62/62	6.52E+03	mg/kg	95% UCL-G	
		Antimony	1.60E+01	mg/kg	4/62	1.45E+00	mg/kg	95% UCL-N	
		Arsenic	9.20E+01	mg/kg	71/74	1.21E+01	mg/kg	95% UCL-NP	
		Cobalt	8.70E+00	mg/kg	61/62	4.08E+00	mg/kg	95% UCL-NP	
		Iron	3.24E+04	mg/kg	62/62	1.20E+04	mg/kg	95% UCL-G	
		Manganese	9.92E+02	mg/kg	62/62	4.00E+02	mg/kg	95% UCL-G	
	Groundwater	Bis(2-Ethylhexyl)phthalate	2.00E-02	mg/L	6/21	3.90E-03	mg/L	95% UCL-N	
		Aluminum	1.60E+01	mg/L	25/29	9.14E+00	mg/L	95% UCL-NP	
		Arsenic	4.87E-02	mg/L	29/32	1.66E-02	mg/L	95% UCL-NP	
		Chromium III ⁽¹⁾	2.01E-01	mg/L	17/32	1.04E-01	mg/L	95% UCL-NP	
		Chromium VI ⁽¹⁾	3.36E-02	mg/L		1.74E-02	mg/L	95% UCL-NP	
		Iron	8.96E+01	mg/L	29/29	2.17E+01	mg/L	95% UCL-G	
		Lead	5.66E-02	mg/L	12/32	9.22E-03	mg/L	95% UCL-N	
		Manganese	2.92E+00	mg/L	29/29	2.38E+00	mg/L	95% UCL-NP	
		Vanadium	5.29E-02	mg/L	16/29	3.05E-02	mg/L	95% UCL-NP	
	Residential Area 2	Surface Soil	Arsenic	1.35E+01	mg/kg	9/9	8.75E+00	mg/kg	95% UCL-N
Surface and Subsurface Soil		Benzene	2.10E-01	mg/kg	2/20	2.10E-01	mg/kg	95% UCL-N	
		Pentachlorophenol	2.10E-01	mg/kg	1/9	2.10E-01	mg/kg	95% UCL-N	
		Aluminum	8.80E+03	mg/kg	20/20	5.91E+03	mg/kg	95% UCL-N	
		Arsenic	1.75E+01	mg/kg	20/20	8.74E+00	mg/kg	95% UCL-G	
		Iron	2.62E+04	mg/kg	20/20	1.34E+04	mg/kg	95% UCL-G	
		Manganese	7.29E+02	mg/kg	20/20	4.56E+02	mg/kg	95% UCL-N	
Groundwater		Bis(2-Ethylhexyl)phthalate	2.00E-02	mg/L	6/21	3.90E-03	mg/L	95% UCL-N	
		Aluminum	1.60E+01	mg/L	25/29	9.14E+00	mg/L	95% UCL-NP	
		Arsenic	4.87E-02	mg/L	29/32	1.66E-02	mg/L	95% UCL-NP	
		Chromium III ⁽¹⁾	2.01E-01	mg/L	17/32	1.04E-01	mg/L	95% UCL-NP	
		Chromium VI ⁽¹⁾	3.36E-02	mg/L		1.74E-02	mg/L	95% UCL-NP	
		Iron	8.96E+01	mg/L	29/29	2.17E+01	mg/L	95% UCL-G	
		Lead	5.66E-02	mg/L	12/32	9.22E-03	mg/L	95% UCL-N	
		Manganese	2.92E+00	mg/L	29/29	2.38E+00	mg/L	95% UCL-NP	
		Vanadium	5.29E-02	mg/L	16/29	3.05E-02	mg/L	95% UCL-NP	
Residential Area 3		Surface Soil	Arsenic	1.99E+01	mg/kg	11/11	1.15E+01	mg/kg	95% UCL-G
		Surface and Subsurface Soil	Methylene Chloride	1.80E-01	mg/kg	1/22	1.80E-01	mg/kg	95% UCL-N
			Aluminum	9.01E+03	mg/kg	22/22	5.71E+03	mg/kg	95% UCL-N
	Antimony		9.40E+00	mg/kg	3/22	9.40E+00	mg/kg	95% UCL-N	
	Arsenic		2.64E+01	mg/kg	22/22	1.28E+01	mg/kg	95% UCL-G	
	Cobalt		1.10E+01	mg/kg	19/22	5.14E+00	mg/kg	95% UCL-NP	
	Iron		3.33E+04	mg/kg	22/22	1.64E+04	mg/kg	95% UCL-N	
	Manganese		1.44E+03	mg/kg	22/22	5.81E+02	mg/kg	95% UCL-G	
	Mercury		2.19E+00	mg/kg	9/22	4.43E-01	mg/kg	95% UCL-N	
	Groundwater	Bis(2-Ethylhexyl)phthalate	2.00E-02	mg/L	6/21	3.90E-03	mg/L	95% UCL-N	
		Aluminum	1.60E+01	mg/L	25/29	9.14E+00	mg/L	95% UCL-NP	
		Arsenic	4.87E-02	mg/L	29/32	1.66E-02	mg/L	95% UCL-NP	
		Chromium III ⁽¹⁾	2.01E-01	mg/L	17/32	1.04E-01	mg/L	95% UCL-NP	
		Chromium VI ⁽¹⁾	3.36E-02	mg/L		1.74E-02	mg/L	95% UCL-NP	
		Iron	8.96E+01	mg/L	29/29	2.17E+01	mg/L	95% UCL-G	
		Lead	5.66E-02	mg/L	12/32	9.22E-03	mg/L	95% UCL-N	
		Manganese	2.92E+00	mg/L	29/29	2.38E+00	mg/L	95% UCL-NP	
		Vanadium	5.29E-02	mg/L	16/29	3.05E-02	mg/L	95% UCL-NP	

Table 4: Summary of Contaminants of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Current/Future								
Redevelopment Area	Exposure Point	Contaminant of Concern	Maximum Concentration	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Residential Area 4	Surface Soil	Benzo(a)pyrene	4.90E+00	mg/kg	15/22	1.16E+00	mg/kg	95% UCL-NP
		Dibenz(a,h)anthracene	6.40E+00	mg/kg	12/22	3.40E+00	mg/kg	95% UCL-NP
		Arsenic	2.16E+01	mg/kg	17/22	9.32E+00	mg/kg	95% UCL-NP
		Lead	9.90E+02	mg/kg	22/22	1.84E+02	mg/kg	95% UCL-L
	Surface and Subsurface Soil	Benzene	3.40E+00	mg/kg	8/30	3.35E-01	mg/kg	95% UCL-N
		Ethylbenzene	4.30E+00	mg/kg	10/30	5.99E-01	mg/kg	95% UCL-N
		Toluene	2.50E+01	mg/kg	18/30	1.24E+01	mg/kg	95% UCL-NP
		Xylene (total)	2.90E+01	mg/kg	13/30	4.21E+00	mg/kg	95% UCL-N
		Benzo(a)pyrene	4.90E+00	mg/kg	22/43	1.19E+00	mg/kg	95% UCL-NP
		Dibenz(a,h)anthracene	6.40E+00	mg/kg	16/43	1.78E+00	mg/kg	95% UCL-NP
		Pentachlorophenol	3.40E-01	mg/kg	2/26	3.00E-01	mg/kg	95% UCL-NP
		Aluminum	1.79E+04	mg/kg	30/30	6.62E+03	mg/kg	95% UCL-G
		Antimony	4.72E+01	mg/kg	6/30	8.14E+00	mg/kg	95% UCL-N
		Arsenic	5.58E+01	mg/kg	38/43	1.25E+01	mg/kg	95% UCL-NP
		Cobalt	1.44E+01	mg/kg	28/30	6.07E+00	mg/kg	95% UCL-NP
		Iron	8.36E+05	mg/kg	30/30	1.89E+05	mg/kg	95% UCL-NP
		Lead	2.05E+03	mg/kg	43/43	8.27E+02	mg/kg	95% UCL-NP
		Manganese	1.27E+03	mg/kg	30/30	4.59E+02	mg/kg	95% UCL-G
		Mercury	1.55E+01	mg/kg	22/43	3.75E+00	mg/kg	95% UCL-NP
		Selenium	4.50E+00	mg/kg	30/30	1.23E+00	mg/kg	95% UCL-N
Total PCBs	3.79E+01	mg/kg	13/30	9.10E+00	mg/kg	95% UCL-NP		
Groundwater	Arsenic	1.71E-02	mg/L	18/24	1.47E-02	mg/L	95% UCL-NP	
	Iron	3.31E+00	mg/L	16/18	1.65E+00	mg/L	95% UCL-NP	
	Manganese	3.10E+00	mg/L	16/18	1.75E+00	mg/L	95% UCL-NP	
Waterfront Plaza	Surface Soil	Arsenic	3.47E+01	mg/kg	5/5	3.73E+01	mg/kg	95% UCL-G
		Methylene Chloride	2.10E-01	mg/kg	1/12	2.10E-01	mg/kg	95% UCL-N
	Surface and Subsurface Soil	Aluminum	6.96E+03	mg/kg	12/12	4.65E+03	mg/kg	95% UCL-N
		Arsenic	3.47E+01	mg/kg	12/12	1.81E+01	mg/kg	95% UCL-NP
		Iron	1.37E+04	mg/kg	12/12	9.26E+03	mg/kg	95% UCL-N
		Manganese	6.89E+02	mg/kg	12/12	4.22E+02	mg/kg	95% UCL-G
	Groundwater	Arsenic	1.71E-02	mg/L	18/24	1.47E-02	mg/L	95% UCL-NP
		Iron	3.31E+00	mg/L	16/18	1.65E+00	mg/L	95% UCL-NP
		Manganese	3.10E+00	mg/L	16/18	1.75E+00	mg/L	95% UCL-NP
Mixed Residential/ Commercial Area 1	Surface Soil	Arsenic	2.00E+01	mg/kg	13/13	7.93E+00	mg/kg	95% UCL-N
		Tetrachloroethene	1.40E-01	mg/kg	1/26	1.40E-01	mg/kg	95% UCL-N
	Surface and Subsurface Soil	Aluminum	7.98E+03	mg/kg	26/26	5.11E+03	mg/kg	95% UCL-N
		Arsenic	2.00E+01	mg/kg	26/27	1.10E+01	mg/kg	95% UCL-NP
		Cobalt	2.96E+01	mg/kg	26/26	6.55E+00	mg/kg	95% UCL-N
		Iron	3.88E+04	mg/kg	26/26	1.40E+04	mg/kg	95% UCL-N
		Manganese	1.88E+03	mg/kg	26/26	6.08E+02	mg/kg	95% UCL-N
	Groundwater	Arsenic	1.71E-02	mg/L	18/24	1.47E-02	mg/L	95% UCL-NP
		Iron	3.31E+00	mg/L	16/18	1.65E+00	mg/L	95% UCL-NP
Manganese		3.10E+00	mg/L	16/18	1.75E+00	mg/L	95% UCL-NP	

Table 4: Summary of Contaminants of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Current/Future								
Redevelopment Area	Exposure Point	Contaminant of Concern	Maximum Concentration	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Mixed Residential/ Commercial Area 2	Surface Soil	Benzo(a)pyrene	4.90E+00	mg/kg	38/63	9.85E-01	mg/kg	95% UCL-NP
		Dibenz(a,h)anthracene	4.40E+00	mg/kg	23/63	6.23E-01	mg/kg	95% UCL-NP
		Arsenic	1.02E+02	mg/kg	54/54	1.98E+01	mg/kg	95% UCL-N
		Lead	2.33E+03	mg/kg	58/58	3.85E+02	mg/kg	95% UCL-NP
	Surface and Subsurface Soil	Benzene	7.20E-01	mg/kg	43/141	4.77E-02	mg/kg	95% UCL-NP
		Ethylbenzene	3.10E+00	mg/kg	46/139	1.82E-01	mg/kg	95% UCL-NP
		Methylene Chloride	2.10E-01	mg/kg	27/134	5.68E-02	mg/kg	95% UCL-NP
		Tetrachloroethene	9.60E-01	mg/kg	38/134	6.36E-02	mg/kg	95% UCL-NP
		Xylene (total)	2.70E+01	mg/kg	64/131	2.14E+00	mg/kg	95% UCL-NP
		Benzo(a)anthracene	4.30E+01	mg/kg	65/138	3.37E+00	mg/kg	95% UCL-NP
		Benzo(a)pyrene	3.30E+01	mg/kg	60/138	2.62E+00	mg/kg	95% UCL-NP
		Benzo(b)fluoranthene	3.90E+01	mg/kg	70/139	3.31E+00	mg/kg	95% UCL-NP
		Dibenz(a,h)anthracene	6.10E+00	mg/kg	38/139	6.86E-01	mg/kg	95% UCL-NP
		Indeno(1,2,3-cd)pyrene	2.20E+01	mg/kg	53/139	1.02E+00	mg/kg	95% UCL-NP
		Pentachlorophenol	4.20E-01	mg/kg	7/108	2.53E-01	mg/kg	95% UCL-N
		Phenanthrene	6.80E+01	mg/kg	80/139	5.44E+00	mg/kg	95% UCL-NP
		Aluminum	1.67E+04	mg/kg	123/123	6.26E+03	mg/kg	03 95% UCL-G
		Antimony	5.45E+01	mg/kg	38/123	1.87E+00	mg/kg	95% UCL-N
		Arsenic	8.04E+02	mg/kg	124/124	4.77E+01	mg/kg	95% UCL-NP
		Cobalt	3.81E+01	mg/kg	122/123	7.07E+00	mg/kg	95% UCL-NP
		Iron	6.32E+04	mg/kg	123/123	1.53E+04	mg/kg	95% UCL-N
		Lead	2.33E+03	mg/kg	132/134	2.34E+02	mg/kg	95% UCL-NP
		Manganese	1.10E+03	mg/kg	123/123	4.01E+02	mg/kg	95% UCL-N
		Mercury	4.20E+00	mg/kg	65/124	6.25E-01	mg/kg	95% UCL-NP
	Selenium	3.33E+01	mg/kg	118/124	2.02E+00	mg/kg	95% UCL-NP	
	Thallium	8.10E+00	mg/kg	9/123	6.90E-01	mg/kg	95% UCL-N	
	Vanadium	7.21E+01	mg/kg	123/123	1.84E+01	mg/kg	95% UCL-N	
	Zinc	4.60E+03	mg/kg	123/123	1.01E+02	mg/kg	95% UCL-L	
	Groundwater	Aluminum	1.70E+01	mg/L	28/33	5.84E+00	mg/L	95% UCL-NP
		Antimony	1.00E-01	mg/L	24/33	7.90E-02	mg/L	95% UCL-NP
		Arsenic	3.77E-02	mg/L	33/44	8.72E-03	mg/L	95% UCL-NP
		Cadmium	1.00E-01	mg/L	18/44	7.57E-02	mg/L	95% UCL-NP
Chromium III ⁽¹⁾		1.44E-01	mg/L	29/44	2.68E-02	mg/L	95% UCL-NP	
Chromium VI ⁽¹⁾		2.40E-02	mg/L		4.46E-03	mg/L	95% UCL-NP	
Iron		1.42E+02	mg/L	28/33	4.86E+01	mg/L	95% UCL-NP	
Lead		9.21E-02	mg/L	22/47	7.10E-03	mg/L	95% UCL-N	
Manganese		4.40E+00	mg/L	32/33	1.08E+00	mg/L	95% UCL-NP	
Selenium		1.01E-01	mg/L	17/44	6.99E-02	mg/L	95% UCL-NP	
Vanadium		6.92E-02	mg/L	22/33	2.42E-02	mg/L	95% UCL-NP	
Commercial Area 1	Surface Soil	Manganese	1.51E+03	mg/kg	11/11	1.04E+03	mg/kg	95% UCL-N
	Surface and Subsurface Soil	Arsenic	1.06E+01	mg/kg	15/15	7.23E+00	mg/kg	95% UCL-N
		Iron	1.49E+04	mg/kg	15/15	1.20E+04	mg/kg	95% UCL-N
	Groundwater	Manganese	1.51E+03	mg/kg	15/15	8.95E+02	mg/kg	95% UCL-N
		Bis(2-Ethylhexyl)phthalate	2.00E-02	mg/L	6/21	3.90E-03	mg/L	95% UCL-N
		Aluminum	1.60E+01	mg/L	25/29	9.14E+00	mg/L	95% UCL-NP
		Arsenic	4.87E-02	mg/L	29/32	1.66E-02	mg/L	95% UCL-NP
		Chromium III ⁽¹⁾	2.01E-01	mg/L	17/32	1.04E-01	mg/L	95% UCL-NP
		Chromium VI ⁽¹⁾	3.36E-02	mg/L		1.74E-02	mg/L	95% UCL-NP
		Iron	8.96E+01	mg/L		29/29	2.17E+01	mg/L
		Lead	5.66E-02	mg/L	12/32	9.22E-03	mg/L	95% UCL-N
Manganese	2.92E+00	mg/L	29/29	2.38E+00	mg/L	95% UCL-NP		

Table 4: Summary of Contaminants of Concern and Medium-Specific Exposure Point Concentration

Scenario Timeframe: Current/Future								
Redevelopment Area	Exposure Point	Contaminant of Concern	Maximum Concentration	Units	Frequency of Detection	Exposure Point Concentration	Exposure Point Concentration Units	Statistical Measure
Commercial Area 2	Surface and Subsurface Soil	Methylene Chloride	2.10E-01	mg/kg	11/44	6.75E-02	mg/kg	95% UCL-NP
		Arsenic	4.69E+01	mg/kg	43/44	1.33E+01	mg/kg	95% UCL-NP
		Cobalt	7.20E+00	mg/kg	43/43	3.96E+00	mg/kg	95% UCL-N
		Iron	2.97E+04	mg/kg	43/43	1.14E+04	mg/kg	95% UCL-N
	Groundwater	Manganese	1.31E+03	mg/kg	43/43	4.37E+02	mg/kg	95% UCL-N
		Arsenic	1.71E-02	mg/L	18/24	1.47E-02	mg/L	95% UCL-NP
Commercial Area 3	Surface and Subsurface Soil	Manganese	3.10E+00	mg/L	16/18	1.75E+00	mg/L	95% UCL-NP
		Benzene	1.30E-01	mg/kg	5/19	2.97E-02	mg/kg	95% UCL-N
		Methylene Chloride	2.30E-01	mg/kg	6/19	1.58E-01	mg/kg	95% UCL-N
		Arsenic	1.80E+01	mg/kg	20/21	9.65E+00	mg/kg	95% UCL-N
		Cobalt	9.70E+00	mg/kg	19/19	5.81E+00	mg/kg	95% UCL-N
		Iron	1.88E+04	mg/kg	19/19	1.18E+04	mg/kg	95% UCL-N
		Manganese	1.20E+03	mg/kg	19/19	5.80E+02	mg/kg	95% UCL-N
	Groundwater	Mercury	4.69E+00	mg/kg	6/21	4.25E+00	mg/kg	95% UCL-N
		Arsenic	1.71E-02	mg/L	18/24	1.47E-02	mg/L	95% UCL-NP
		Manganese	3.10E+00	mg/L	16/18	1.75E+00	mg/L	95% UCL-NP
Commercial Area 4	Surface Soil	Arsenic	7.54E+01	mg/kg	55/55	1.94E+01	mg/kg	95% UCL-NP
		Manganese	3.90E+03	mg/kg	55/55	6.00E+02	mg/kg	95% UCL-NP
	Surface and Subsurface Soil	Benzene	3.50E-01	mg/kg	40/125	1.89E-02	mg/kg	95% UCL-N
		Methylene Chloride	2.30E-01	mg/kg	54/125	4.44E-02	mg/kg	95% UCL-N
		Tetrachloroethene	4.30E+00	mg/kg	31/125	3.25E-01	mg/kg	95% UCL-NP
		Antimony	1.37E+01	mg/kg	38/129	9.22E-01	mg/kg	95% UCL-N
		Arsenic	7.54E+01	mg/kg	136/136	1.38E+01	mg/kg	95% UCL-N
		Cadmium	6.50E+00	mg/kg	35/136	6.05E-01	mg/kg	95% UCL-NP
		Cobalt	2.38E+01	mg/kg	129/129	5.61E+00	mg/kg	95% UCL-N
		Copper	2.00E+04	mg/kg	130/130	6.97E+02	mg/kg	95% UCL-NP
		Iron	8.52E+04	mg/kg	129/129	1.74E+04	mg/kg	95% UCL-N
		Lead	7.71E+02	mg/kg	135/136	1.00E+02	mg/kg	95% UCL-NP
		Manganese	3.90E+03	mg/kg	129/129	4.80E+02	mg/kg	95% UCL-N
		Mercury	3.30E+00	mg/kg	56/136	3.46E-01	mg/kg	95% UCL-NP
		Total PCBs	5.30E+01	mg/kg	84/206	5.09E+00	mg/kg	95% UCL-NP
	Groundwater	Aluminum	1.70E+01	mg/L	28/33	5.84E+00	mg/L	95% UCL-NP
		Antimony	1.00E-01	mg/L	24/33	7.90E-02	mg/L	95% UCL-NP
		Arsenic	3.77E-02	mg/L	33/44	8.72E-03	mg/L	95% UCL-NP
		Cadmium	1.00E-01	mg/L	18/44	7.57E-02	mg/L	95% UCL-NP
		Chromium III ⁽¹⁾	1.44E-01	mg/L	29/44	2.68E-02	mg/L	95% UCL-NP
		Chromium VI ⁽¹⁾	2.40E-02	mg/L		4.46E-03	mg/L	95% UCL-NP
		Iron	1.42E+02	mg/L	28/33	4.86E+01	mg/L	95% UCL-NP
		Lead	9.21E-02	mg/L	22/47	7.10E-03	mg/L	95% UCL-N
Manganese		4.40E+00	mg/L	32/33	1.08E+00	mg/L	95% UCL-NP	
Selenium		1.01E-01	mg/L	17/44	6.99E-02	mg/L	95% UCL-NP	
Vanadium	6.92E-02	mg/L	22/33	2.42E-02	mg/L	95% UCL-NP		

UCL=Upper Confidence Limit

bgs = below ground surface

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-L);

95% UCL of Gamma distributed data (95% UCL-G); Non-parametric method used to Determine 95% UCL (95% UCL-NP).

⁽¹⁾ Calculated using the measured total chromium analytical data and the ratio of 1:6 Chromium VI to Chromium III (per USEPA Regional Screening Levels User's Guide, April 2012).

Table 5: Cancer Toxicity Data Summary

Pathway: Ingestion, Dermal						
Contaminant of Concern	Oral Cancer Slope Factor	Dermal Cancer Slope Factor	Slope Factor Units	Weight of Evidence/Cancer Guideline Description	Source	Date (MM-YY)
Benzene	5.50E-02	5.50E-02	(mg/kg-day) ⁻¹	A	IRIS	Jan-00
Ethylbenzene	1.10E-02	1.10E-02	(mg/kg-day) ⁻¹	-	RSL	Apr-12
Methylene chloride	2.00E-03	2.00E-03	(mg/kg-day) ⁻¹	B2	IRIS	Nov-11
Tetrachloroethene	2.10E-03	2.10E-03	(mg/kg-day) ⁻¹	A	IRIS	Feb-12
Toluene	-	-	-	-	-	-
Xylenes (total)	-	-	-	-	-	-
Benzo(a)anthracene	7.30E-01	7.30E-01	(mg/kg-day) ⁻¹	B2	RSL	Apr-12
Benzo(a)pyrene	7.30E+00	7.30E+00	(mg/kg-day) ⁻¹	B2	RSL	Apr-12
Benzo(b)fluoranthene	7.30E-01	7.30E-01	(mg/kg-day) ⁻¹	B2	IRIS	Nov-94
Bis(2-Ethylhexyl)phthalate	1.40E-02	1.40E-02	(mg/kg-day) ⁻¹	B2	IRIS	Feb-93
Dibenz(a,h)anthracene	7.30E+00	7.30E+00	(mg/kg-day) ⁻¹	B1	IRIS	Apr-12
Indeno(1,2,3-cd)pyrene	7.30E-01	7.30E-01	(mg/kg-day) ⁻¹	B2	RSL	Apr-12
Pentachlorophenol	4.00E-01	4.00E-01	(mg/kg-day) ⁻¹	B1	IRIS	Sep-10
Phenanthrene	-	-	-	D	-	-
Aluminum	-	-	-	-	-	-
Antimony	-	-	-	-	-	-
Arsenic	1.50E+00	1.50E+00	(mg/kg-day) ⁻¹	A	IRIS	Apr-98
Cadmium	-	-	-	B1	-	-
Chromium III	-	-	-	D	-	-
Chromium VI	5.00E-01	5.00E-01	(mg/kg-day) ⁻¹	A	RSL	Apr-12
Cobalt	-	-	-	-	-	-
Copper	-	-	-	D	-	-
Iron	-	-	-	-	-	-
Lead	-	-	-	B2	-	-
Manganese	-	-	-	D	-	-
Mercury	-	-	-	D	-	-
Selenium	-	-	-	D	-	-
Thallium	-	-	-	D	-	-
Vanadium	-	-	-	-	-	-
Zinc	-	-	-	D	-	-
Total PCBs	2.00E+00	2.00E+00	(mg/kg-day) ⁻¹	B2	IRIS	Jun-97

Table 5: Cancer Toxicity Data Summary

Pathway: Inhalation						
Contaminant of Concern	Unit Risk	Units	Inhalation Cancer Slope Factor	Weight of Evidence/Cancer Guideline Description	Source	Date (MM/DD/YYYY)
Benzene	7.80E-03	(mg/m ³) ⁻¹	-	A	IRIS	Jan-00
Ethylbenzene	2.50E-03	(mg/m ³) ⁻¹	-	-	RSL	Apr-12
Methylene chloride	1.00E-05	(mg/m ³) ⁻¹	-	B2	IRIS	Nov-11
Tetrachloroethene	2.60E-04	(mg/m ³) ⁻¹	-	A	IRIS	Feb-12
Toluene	-	-	-	-	-	-
Xylenes (total)	-	-	-	-	-	-
Benzo(a)anthracene	1.10E-01	(mg/m ³) ⁻¹	-	B2	RSL	Apr-12
Benzo(a)pyrene	1.10E+00	(mg/m ³) ⁻¹	-	B2	RSL	Apr-12
Benzo(b)fluoranthene	1.10E-01	(mg/m ³) ⁻¹	-	B2	RSL	Apr-12
Bis(2-Ethylhexyl)pbthalate	-	-	-	B2	-	-
Dibenz(a,h)anthracene	1.20E+00	(mg/m ³) ⁻¹	-	B2	RSL	Apr-12
Indeno(1,2,3-cd)pyrene	1.10E-01	(mg/m ³) ⁻¹	-	B2	RSL	Apr-12
Pentachlorophenol	5.10E-03	(mg/m ³) ⁻¹	-	B1	RSL	Apr-12
Phenanthrene	-	-	-	-	-	-
Aluminum	-	-	-	-	-	-
Antimony	-	-	-	-	-	-
Arsenic	4.30E+00	(mg/m ³) ⁻¹	-	A	IRIS	Apr-98
Cadmium	1.80E+00	(mg/m ³) ⁻¹	-	B1	IRIS	Jun-92
Chromium III	-	-	-	D	-	-
Chromium VI	1.20E-02	(mg/m ³) ⁻¹	-	A	IRIS	Sep-98
Copper	-	-	-	D	-	-
Cobalt	-	-	-	-	-	-
Iron	-	-	-	-	-	-
Lead	-	-	-	B2	-	-
Manganese	-	-	-	D	-	-
Mercury	-	-	-	D	-	-
Selenium	-	-	-	D	-	-
Thallium	-	-	-	D	-	-
Vanadium	-	-	-	-	-	-
Zinc	-	-	-	D	-	-
Total PCBs	5.70E-01	(mg/m ³) ⁻¹	-	B2	IRIS	Jun-97

Key

- A - Known Human carcinogen
- B1 - Probable human carcinogen - indicates that limited human data are :
- B2 - Probable human carcinogen - indicates sufficient evidence in anima
- C - Possible human carcinogen
- D - Not classifiable as a human carcinogen
- E - Evidence of noncarcinogenicity

Table 6: Summary of Non-Cancer Toxicity Data

Pathway: Ingestion, Dermal									
Contaminant of Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Dermal RfD	Dermal RfD Units	Primary Target Organ	Combined Uncertainty/ Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ
Benzene	chronic	4.00E-03	mg/kg-day	4.00E-03	mg/kg-day	blood system	300	IRIS	Apr-03
Ethylbenzene	chronic	1.00E-01	mg/kg-day	1.00E-01	mg/kg-day	liver	1000	IRIS	Jun-91
Methylene chloride	chronic	6.00E-03	mg/kg-day	6.00E-03	mg/kg-day	liver	30	IRIS	Nov-11
Tetrachloroethene	chronic	6.00E-03	mg/kg-day	6.00E-03	mg/kg-day	central nervous system	1000	IRIS	Feb-12
Toluene	chronic	8.00E-02	mg/kg-day	8.00E-02	mg/kg-day	kidney	3000	IRIS	Sep-05
Xylenes (total)	chronic	2.00E-01	mg/kg-day	2.00E-01	mg/kg-day	body weight	1000	IRIS	Feb-03
Benzo(a)anthracene	-	-	-	-	-	-	-	-	-
Benzo(a)pyrene	-	-	-	-	-	-	-	-	-
Benzo(b)fluoranthene	-	-	-	-	-	-	-	-	-
Bis(2-Ethylhexyl)phthalate	chronic	2.00E-02	mg/kg-day	2.00E-02	mg/kg-day	liver	1000	IRIS	May-91
Dibenz(a,h)anthracene	-	-	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	-	-	-	-	-	-	-	-	-
Pentachlorophenol	chronic	5.00E-03	mg/kg-day	5.00E-03	mg/kg-day	liver	300	IRIS	Sep-10
Phenanthrene	-	-	-	-	-	-	-	-	-
Aluminum	chronic	1.00E+00	mg/kg-day	1.00E+00	mg/kg-day	-	-	RSL	Apr-12
Antimony	chronic	4.00E-04	mg/kg-day	6.00E-05	mg/kg-day	mortality	1000	IRIS	Feb-91
Arsenic	chronic	3.00E-04	mg/kg-day	3.00E-04	mg/kg-day	skin	3	IRIS	Feb-93
Cadmium	chronic	5.00E-04	mg/kg-day	2.50E-05	mg/kg-day	kidney	10	IRIS	Feb-94
Chromium III	chronic	1.50E+00	mg/kg-day	1.95E-02	mg/kg-day	no effects	1000	IRIS	Sep-98
Chromium VI	chronic	3.00E-03	mg/kg-day	7.50E-05	mg/kg-day	no effects	900	IRIS	Sep-98
Cobalt	chronic	3.00E-04	mg/kg-day	3.00E-04	mg/kg-day	-	-	RSL	Apr-12
Copper	chronic	4.00E-02	mg/kg-day	4.00E-02	mg/kg-day	gastrointestinal system	-	RSL	Apr-12
Iron	chronic	7.00E-01	mg/kg-day	7.00E-01	mg/kg-day	-	-	RSL	Apr-12
Lead	-	-	-	-	-	-	-	-	-
Manganese	chronic	2.40E-02	mg/kg-day	9.60E-04	mg/kg-day	central nervous system	3	IRIS	May-96
Mercury	chronic	1.60E-04	mg/kg-day	1.60E-04	mg/kg-day	-	-	RSL	Apr-12
Selenium	chronic	5.00E-03	mg/kg-day	5.00E-03	mg/kg-day	clinical selenosis	3	IRIS	Sep-91
Thallium	chronic	1.00E-05	mg/kg-day	2.60E-07	mg/kg-day	alopecia	3000	IRIS	Sep-09
Vanadium	chronic	5.00E-03	mg/kg-day	1.30E-04	mg/kg-day	-	-	RSL	Apr-12
Zinc	chronic	3.00E-01	mg/kg-day	3.00E-01	mg/kg-day	blood system	3	IRIS	Aug-05
Total PCBs	chronic	2.00E-05	mg/kg-day	2.00E-05	mg/kg-day	immune system	300	IRIS	Nov-96

Table 6: Summary of Non-Cancer Toxicity Data

Pathway: Inhalation							
Contaminant of Concern	Chronic/ Subchronic	Inhalation RfC	Inhalation RfC Units	Primary Target Organ	Combined Uncertainty/ Modifying Factors	Sources of RfC: RfD: Target Organ	Dates
Benzene	chronic	3.00E-02	mg/kg-day	blood system	300	IRIS	Apr-03
Ethylbenzene	chronic	1.00E+00	mg/kg-day	liver	300	IRIS	Mar-91
Methylene chloride	chronic	6.00E-01	mg/kg-day	liver	30	IRIS	Nov-11
Tetrachloroethene	chronic	4.00E-02	mg/kg-day	central nervous syst	1000	IRIS	Feb-12
Toluene	chronic	5.00E+00	mg/kg-day	kidney	10	IRIS	Sep-05
Xylenes (total)	chronic	1.00E-01	mg/kg-day	body weight	300	IRIS	Feb-03
Benzo(a)anthracene	-	-	-	-	-	-	-
Benzo(a)pyrene	-	-	-	-	-	-	-
Benzo(b)fluoranthene	-	-	-	-	-	-	-
Bis(2-Ethylhexyl)phthalate	-	-	-	-	-	-	-
Dibenz(a,h)anthracene	-	-	-	-	-	-	-
Indeno(1,2,3-cd)pyrene	-	-	-	-	-	-	-
Pentachlorophenol	-	-	-	-	-	-	-
Phenanthrene	-	-	-	-	-	-	-
Aluminum	chronic	5.00E-03	mg/kg-day	-	-	RSL	Apr-12
Antimony	chronic	-	mg/kg-day	mortality	1000	IRIS	Feb-91
Arsenic	chronic	1.50E-05	mg/kg-day	-	-	RSL	Apr-12
Cadmium	chronic	1.00E-05	mg/kg-day	-	-	RSL	Apr-12
Chromium III	chronic	-	-	-	-	-	-
Chromium VI	chronic	1.00E-04	mg/kg-day	respiratory system	300	IRIS	Sep-98
Cobalt	chronic	6.00E-06	mg/kg-day	-	-	RSL	Apr-12
Copper	-	-	-	-	-	-	-
Iron	-	-	-	-	-	-	-
Lead	-	-	-	-	-	-	-
Manganese	chronic	5.00E-05	mg/kg-day	central nervous syst	1000	IRIS	Dec-95
Mercury	chronic	3.00E-04	mg/kg-day	central nervous syst	30	IRIS	Jun-95
Selenium	chronic	2.00E-02	mg/kg-day	-	-	RSL	Apr-12
Thallium	-	-	-	-	-	-	-
Vanadium	-	-	-	-	-	-	-
Zinc	-	-	-	-	-	-	-
Total PCBs	-	-	-	-	-	-	-

Key

IRIS = United States Environmental Protection Agency Integrated Risk Information System (<http://www.epa.gov/iris/ncea/iris/index.cfm?fuseaction=iris.showSubstanceList>).

NA = Not Applicable

—, No information available

Regional Screening Level Summary Table (RSL), April 2012

Table 7: Adult Lead Model Results

Redevelopment Area	Exposure Media	95th percentile for fetal blood lead (µg/dL)				>10 µg/dL
		Future Commercial Worker		Future Utility Worker	Future Construction Worker	
		Undisturbed Surface Soil Exposure Scenario	Disturbed Soil Exposure Scenario			
Residential Area 1	Groundwater	NC	NC	2.4	2.4	No
Residential Area 2	Groundwater	NC	NC	2.4	2.4	No
Residential Area 3	Groundwater	NC	NC	2.4	2.4	No
Residential Area 4	Soil and Groundwater	3.0	3.8	2.4	7.3	No
Mixed Residential/Commercial Area 2	Soil and Groundwater	3.2	3.0	2.4	4.6	No
Commercial Area 1	Groundwater	NC	NC	2.4	2.4	No
Commercial Area 2	Soil and Groundwater	NC	2.8	2.4	3.9	No

Notes:

NC=Not Calculated

TABLE 8:

REFINEMENT OF CONSTITUENTS OF POTENTIAL ECOLOGICAL CONCERN - AVIAN WILDLIFE
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

Constituent	Units	Refinement Benchmark	No. Samples	No. Detects	Minimum Detected	Maximum Detected	95% UCL	RQ _{UCL}	Retain as COPEC	Rationale
Volatile Organic Compounds (VOCs)										
Acetone	µg/kg	n/a	3	3	310	5,500	n/c	---	Yes	No RB
Isopropylbenzene	µg/kg	n/a	24	3	50	660	150	---	Yes	No RB
BTEX										
Benzene	µg/kg	n/a	24	7	5.6	1,300	167		Yes	No RB
Toluene	µg/kg	n/a	24	10	16	22,000	2,661		Yes	No RB
Xylenes (Total)	µg/kg	na	24	10	27	18,400	2,343		Yes	No RB
Semi-Volatile Organic Compounds (SVOCs)										
Carbazole	µg/kg	n/a	23	3	40	83	83	---	Yes	No RB
Polycyclic Aromatic Hydrocarbons (PAHs)										
High Molecular Weight PAHs	µg/kg	600	30	22	82.1	26,500	13,920	23	Yes	RQ _{UCL} > 1
Polychlorinated Biphenyls (PCBs)										
Total PCBs	µg/kg	655	23	20	10	400	187	0.29	No	RQ _{UCL} < 1
Inorganic Constituents										
Antimony	mg/kg	1.3	24	8	0.30	3.1	0.944	0.73	No	RQ _{UCL} < 1
Arsenic	mg/kg	43	30	29	3.3	21.6	11.0	0.25	No	RQ _{UCL} < 1
Barium	mg/kg	283	24	24	17.2	500	171	0.60	No	RQ _{UCL} < 1
Cadmium	mg/kg	0.90	30	15	0.27	3.9	0.948	1.1	No	RQ _{UCL} < 1
Chromium	mg/kg	26	30	30	5.5	40	16.7	0.64	No	RQ _{UCL} < 1
Copper	mg/kg	28	30	29	3.8	308	143	5.1	Yes	RQ _{UCL} > 1
Lead	mg/kg	11	30	30	4.0	990	181	16	Yes	RQ _{UCL} > 1
Manganese	mg/kg	4,300	24	24	127	698	468	0.11	No	RQ _{UCL} < 1
Mercury	mg/kg	0.00051	30	24	0.049	5.6	1.53	2,990	Yes	RQ _{UCL} > 1
Selenium	mg/kg	1.2	30	19	0.30	1.8	0.744	0.62	No	RQ _{UCL} < 1
Vanadium	mg/kg	44	24	24	8.0	28	18.2	0.41	No	RQ _{UCL} < 1
Zinc	mg/kg	46	30	27	18	764	333	7.2	Yes	RQ _{UCL} > 1
Cyanide (Total)	mg/kg	11	6	6	0.50	1.8	1.47	0.13	Yes	RQ _{UCL} < 1

Notes :

COPEC - Constituent of Potential Ecological Concern

RB - Refinement Benchmark

RQ_{UCL} - Refinement quotient based on the 95% upper confidence limit

UCL - Upper Confidence Limit

µg/kg- micrograms per kilogram

mg/kg- milligrams per kilogram

TABLE 9:

REFINEMENT OF CONSTITUENTS OF POTENTIAL ECOLOGICAL CONCERN - MAMMALIAN WILDLIFE
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

Constituent	Units	Refinement Benchmark	No. Samples	No. Detects	Minimum Detected	Maximum Detected	95% UCL	RQ _{UCL}	Retain as COPEC	Rationale
<i>Volatile Organic Compounds (VOCs)</i>										
Acetone	µg/kg	2,500	3	3	310	5,500	n/c	2.2	Yes	RQ _{UCL} > 1
Isopropylbenzene	µg/kg	n/a	24	3	50	660	150	---	Yes	No RB
<i>BTEX</i>										
Benzene	µg/kg	255	24	7	5.6	1,300	167	0.65	No	RQ _{UCL} < 1
Toluene	µg/kg	5,450	24	10	16	22,000	2,661	0.49	No	RQ _{UCL} < 1
Xylene (Total)	µg/kg	na	24	10	27	18,400	2,343	---	Yes	No RB
<i>Semi-Volatile Organic Compounds (SVOCs)</i>										
Carbazole	µg/kg	n/a	23	3	40	83	83	---	Yes	No RB
<i>Polycyclic Aromatic Hydrocarbons (PAHs)</i>										
High Molecular Weight PAHs	µg/kg	1,100	30	22	82.1	26,500	13,920	13	Yes	RQ _{UCL} > 1
<i>Polychlorinated Biphenyls (PCBs)</i>										
Total PCBs	µg/kg	1,300	23	20	10	400	187	0.14	No	RQ _{UCL} < 1
<i>Inorganic Constituents</i>										
Antimony	mg/kg	1.3	24	8	0.30	3.1	0.944	0.73	No	RQ _{UCL} < 1
Arsenic	mg/kg	46	30	29	3.3	21.6	11.0	0.24	No	RQ _{UCL} < 1
Barium	mg/kg	2,000	24	24	17.2	500	171	0.085	No	RQ _{UCL} < 1
Cadmium	mg/kg	0.90	30	15	0.27	3.9	0.948	1.1	No	RQ _{UCL} < 1
Chromium	mg/kg	34	30	30	5.5	40	16.7	0.49	No	RQ _{UCL} < 1
Copper	mg/kg	49	30	29	3.8	308	143	2.9	Yes	RQ _{UCL} > 1
Lead	mg/kg	56	30	30	4.0	990	181	3.2	Yes	RQ _{UCL} > 1
Manganese	mg/kg	4,000	24	24	127	698	468	0.12	No	RQ _{UCL} < 1
Mercury	mg/kg	0.146	30	24	0.049	5.6	1.53	10	Yes	RQ _{UCL} > 1
Selenium	mg/kg	0.63	30	19	0.30	1.8	0.744	1.2	Yes	RQ _{UCL} > 1
Vanadium	mg/kg	280	24	24	8.0	28	18.2	0.065	No	RQ _{UCL} < 1
Zinc	mg/kg	79	30	27	18	764	333	4.2	Yes	RQ _{UCL} > 1
Cyanide (Total)	mg/kg	1.33	6	6	0.50	1.8	1.47	1.1	Yes	RQ _{UCL} > 1

Notes:

COPEC - Constituent of potential ecological concern

RB - Refinement Benchmark

RQ_{UCL} - Refinement quotient based on the 95% upper confidence limit

UCL - Upper Confidence Limit

µg/kg- micrograms per kilogram

mg/kg- milligrams per kilogram

TABLE 10:
ECOLOGICAL ASSESSMENT AND MEASUREMENT ENDPOINTS
FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

<i>Exposure Route</i>	<i>Assessment Endpoint</i>	<i>Measurement Endpoint</i>
Direct Contact Ingestion/Uptake Adsorption	Species richness and productivity of terrestrial plant and soil invertebrate communities	Maximum detected concentration of constituents in soil compared to Ecological Screening Values
Food Web Transfer (Ingestion and Absorption)	Relative and absolute densities of avian and mammalian insectivores, herbivores, omnivores, and carnivores	Maximum detected concentration of constituents in soil compared to Ecological Screening Values

Table 11: Comparison of Major Remedy Components of the Alternatives

Remedy Component	Alternatives								
	<u>1</u>	<u>2A</u>	<u>2B</u>	<u>2C</u>	<u>2D</u>	<u>3A</u>	<u>3B</u>	<u>3C</u>	<u>3D</u>
No-Action	✓								
Excavation		✓	✓	✓	✓	✓	✓	✓	✓
Off-Site Disposal		✓	✓	✓	✓	✓	✓	✓	✓
On-Site Consolidation		✓	✓	✓	✓				
Institutional Controls		✓	✓	✓	✓		✓	✓	✓
Engineering Controls		✓	✓	✓	✓		✓	✓	✓
Future Land Use		Residential	Residential Non-Residential	Residential Non-Residential	Residential Non-Residential	Residential	Residential Non-Residential	Residential Non-Residential	Residential Non-Residential
Arsenic CL									
Residential		7.6 mg/kg (Part 201)	7.6 mg/kg (Part 201)	6.4 mg/kg (risk-based)	5.8 mg/kg (SDBL)	7.6 mg/kg (Part 201)	7.6 mg/kg (Part 201)	6.4 mg/kg (risk-based)	5.8 mg/kg (SDBL)
Non-Residential		7.6 mg/kg (Part 201)	37 mg/kg (Part 201)	27 mg/kg (risk-based)	5.8 mg/kg (SDBL)	7.6 mg/kg (Part 201)	37 mg/kg (Part 201)	27 mg/kg (risk-based)	5.8 mg/kg (SDBL)
PCB CL									
Residential		1 mg/kg (TSCA)	2.5 mg/kg (risk-based)	2.5 mg/kg (risk-based)	1 mg/kg (TSCA)	1 mg/kg (TSCA)	2.5 mg/kg (risk-based)	2.5 mg/kg (risk-based)	1 mg/kg (TSCA)
Non-Residential		1 mg/kg (TSCA)	9.1 mg/kg (risk-based)	9.1 mg/kg (risk-based)	10 mg/kg (TSCA)	1 mg/kg (TSCA)	9.1 mg/kg (risk-based)	9.1 mg/kg (risk-based)	10 mg/kg (TSCA)
Cost	\$0	Not Calculated	\$4,462,820	\$4,998,195	Not Calculated	\$9,424,482	\$4,363,857	\$4,875,232	\$7,477,202

Note: Alternatives 2A and 2D have no suitable area for consolidation and capping of soils (i.e., there would be no designated non-residential/commercial portion of OU7). Because of this, Alternatives 2A and 2D do not meet the general intent of the Alternative 2 Series (i.e., on-site consolidation) and were not carried through the ROD. For Alternative 3D, the Waterfront Plaza is cleaning up to residential criteria for PCBs.

(Part 201) means Michigan Part 201 Generic Residential Cleanup Criteria
 (risk-based) means site-specific risk-based concentration corresponding to 10⁻⁵ risk level
 (TSCA) means the self-implementing PCB standards at 40 CFR 761.61(a)
 (SDBL) means the Statewide Default Background Level

TABLE 12

SUMMARY OF POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
 FEASIBILITY STUDY REPORT
 FORMER PLAINWELL, INC. MILL PROPERTY
 PLAINWELL, MICHIGAN

Regulation	Citation	Description	ARAR/TBC	Comments
FEDERAL				
Toxic Substances Control Act	40 CFR 761	Establishes storage, treatment and disposal requirements for PCB remediation wastes and for non-porous and porous surfaces contaminated with PCBs. Determines PCB cleanup level for soil using self-implementing, performance-based, or risk-based criteria; cleanup levels based on future land use.	ARAR ARAR	Sampling and disposal requirements may be applicable to investigation-derived waste (IDW) and/or equipment evaluated PCB cleanup levels for PCB remediation waste may be applicable 40 CFR 761.61(a)(8) requires deed restrictions requiring maintenance of caps for high occupancy areas with remaining contamination between 1-10 mg/kg. 40 CFR 761.61(a)(7) includes the cap requirements for high occupancy areas with contamination remaining between 1-10 mg/kg.
Clean Air Act	40 CFR 50 and 52	Establishes requirements for constituent emission rates in accordance with National Ambient Air Quality Standards.	ARAR	May be considered for remedial alternatives that include relocation of materials. State criteria may also apply.
	42 U.S.C. 7401 et seq.	Provides guidelines with respect to minimizing the harmful effects of fugitive dust and airborne contaminants that result from excavation, construction, and other removal activities. Establishes primary and secondary ambient air quality standards for emissions of chemicals and particulate matter.	ARAR	May be considered for remedial alternatives that include excavation/removal of residual/soil.
U.S. DOT Placarding and Handling	40 CFR 264.227 49 CFR 171	Transportation and handling requirements for materials containing PCBs with concentrations of 20 mg/kg or more.	ARAR	Applicable for the MW-16 area.
National Historic Preservation Act	16 USC 470, as amended	Establishes a program for the preservation of historical and archaeological sites. Created the National Register of Historic Places, list of National Historic Landmarks, and State Historic Preservation Offices.	ARAR	The Michigan Paper Company Historic District was listed in the National Register of Historic Places on September 8, 2011. Portions of the Site buildings have been designated as historical structures.
STATE				
Michigan Act 451, Part 201 - Environmental Remediation and Rules Promulgated Thereunder	MCL 324.20118(2) MCL 324.20120a MAC 299.5705	Requires that a remedial action shall provide for response activity that will satisfy cleanup criteria.	ARAR	The remedial action implemented must meet generic or Site-specific cleanup criteria.
	MCL 324.20120a MAC 299.5708	If the target detection limit or background concentration is greater than the risk-based cleanup criteria, the target detection limit or background concentration shall be used instead of the risk-based cleanup criterion.	ARAR	Applicable to all environmental media and may be used to gauge the success of the remedial action.
	MCL 324.2017a MCL 324.20114	Requirements for owner of a facility, such as preventing exacerbation and exercising due care.	ARAR	Applicable if materials are consolidated on-Site or if there is a release of materials above the PRGs from the Site.

TABLE 12

SUMMARY OF POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
 FEASIBILITY STUDY REPORT
 FORMER PLAINWELL, INC. MILL PROPERTY
 PLAINWELL, MICHIGAN

Regulation	Citation	Description	ARAR/TBC	Comments
STATE (CONTINUED)				
Michigan Act 451, Part 201 - Environmental Remediation and Rules Promulgated Thereunder	MCL 324.20120c	Requirements for relocation of excavated soil	ARAR	Application for consolidation alternative - Due to the presence of COCs above the Part 201 Residential Cleanup Criteria, property cannot be transferred without notification of land use restrictions that apply to the Site. All actions leaving COCs in place or cleanup that does not achieve unrestricted/residential use must include deed restrictions on activities that may interfere with the integrity of the remedial action and on activities that may result in unacceptable exposure.
	MCL 324.20116	Restrictions on transfer of real property designated as a facility. Requirement that if residential criteria are not met, land use restrictions must be provided. Actions required upon approval of remedial action plans.	ARAR	
	MCL 324.20120a(16)			
	MCL 324.20120b			
	MAC 299.5524			
	MCL 324.20118, et al. MAC 299.5532(11)	Required elements of remedial action plans (remedial design documents).	ARAR	Primary requirements can be met in remedial design documents by including plans identifying points of compliance for evaluating the effectiveness of the remedial action.
	MCL 324.20120c	Required action if contaminated soil is moved off-Site or relocated within the site.	ARAR	Material disposed off Site must be properly characterized to determine if it is subject to the requirements of Part 111 (Hazardous Waste Management). Required approval for soil relocation can be attained through MDEQ approval of a Remedial Design.
	MAC 299.5520	Objectives of response activities, determination (or nullification) that a response activity is complete. Part 201 requires evaluation of the cumulative risk and the cumulative risk may not exceed a carcinogenic risk of 10 ⁻⁵ or a hazard index of 1.	ARAR	Upon completion of remedial actions, the PRP is required to demonstrate all requirements are achieved. The cumulative risk at each site area may not exceed a carcinogenic risk of 10 ⁻⁵ or a hazard index of 1.
	MAC 299.51003-51005		ARAR	
	MCL 324.20120a(4)		ARAR	
	MCL 324.20120b		ARAR	
	MAC 299.5522	Liable parties must provide notice to the department and adjacent land owners in certain situations, such as if hazardous substances emanate beyond the property boundary.	ARAR	Applicable if there is a release (above criteria) from the Site or if Generic Residential Cleanup Criteria are exceeded and contamination is believed to be migrating off-Site.
	MAC 299.51017			
Michigan Act 451, Part 111 - Hazardous Waste Management and Rules Promulgated Thereunder	MCL 324.11101-11153 MAC 299.9101 -11107	Establishes requirements for hazardous waste generators, transporters, and treatment/storage/disposal facilities.	ARAR	Used for the characterization and identification of hazardous waste, and identification of appropriate treatment and disposal.
Michigan Act 451, Part 31 - Water Resources Protection and Rules Promulgated Thereunder	MCL 324.3109b	States that remedial actions that satisfy Part 201 satisfy this section.	ARAR	Applicable to remedial alternatives where Part 31 requirements are met.
Michigan Act 451, Part 91 - Soil Erosion and Sedimentation Control	MCL 324.9112 MCL 324.9116 MAC 323.1701-1714	Requirements for owners of land undergoing an earth change. Establishes rules prescribing soil erosion and sedimentation control plans, procedures, and measures.	ARAR	For any remedial action involving an earth change, liable parties must implement and maintain soil erosion and sedimentation control measures. Substantive requirements of permit must be satisfied.

TABLE 12

SUMMARY OF POTENTIAL APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)
 FEASIBILITY STUDY REPORT
 FORMER PLAINWELL, INC. MILL PROPERTY
 PLAINWELL, MICHIGAN

Regulation	Citation	Description	ARAR/TBC	Comments
STATE (CONTINUED)				
Michigan Act 451, Part 55 - Air Pollution Control and Rules Promulgated Thereunder	MAC 336.1101-2706	Establishes rules prohibiting the emission of air contaminants in quantities which cause injurious effects to human health, animal life, plant life or significant economic value, and/or property.	ARAR	Applicable for remedial alternatives that would generate air emissions (e.g., dust during excavation, soil stabilization, or compaction). For certain remedial alternatives, air emissions must comply with substantive requirements of permits and monitoring would be required.
Michigan Public Act 300 of 1949, as amended. Michigan Vehicle Code	MCL 257.716, 257.722, et seq MAC 257.101, et seq	Rules governing the reduction of maximum axle loads during springtime frost periods.	ARAR	Remedial action and construction may require heavy loads of equipment, fill dirt, PCB- containing media, etc. to be transported over roadways; however, this is not allowed during frost periods.
Michigan Public Act 306 of 1969, as amended - Well Construction Code	MCL 24.233, 24.263, and 333.12714	Establishes rules for well installation and abandonment.	ARAR	Applicable to wells that are abandoned or wells that may be installed as part of groundwater monitoring activities.
Michigan Act 451, Part 115 - Solid Waste Management and Rules Promulgated Thereunder	MCL 324.11501-11504	Establishes rules for methods of solid waste disposal and for design/operational standards for disposal areas.	ARAR	May apply for on-Site remedial actions that rely on solid waste to remain on-Site.
	MCL 324.11507	Landfill location restrictions and liner design standards.	ARAR	Not applicable because the Site is not a new disposal area. However, location restrictions and liner design standards may be considered for alternatives that include on-Site consolidation.
	MCL 324.11540			
	MAC 299.4101-4106a	Water quality performance standards.	ARAR	The cap design must ensure that all requirements for the protection of surface and groundwater under Part 31 (and rules) are met. A design that keeps the final cover from being inundated is capable of limiting erosion and infiltration to the extent necessary to protect human health and the environment.
	MAC 299.4301 (3)(d)			
	MAC 299.4305			
	MAC 299.4307	Requirements for natural soil barriers.	ARAR	Natural soil barriers (or augments) may be evaluated by the specifications in this rule to help determine if the barriers are adequate to prevent lateral flow of groundwater into and out of the waste.
MAC 299.4308				
MAC 299.4306				
MAC 299.4912				
MAC 299.4913	Requirements for final cover materials.	ARAR	Covers must meet the specifications in the rules.	
MAC 299.4915				
MAC 299.4916-4921	Construction Quality Control Program	ARAR	Substantive portions of construction quality control must be met in Remedial Design and Remedial Action.	

Table 13: List of Michigan Part 201 Generic Cleanup Criteria⁽¹⁾ For COCs in Soil

	Units	<u>Groundwater Protection</u>				<u>Indoor Air</u>		<u>Ambient Air</u>	
		Statewide Default Background Level	Residential Drinking Water Protection	Nonresidential Drinking Water Protection	Groundwater Surface Water Interface Protection ⁽²⁾	Residential Soil Volatilization to Indoor Air Inhalation	Nonresidential Soil Volatilization to Indoor Air Inhalation	Residential Infinite Source Volatile Soil Inhalation	Nonresidential Infinite Source Volatile Soil Inhalation
Volatile Organic Compounds (VOCs)									
Benzene	mg/kg	-	0.1	0.1	4	1.6	8.4	13	45
Ethylbenzene	mg/kg	-	1.5	1.5	0.36	87	460	720	2400
Methylene chloride	mg/kg	-	0.1	0.1	30	45	240	210	700
Tetrachloroethene	mg/kg	-	0.1	0.1	1.2	11	21	170	210
Toluene	mg/kg	-	16	16	5.4	330	610	2800	3300
1,1,1-Trichloroethane	mg/kg	-	4	4	1.8	250	460	3800	4500
Trichloroethene	mg/kg	-	0.1	0.1	4	1.0	1.9	11	14
1,2,4-Trimethylbenzene	mg/kg	-	2,100	2100	570	4300000	8000000	21000000	25000000
Xylenes (total)	mg/kg	-	5.6	5.6	0.82	6300	12000	46000	54000
Semi-Volatile Organic Compounds (SVOCs)									
Benzo(a)anthracene	mg/kg	-	NLL	NLL	NLL	NLV	NLV	NLV	NLV
Benzo(a)pyrene	mg/kg	-	NLL	NLL	NLL	NLV	NLV	NLV	NLV
Benzo(b)fluoranthene	mg/kg	-	NLL	NLL	NLL	ID	ID	ID	ID
Carbazole	mg/kg	-	9.4	39	1.1	NLV	NLV	NLV	NLV
4-Chloro-3-methylphenol	mg/kg	-	5.8	16	0.28	NLV	NLV	NLV	NLV
Dibenz(a,h)anthracene	mg/kg	-	NLL	NLL	NLL	NLV	NLV	NLV	NLV
Dibenzofuran	mg/kg	-	ID	ID	1.7	2000	3600	130	160
Fluoranthene	mg/kg	-	730	730	5.5	1000000	1000000	740000	890000
Fluorene	mg/kg	-	390	890	5.3	580000	1000000	130000	150000
Indeno(1,2,3-cd)pyrene	mg/kg	-	NLL	NLL	NLL	NLV	NLV	NLV	NLV
2-Methylnaphthalene	mg/kg	-	57	170	4.2	2700	4900	1500	1800
4-Methylphenol	mg/kg	-	7.4	20	1	NLV	NLV	NLV	NLV
Naphthalene	mg/kg	-	35	100	0.73	250	470	300	350
Pentachlorophenol	mg/kg	-	0.022	0.022	26.5	NLV	NLV	NLV	NLV
Phenanthrene	mg/kg	-	56	160	2.1	2800	5100	160	190
2,4,6-Trichlorophenol	mg/kg	-	2.4	9.4	0.33	NLV	NLV	NLV	NLV
Polychlorinated Biphenyls (PCBs)⁽³⁾									
Total PCBs	mg/kg	-	NLL	NLL	NLL	3000	16000	240	810

Table 13: List of Michigan Part 201 Generic Cleanup Criteria⁽¹⁾ For COCs in Soil

		<u>Groundwater Protection</u>			<u>Indoor Air</u>		<u>Ambient Air</u>		
		Statewide Default Background Level	Residential Drinking Water Protection	Nonresidential Drinking Water Protection	Groundwater Surface Water Interface Protection ⁽⁴⁾	Residential Soil Volatilization to Indoor Air Inhalation	Nonresidential Soil Volatilization to Indoor Air Inhalation	Residential Infinite Source Volatile Soil Inhalation	Nonresidential Infinite Source Volatile Soil Inhalation
Units									
Metals									
Aluminum	mg/kg	6900	1	1	-	NLV	NLV	NLV	NLV
Antimony	mg/kg	-	4.3	4.3	94	NLV	NLV	NLV	NLV
Arsenic	mg/kg	5.8	4.6	4.6	4.6	NLV	NLV	NLV	NLV
Barium	mg/kg	75	1300	1300	950	NLV	NLV	NLV	NLV
Cadmium	mg/kg	1.2	6	6	6.15	NLV	NLV	NLV	NLV
Chromium	mg/kg	18	1000000	1000000	3.3	NLV	NLV	NLV	NLV
Cobalt	mg/kg	6.8	0.8	2	2	NLV	NLV	NLV	NLV
Copper	mg/kg	32	5800	5800	135	NLV	NLV	NLV	NLV
Iron	mg/kg	12000	6	6	-	NLV	NLV	NLV	NLV
Lead	mg/kg	21	700	700	8780	NLV	NLV	NLV	NLV
Magnesium	mg/kg	-	8000	22000	-	NLV	NLV	NLV	NLV
Manganese	mg/kg	440	1	1	105	NLV	NLV	NLV	NLV
Mercury	mg/kg	0.13	1.7	1.7	0.05	48	89	52	62
Selenium	mg/kg	0.41	4	4	0.4	NLV	NLV	NLV	NLV
Silver	mg/kg	1	4.5	13	0.1	NLV	NLV	NLV	NLV
Sodium	mg/kg	-	4600	7000	-	NLV	NLV	NLV	NLV
Thallium	mg/kg	-	2.3	2.3	4.2	NLV	NLV	NLV	NLV
Vanadium	mg/kg	-	72	990	430	NLV	NLV	NLV	NLV
Zinc	mg/kg	47	2400	5000	303	NLV	NLV	NLV	NLV
General Chemistry									
Cyanide (total)	%	0.39	4	4	0.1	NLV	NLV	NLV	NLV
Cyanide (total)	mg/kg	0.39	4	4	0.1	NLV	NLV	NLV	NLV
Nitrate (as N)	mg/kg	-	200	200	ID	NLV	NLV	NLV	NLV
Phosphorus	mg/kg	-	1300	4800	EE	NLV	NLV	NLV	NLV

Notes:

-- No criterion promulgated under Part 201

NLV - Hazardous substance is not likely to volatilize under most conditions.

ID - Insufficient data to develop criterion

NLL - Hazardous substance is not likely to leach under most soil conditions.

mg/kg - milligrams per kilogram

⁽¹⁾ MDEQ (Michigan) Generic soil cleanup criteria for residential and nonresidential category, administrative rule R 299.48 effective

⁽²⁾ Carbonate Hardness of 307 mg/L and pH of 7.97 were used to calculate site-specific GSI Protection Criteria, as applicable.

⁽³⁾ Footnote T, Footnotes for Generic Cleanup Criteria Tables, administrative rule R 299.49, effective December 30, 2013, refers the reader to TSCA for the determination of the applicability of TSCA, which is incorporated by reference into the Part 201 rules. Footnote T provides for alternatives to compliance with the TSCA requirements if TSCA cleanup levels are not applicable.

See Table 2:3 for TSCA cleanup levels.

Table 13: List of Michigan Part 201 Generic Cleanup Criteria⁽¹⁾ For COCs in Soil

	Units	<u>Ambient Air</u>				<u>Contact</u>		<u>Csgt</u>		
		Residential Finite VSIC for 5 Meter Source Thickness	Nonresidential Finite VSIC for 5 Meter Source Thickness	Residential Finite VSIC for 2 Meter Source Thickness	Nonresidential Finite VSIC for 2 Meter Source Thickness	Residential Particulate Soil Inhalation	Nonresidential Particulate Soil Inhalation	Residential Direct Contact	Nonresidential Direct Contact	Soil Saturation Concentration Screening Levels
Volatile Organic Compounds (VOCs)										
Benzene	mg/kg	34	99	79	230	380000	470000	180	840	400
Ethylbenzene	mg/kg	1000	3100	2200	6500	10000000	13000000	22000	71000	140
Methylene chloride	mg/kg	590	1700	1400	4000	6600000	8300000	1300	5800	2300
Tetrachloroethene	mg/kg	480	490	1100	1100	2700000	1200000	200	930	88
Toluene	mg/kg	5100	36000	12000	36000	27000000	12000000	50000	160000	250
1,1,1-Trichloroethane	mg/kg	12000	15000	28000	31000	67000000	29000000	500000	1000000	460
Trichloroethene	mg/kg	25	25	57	58	130000	59000	110	660	500
1,2,4-Trimethylbenzene	mg/kg	500000000	600000000	500000000	600000000	82000000000	36000000000	32000000	100000000	110000
Xylenes (total)	mg/kg	61000	65000	130000	130000	290000000	130000000	410000	1000000	150
Semi-Volatile Organic Compounds (SVOCs)										
Benzo(a)anthracene	mg/kg	NLV	NLV	NLV	NLV	ID	ID	20	80	-
Benzo(a)pyrene	mg/kg	NLV	NLV	NLV	NLV	1500	1900	2	8	-
Benzo(b)fluoranthene	mg/kg	ID	ID	ID	ID	ID	ID	20	80	-
Carbazole	mg/kg	NLV	NLV	NLV	NLV	62000	78000	530	2400	-
4-Chloro-3-methylphenol	mg/kg	NLV	NLV	NLV	NLV	ID	ID	4500	15000	-
Dibenz(a,h)anthracene	mg/kg	NLV	NLV	NLV	NLV	ID	ID	2	8	-
Dibenzofuran	mg/kg	130	160	130	160	6700	2900	ID	ID	-
Fluoranthene	mg/kg	740000	880000	740000	880000	9300000	4100000	46000	130000	-
Fluorene	mg/kg	130000	150000	130000	150000	9300000	4100000	27000	87000	-
Indeno(1,2,3-cd)pyrene	mg/kg	NLV	NLV	NLV	NLV	ID	ID	20	80	-
2-Methylnaphthalene	mg/kg	1500	1800	1500	1800	670000	290000	8100	26000	-
4-Methylphenol	mg/kg	NLV	NLV	NLV	NLV	6700000	2900000	11000	36000	-
Naphthalene	mg/kg	300	350	300	350	200000	88000	16000	52000	-
Pentachlorophenol	mg/kg	NLV	NLV	NLV	NLV	100000	130000	90	320	-
Phenanthrene	mg/kg	160	190	160	190	6700	2900	1600	5200	-
2,4,6-Trichlorophenol	mg/kg	NLV	NLV	NLV	NLV	1000000	1300000	710	3300	-
Polychlorinated Biphenyls (PCBs)⁽³⁾										
Total PCBs	mg/kg	7900	28000	7900	28000	5200	6500	4	16	-

Table 13: List of Michigan Part 201 Generic Cleanup Criteria⁽¹⁾ For COCs in Soil

	Units	<u>Ambient Air</u>				<u>Contact</u>		<u>Csat</u>		
		Residential Finite VSIC for 5 Meter Source Thickness	Nonresidential Finite VSIC for 5 Meter Source Thickness	Residential Finite VSIC for 2 Meter Source Thickness	Nonresidential Finite VSIC for 2 Meter Source Thickness	Residential Particulate Soil Inhalation	Nonresidential Particulate Soil Inhalation	Residential Direct Contact	Nonresidential Direct Contact	Soil Saturation Concentration Screening Levels
Metals										
Aluminum	mg/kg	NLV	NLV	NLV	NLV	ID	ID	50000	370000	-
Antimony	mg/kg	NLV	NLV	NLV	NLV	13000	5900	180	670	-
Arsenic	mg/kg	NLV	NLV	NLV	NLV	720	910	7.6	37	-
Barium	mg/kg	NLV	NLV	NLV	NLV	330000	150000	37000	130000	-
Cadmium	mg/kg	NLV	NLV	NLV	NLV	1700	2200	550	2100	-
Chromium	mg/kg	NLV	NLV	NLV	NLV	330000	150000	790000	1000000	-
Cobalt	mg/kg	NLV	NLV	NLV	NLV	13000	5900	2600	9000	-
Copper	mg/kg	NLV	NLV	NLV	NLV	130000	59000	20000	73000	-
Iron	mg/kg	NLV	NLV	NLV	NLV	ID	ID	160000	580000	-
Lead	mg/kg	NLV	NLV	NLV	NLV	100000	44000	400	900	-
Magnesium	mg/kg	NLV	NLV	NLV	NLV	6700000	2900000	1000000	1000000	-
Manganese	mg/kg	NLV	NLV	NLV	NLV	3300	1500	25000	90000	-
Mercury	mg/kg	52	62	52	62	20000	8800	160	580	-
Selenium	mg/kg	NLV	NLV	NLV	NLV	130000	59000	2600	9600	-
Silver	mg/kg	NLV	NLV	NLV	NLV	6700	2900	2500	9000	-
Sodium	mg/kg	NLV	NLV	NLV	NLV	ID	ID	1000000	1000000	-
Thallium	mg/kg	NLV	NLV	NLV	NLV	13000	5900	35	130	-
Vanadium	mg/kg	NLV	NLV	NLV	NLV	ID	ID	750	5500	-
Zinc	mg/kg	NLV	NLV	NLV	NLV	ID	ID	170000	630000	-
General Chemistry										
Cyanide (total)	%	NLV	NLV	NLV	NLV	250	250	12	250	-
Cyanide (total)	mg/kg	NLV	NLV	NLV	NLV	250	250	12	250	-
Nitrate (as N)	mg/kg	NLV	NLV	NLV	NLV	ID	ID	ID	ID	-
Phosphorus	mg/kg	NLV	NLV	NLV	NLV	67000	29000	1000000	1000000	-

Notes:

-- No criterion promulgated under Part 201

NLV - Hazardous substance is not likely to volatilize under most conditions.

ID - Insufficient data to develop criterion

NLL - Hazardous substance is not likely to leach under most soil conditions.

mg/kg - milligrams per kilogram

⁽¹⁾ MDEQ (Michigan) Generic soil cleanup criteria for residential and nonresidential category, administrative rule R 299.48 effective

⁽²⁾ Carbonate Hardness of 307 mg/L and pH of 7.97 were used to calculate site-specific GSI Protection Criteria, as applicable.

⁽³⁾ Footnote T, Footnotes for Generic Cleanup Criteria Tables, administrative rule R 299.49, effective December 30, 2013, refers the reader to TSCA for the determination of the applicability of TSCA, which is incorporated by reference into the Part 201 rules. Footnote T provides for alternatives to compliance with the TSCA requirements if TSCA cleanup levels are not applicable.

See Table 2.3 for TSCA cleanup levels.

Table 14: Comparison of Cleanup Levels for Soil by Alternative for Each Redevelopment Area

Redevelopment Area	Land Use Designation	Soil Remedial Alternatives 2A and 3A	Soil Remedial Alternatives 2B and 3B	Soil Remedial Alternatives 2C and 3C	Soil Remedial Alternatives 2D and 3D
Residential Area 1, Residential Area 2, Residential Area 3, Residential Area 4, Mixed Residential/Commercial Area 1, Mixed Residential/Commercial Area 2	Residential ¹⁴	Part 201 Generic Residential Cleanup Criteria ^(1, 2, 3)	Part 201 Generic Residential Cleanup Criteria ^(1, 2, 3)	Part 201 Generic Residential Cleanup Criteria ^(1, 3, 7)	Part 201 Generic Residential Cleanup Criteria ^(1, 3, 7)
		1 mg/kg for PCBs ⁽⁴⁾	2.5 mg/kg for PCBs ⁽⁵⁾	2.5 mg/kg for PCBs ⁽⁵⁾	1 mg/kg for PCBs ^(4, 12)
				6.4 mg/kg for Arsenic ⁽⁶⁾	5.8 mg/kg for Arsenic ^(8, 9)
Waterfront Plaza	Non-Residential (Recreational)	Part 201 Generic Residential Cleanup Criteria ^(1, 2, 3)	Part 201 Generic Non-Residential Cleanup Criteria ^(1, 2, 3)	Part 201 Generic Non-Residential Cleanup Criteria ^(1, 3, 7)	Part 201 Generic Non-Residential Cleanup Criteria ^(1, 3, 7)
		1 mg/kg for PCBs ⁽⁴⁾	9.1 mg/kg for PCBs ⁽⁵⁾	9.1 mg/kg for PCBs ⁽⁵⁾	1 mg/kg for PCBs ⁽⁴⁾
				27 mg/kg for Arsenic ⁽⁶⁾	5.8 mg/kg for Arsenic ^(8, 9)
Commercial Area 1, Commercial Area 2, Commercial Area 3, Commercial Area 4	Non-Residential/Commercial	Part 201 Generic Residential Cleanup Criteria ^(1, 2, 3)	Part 201 Generic Non-Residential Cleanup Criteria ^(1, 2, 3)	Part 201 Generic Non-Residential Cleanup Criteria ^(1, 3, 7)	Part 201 Generic Non-Residential Cleanup Criteria ^(1, 3, 7)
		1 mg/kg for PCBs ⁽⁴⁾	9.1 mg/kg for PCBs ⁽¹⁰⁾	9.1 mg/kg for PCBs ⁽¹⁰⁾	10 mg/kg for PCBs ⁽¹³⁾
				27 mg/kg for Arsenic ⁽¹¹⁾	5.8 mg/kg for Arsenic ^(8, 9)

Notes:

⁽¹⁾ MDEQ (Michigan) Cleanup Criteria Requirements for Response Activity, Administrative Rules R299.1 to R299.50 effective December 30, 2013 pursuant to 1994 PA 451 as amended. Does not include comparison to Residential/Non-Residential Drinking Water Protection Criteria or Groundwater-Surface Water Interface Protection Criteria.

⁽²⁾ All parameters except PCBs.

⁽³⁾ List of specific CLs (except DWPC and GSIPC) presented in Table 13 for COCs.

⁽⁴⁾ TSCA Criterion for bulk PCB remediation waste in High Occupancy Areas without further conditions.

⁽⁵⁾ Residential Risk-Based Concentration for PCBs in soil with a Target Cancer Risk of 10^{-5}

⁽⁶⁾ Residential Risk-Based Concentration for arsenic in soil with a Target Cancer Risk of 10^{-5}

⁽⁷⁾ All parameters except PCBs and arsenic.

⁽⁸⁾ Residential Risk-Based Concentration for arsenic in soil with a Target Cancer Risk of 10^{-6}

⁽⁹⁾ State Default Background Level. The minimum calculated RBC is below background; therefore, the value was substituted with background.

⁽¹⁰⁾ Non-Residential/Commercial Risk-Based Concentration for PCBs in soil with a Target Cancer Risk of 10^{-5}

⁽¹¹⁾ Non-Residential/Commercial Risk-Based Concentration for arsenic in soil with a Target Cancer Risk of 10^{-5}

⁽¹²⁾ Residential Risk-Based Concentration for PCBs in soil with a Target Cancer Risk of 10^{-6} . The minimum calculated RBC is below the TSCA Criterion of 1 mg/kg for Bulk PCB Remediation Waste in High Occupancy Areas without further conditions (40 CFR 761.61(a)(4)(i)); therefore, the value was substituted with this value.

⁽¹³⁾ TSCA Criterion for bulk PCB remediation waste in High Occupancy Areas with further conditions.

⁽¹⁴⁾ For Mixed Residential/Commercial Area 1 and 2, the most stringent criteria of the Part 201 Residential and Non-residential Cleanup Criteria will be used. In most instances it will be the residential criteria, but for PSIC for some contaminants, it may be non-residential.

TABLE 15
SUMMARY OF ALTERNATIVES EVALUATION
 FEASIBILITY STUDY REPORT
 PLAINWELL, INC. MILL PROPERTY
 PLAINWELL, MICHIGAN

EVALUATION CRITERIA	Soil Alternative 1 - No Action	Soil Alternative 2B - Excavation, Consolidation, Capping, and Off-Site Disposal to Meet Part 201 Land Use and PCB Risk-Based Criteria	Soil Alternative 2C - Excavation, Consolidation, Capping, and Off-Site Disposal to Meet Land Use for Part 201, 10 ⁶ Risk Level for Arsenic, and PCB Risk-Based Criteria	Soil Alternative 3A - Excavation and Off-Site Disposal to Meet Part 201 Residential and TSCA Unrestricted High Occupancy Criteria	Soil Alternative 3B - Excavation and Off-Site Disposal to Meet Part 201 Land Use and PCB Risk-Based Criteria	Soil Alternative 3C - Excavation and Off-Site Disposal to Meet Land Use for Part 201, 10 ⁶ Risk Level for Arsenic, and PCB Risk-Based Criteria	Soil Alternative 3D - Excavation and Off-Site Disposal to Meet Land Use for Part 201, 10 ⁶ Risk Level for Arsenic, and TSCA High Occupancy Criteria
THRESHOLD CRITERIA							
Overall Protection of Human Health and the Environment							
Human Health Protection (i.e. direct contact, soil ingestion, etc.)	No reduction in risk	Reduction in impacted material on site through off-site disposal Cap reduces direct contact risk and soil ingestion risk	See Alternative 2B See Alternative 2B	Reduction in impacted material on site through off-site disposal	See Alternative 3A	See Alternative 3A	See Alternative 3A
		Institutional controls in the form of deed restrictions including drinking water restrictions and a restrictive covenant prohibiting gardens/other than raised bed gardens at the site.	See Alternative 2B	Institutional controls to restrict drinking water well installation / drinking water restrictions	See Alternative 2B	See Alternative 2B	See Alternative 2B
		Engineering controls in the form of specific existing concrete slabs utilized to prevent direct contact with impacted soils remaining under the slabs.	See Alternative 2B	Soils above direct contact criteria will not remain following remedial action	See Alternative 2B	See Alternative 2B	See Alternative 2B
Environmental Protection	No reduction in risk	Potential migration of impacted soil is mitigated through off-site disposal, and consolidation with capping	See Alternative 2B	Potential migration of impacted soils is mitigated through off-site disposal	See Alternative 3A	See Alternative 3A	See Alternative 3A
		Engineering controls, in the form of specific existing concrete slabs, utilized to prevent migration of impacted soils remaining under the slabs.	See Alternative 2B	Alternative does not include utilization of concrete slabs as engineering controls	See Alternative 2B	See Alternative 2B	See Alternative 2B
Compliance with ARARs							
Compliance with ARARs	Does not meet ARARs	Meet ARARs	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B
		Sampling and disposal requirements applicable to PCB impacted IDW	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B
		Deed restrictions related to PCB impacted soils will not be necessary	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	Requires deed restrictions for high occupancy areas with PCBs between 1 mg/ kg and 10 mg/kg that will remain in place with a cap over the soils.
		VOCs, SVOCs, metals and other inorganics to Part 201 Land Use Criteria, PCBs to risk-based level based on land use	VOCs, SVOCs, metals and other inorganics except arsenic to Part 201 Land Use Criteria; Arsenic to risk based criteria based on land use. PCBs to risk-based level based on land use.	VOCs, SVOCs, metals and other inorganics to Part 201 Residential Criteria; PCBs to high occupancy unrestricted use.	See Alternative 2B	See Alternative 2C	VOCs, SVOCs, metals and other inorganics except arsenic to Part 201 Land Use Criteria; Arsenic to Residential Direct Contact Criteria; PCBs to unrestricted use in Residential Areas and high occupancy with further restrictions in Commercial Areas.
		U.S. DOT Placing and Handling of PCBs greater than 20 mg/kg (within Commercial Area 4)	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B
		Historical Buildings will not be demolished to achieve remediation objectives. Restoration of historical building components (as applicable for remedial action efforts) will follow the State Historic Preservation Office guidance.	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B
		Relocation of soils deemed eligible for on-site consolidation per MDEQ guidance Restrictions on transfer of soil property designated as a facility. Requirement that if residential criteria not met, land use restrictions must be provided (deed restriction on land use).	See Alternative 2B See Alternative 2B	See Alternative 2B See Alternative 2B	See Alternative 2B See Alternative 2B	See Alternative 2B See Alternative 2B	See Alternative 2B See Alternative 2B

TABLE 15
SUMMARY OF ALTERNATIVES EVALUATION
FEASIBILITY STUDY REPORT
PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

EVALUATION CRITERIA	Soil Alternative 1 - No Action	Soil Alternative 2B - Excavation, Consolidation, Capping, and Off-Site Disposal to Meet Part 201 Land Use and PCB Risk-Based Criteria	Soil Alternative 2C - Excavation, Consolidation, Capping, and Off-Site Disposal to Meet Land Use for Part 201, 10 ⁴ Risk Level for Arsenic, and PCB Risk-Based Criteria	Soil Alternative 3A - Excavation and Off-Site Disposal to Meet Part 201 Residential and TSCA Unrestricted High Occupancy Criteria	Soil Alternative 3B - Excavation and Off-Site Disposal to Meet Part 201 Land Use and PCB Risk-Based Criteria	Soil Alternative 3C - Excavation and Off-Site Disposal to Meet Land Use for Part 201, 10 ⁴ Risk Level for Arsenic, and PCB Risk-Based Criteria	Soil Alternative 3D - Excavation and Off-Site Disposal to Meet Land Use for Part 201, 10 ⁴ Risk Level for Arsenic, and TSCA High Occupancy Criteria	
Compliance with ARARs - continued								
Compliance with ARARs	Does not meet ARARs	Remedial Action Plan will be approved by U.S. EPA.	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	
		Material disposed of off-site will be properly characterized for disposal.	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	
		Remedial action completion to achieve a cumulative risk below a carcinogenic risk of 10 ⁻⁴ or a hazard index of 1.	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	Exceeds ARAR	
		Remedial action will satisfy Act 451, Part 93.	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	
		Remedial action will implement soil erosion and sedimentation control measures.	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	
		Dust emissions will be monitored and mitigated during remedial action.	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	
		Asbestos emissions will be monitored and mitigated during abatement work.	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	
		Michigan Vehicle Code will be followed - project will be scheduled to avoid frost laws/periods of frost.	See Alternative 2B	Michigan Vehicle Code will be followed - project could require a winter hiatus.	See Alternative 2B	See Alternative 2B	See Alternative 2B	Michigan Vehicle Code will be followed - project could require spring restoration.
		Abandonment and installation of monitoring wells included in Alternative.	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	
		Cap over consolidated soils will follow Act 451, Part 115 design guidance although consolidated soil is not considered "solid waste" under MCL 334.20120c.	See Alternative 2B	Alternative does not include consolidation/capping.	See Alternative 3A	See Alternative 3A	See Alternative 3A	
The perimeter fence will be kept in place during remedial actions. Construction fence will be installed around open excavations.	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B			
PRIMARY CRITERIA								
Long-term Effectiveness and Permanence	Existing risk will remain	Risk is reduced by removal of impacted soil to achieve the PRGs.	See Alternative 2B					
		Risk eliminated for consolidated soils as long as cap is maintained.	See Alternative 2B	Risk is reduced by removal of impacted soil to achieve the PRGs.	See Alternative 3A	See Alternative 3A	See Alternative 3A	
		Cap is highly reliable if maintained.	See Alternative 2B					
5-year review would be required to ensure adequate protection of human health and the environment is maintained.	5-year review would be necessary. Impacted soils will remain on site under engineering controls (cap and concrete slabs).	See Alternative 2B	See Alternative 2B	5-year review would not be necessary. Impacted soils will remain on site under engineering controls (concrete slabs).	See Alternative 3B	See Alternative 3B		
Reduction of Toxicity, Mobility, and Volume Through Treatment	Not relevant - no reduction in risk through treatment.	See Alternative 1	See Alternative 1	See Alternative 1	See Alternative 1	See Alternative 1	See Alternative 1	
Community Protection	Risk to the community is not increased. The Site is enclosed with a perimeter fence (except for the River and Mill Race borders).	Temporary increase in dust, which would be controlled through application of water for dust suppression.	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	
		Temporary increase in construction traffic. Traffic would be routed through the west end of the Site minimizing impact to the community. Work hours and days would be restricted.	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	

TABLE 15
 SUMMARY OF ALTERNATIVES EVALUATION
 FEASIBILITY STUDY REPORT
 PLAINWELL, INC. MILL PROPERTY
 PLAINWELL, MICHIGAN

EVALUATION CRITERIA	Soil Alternative 1 - No Action	Soil Alternative 2B - Excavation, Consolidation, Capping, and Off-Site Disposal to Meet Part 201 Land Use and PCB Risk-Based Criteria	Soil Alternative 2C - Excavation, Consolidation, Capping, and Off-Site Disposal to Meet Land Use For Part 201, 10 ¹ Risk Level for Arsenic, and PCB Risk-Based Criteria	Soil Alternative 3A - Excavation and Off-Site Disposal to Meet Part 201 Residential and TSCA Unrestricted High Occupancy Criteria	Soil Alternative 2B - Excavation and Off-Site Disposal to Meet Part 201 Land Use and PCB Risk-Based Criteria	Soil Alternative 3C - Excavation and Off-Site Disposal to Meet Land Use For Part 201, 10 ¹ Risk Level for Arsenic, and PCB Risk-Based Criteria	Soil Alternative 3D - Excavation and Off-Site Disposal to Meet Land Use For Part 201, 10 ¹ Risk Level for Arsenic, and TSCA High Occupancy Criteria
PRIMARY CRITERIA - continued							
Worker Protection	No increase in risk to workers	Protection required against dermal contact and inhalation of impacted dust during soil remediation efforts.	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B
		Protection required against inhalation of asbestos fibers during asbestos abatement work.	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B
Environmental Impacts	Contin. of impact from existing conditions	Would consolidate arsenic impacted soils into Commercial Area 4. Effects would be mitigated by the installation of the cap system and cap monitoring and maintenance as necessary.	See Alternative 2B	No consolidation component to Alternative	See Alternative 3A	See Alternative 3A	See Alternative 3A
		Environment would be improved.	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B
Estimated Duration of Construction Effort	0 weeks	4 months	5 months	11 months	4 months	5 months	6 months
Implementability	No construction or operation	Verification samples would be utilized to determine compliance with the PDCs. Sampling can be conducted easily.	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B	See Alternative 2B
		Approximately 4,800 CY of additional soil could be added to capped area based on estimated capacity of consolidation area. Soil could be added to consolidation area with some additional effort to prepare a larger receiving area.	Approximately 3,800 CY of additional soil could be added to capped area based on estimated capacity of consolidation area. Soil could be added to consolidation area with some additional effort to prepare a larger receiving area.	Additional soil excavation within the buildings would be difficult due to existing interior structures, asbestos, brick concrete floors, stability of the structures/shoring requirements, and equipment limitations (size of equipment restrictions).	Additional excavation could be conducted if necessary based on the PDC.	See Alternative 3B	See Alternative 3B
		Monitoring of the cap (over consolidated soils) would be limited to surface observations such as subsidence.	See Alternative 2B	No monitoring required	No cap component to Alternative to monitor	See Alternative 3B	Monitoring of capped areas where PCBs remain in place above unrestricted high occupancy would be required. Monitoring effort is dependent on cap material and location within the Site.
		Monitoring of the concrete slabs within the existing buildings would be limited to surface observations.	See Alternative 2B	No monitoring required	See Alternative 2B	See Alternative 2B	See Alternative 2B
Total Cost	\$0	\$4,462,820	\$4,998,195	\$9,424,482	\$4,361,857	\$4,875,232	\$7,477,202
MODIFYING CRITERIA							
State Acceptance	To Be Determined	See Alternative 1	See Alternative 1	See Alternative 1	See Alternative 1	See Alternative 1	See Alternative 1
Community Acceptance	To Be Determined	See Alternative 1	See Alternative 1	See Alternative 1	See Alternative 1	See Alternative 1	See Alternative 1

- Meets evaluation criteria with least amount of risk/complication.
- Meets evaluation criteria with higher degree of risk/complication.
- Does not meet evaluation criteria or would result in significant risk/complication.

TABLE 16

**SUMMARY OF ALTERNATIVES COST ANALYSIS
FEASIBILITY STUDY REPORT
PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN**

REMEDIAL ALTERNATIVE	SOIL ALTERNATIVE 1	SOIL ALTERNATIVE 2B	SOIL ALTERNATIVE 2C	SOIL ALTERNATIVE 3A
	NO ACTION	EXCAVATION AND OFF-SITE DISPOSAL WITH CONSOLIDATION AND CAPPING TO MEET PART 201 LAND USE AND PCB RISK-BASED LEVEL	EXCAVATION AND OFF-SITE DISPOSAL WITH CONSOLIDATION AND CAPPING TO MEET PART 201 LAND USE, 10 ⁻¹ RISK LEVEL FOR ARSENIC AND PCB RISK- BASED LEVEL	EXCAVATION AND OFF-SITE DISPOSAL TO MEET PART 201 RESIDENTIAL CRITERIA AND TSCA UNRESTRICTED HIGH OCCUPANCY LEVEL
CAPITAL COSTS				
A. Pre-Design Investigation	\$0			
		1.0 Sampling and Analysis Plan \$33,200	1.0 Sampling and Analysis Plan \$33,200	1.0 Sampling and Analysis Plan \$33,200
		2.0 SAP Implementation \$108,100	2.0 SAP Implementation \$123,900	2.0 SAP Implementation \$245,500
		3.0 Contingency \$70,700	3.0 Contingency \$78,600	3.0 Contingency \$139,400
		4.0 Remedial Action Plan \$60,000	4.0 Remedial Action Plan \$60,000	4.0 Remedial Action Plan \$60,000
		<u>Subtotal Pre-Design Costs \$272,000</u>	<u>Subtotal Pre-Design Costs \$295,700</u>	<u>Subtotal Pre-Design Costs \$478,100</u>
B. Construction	\$0			
		1.0 Mobilization and Setup \$234,600	1.0 Mobilization and Setup \$270,000	1.0 Mobilization and Setup \$483,500
		2.0 Preparation and/or Demolition \$138,000	2.0 Preparation and/or Demolition \$139,400	2.0 Preparation and/or Demolition \$372,700
		3.0 Excavation \$279,900	3.0 Excavation \$293,100	3.0 Excavation \$981,200
		4.0 Transportation and Disposal \$1,543,370	4.0 Transportation and Disposal \$1,696,670	4.0 Transportation and Disposal \$2,895,765
		5.0 Consolidation of Soils on Site \$34,500	5.0 Consolidation of Soils on Site \$53,900	5.0 Restoration \$1,209,030
		6.0 Capping Soils On Site \$61,700	6.0 Capping Soils On Site \$96,500	6.0 Demobilization \$26,600
		7.0 Restoration \$400,375	7.0 Restoration \$485,525	
		8.0 Demobilization \$32,300	8.0 Demobilization \$32,300	
		<u>Subtotal Construction Costs \$2,724,695</u>	<u>Subtotal Construction Costs \$3,067,395</u>	<u>Subtotal Construction Costs \$5,968,795</u>
C. Engineering and/or Oversight	\$0			
		1.0 Institutional Controls \$50,000	1.0 Institutional Controls \$50,000	1.0 Institutional Controls \$50,000
		2.0 Engineering \$408,700	2.0 Engineering \$460,100	2.0 Engineering \$895,300
		3.0 Construction Oversight \$272,500	3.0 Construction Oversight \$306,700	3.0 Construction Oversight \$596,900
		<u>Subtotal Engineering and Oversight Costs \$731,200</u>	<u>Subtotal Engineering and Oversight Costs \$816,800</u>	<u>Subtotal Engineering and Oversight Costs \$1,542,200</u>
		Capital Costs \$3,455,895	Capital Costs \$3,884,195	Capital Costs \$7,510,995
		Contingency \$863,974	Contingency \$971,049	Contingency \$1,877,749
		<u>Total Capital Costs \$4,319,869</u>	<u>Total Capital Costs \$4,855,244</u>	<u>Total Capital Costs \$9,388,744</u>
OPERATION, MAINTENANCE, & MONITORING COSTS				
A. ANNUAL MONITORING AND MAINTENANCE	\$0	\$9,600	\$9,600	\$2,400
		Contingency on OM & M Costs - Years 1 - 30 \$1,920	Contingency on OM & M Costs - Years 1 - 30 \$1,920	Contingency on OM & M Costs - Years 1 - 30 \$200
		Contingency on OM & M Costs - Years 1 - 5		
		Contingency on OM & M Costs - Years 6-30		
		OM & M Costs \$0	OM & M Costs \$11,520	OM & M Costs \$2,600
		<u>TOTAL CAPITAL COSTS \$0</u>	<u>TOTAL CAPITAL COSTS \$4,855,244</u>	<u>TOTAL CAPITAL COSTS \$9,388,744</u>
		NET PRESENT VALUE OF OM & M (30 YEARS @ 7% DISCOUNT RATE) \$0	NET PRESENT VALUE OF OM & M (30 YEARS @ 7% DISCOUNT RATE) \$142,952	NET PRESENT VALUE OF OM & M (30 YEARS @ 7% DISCOUNT RATE) \$35,738
		<u>TOTAL COST \$0</u>	<u>TOTAL COST \$4,998,195</u>	<u>TOTAL COST \$9,424,482</u>

TABLE 16
 SUMMARY OF ALTERNATIVES COST ANALYSIS
 FEASIBILITY STUDY REPORT
 PLAINWELL, INC. MILL PROPERTY
 PLAINWELL, MICHIGAN

REMEDIAL ALTERNATIVE	SOIL ALTERNATIVE 2B EXCAVATION AND OFF-SITE DISPOSAL TO MEET PART 201 LAND USE AND PCB RISK-BASED LEVEL	SOIL ALTERNATIVE 3C EXCAVATION AND OFF-SITE DISPOSAL WITH CONSOLIDATION AND CAPPING TO MEET PART 201 LAND USE, 10 ⁻⁶ RISK LEVEL FOR ARSENIC AND PCB RISK- BASED LEVEL	SOIL ALTERNATIVE 3D EXCAVATION AND OFF-SITE DISPOSAL TO MEET LAND USE FOR PART 201, 10 ⁻⁶ RISK LEVEL FOR ARSENIC, AND TSCA HIGH OCCUPANCY CRITERIA
CAPITAL COSTS			
A. Pre-Design Investigation			
1.0 Sampling and Analysis Plan	\$33,200	\$33,200	\$33,200
2.0 SAP Implementation	\$108,100	\$123,900	\$151,100
3.0 Contingency	\$70,700	\$78,600	\$92,200
4.0 Remedial Action Plan	\$60,000	\$60,000	\$60,000
Subtotal Pre-Design Costs	\$272,000	\$295,700	\$336,500
B. Construction			
1.0 Mobilization and Setup	\$276,200	\$261,600	\$374,200
2.0 Preparation and/or Demolition	\$138,000	\$139,400	\$158,200
3.0 Excavation	\$79,900	\$293,100	\$468,700
4.0 Transportation and Disposal	\$1,658,970	\$1,851,070	\$2,636,682
5.0 Restoration	\$400,325	\$485,525	\$989,518
6.0 Demobilization	\$26,600	\$26,600	\$26,600
		8.0 Demobilization	
Subtotal Construction Costs	\$2,729,995	\$3,057,295	\$4,653,900
C. Engineering and/or Oversight			
1.0 Institutional Controls	\$50,000	\$50,000	\$50,000
2.0 Engineering	\$409,500	\$458,600	\$698,100
3.0 Construction Oversight	\$273,000	\$305,700	\$465,400
Subtotal Engineering and Oversight Costs	\$732,500	\$814,300	\$1,213,500
Capital Costs	\$3,462,495	\$3,871,595	\$5,867,400
Contingency	\$865,624	\$967,899	\$1,466,850
Total Capital Costs	\$4,328,119	\$4,839,494	\$7,334,250
OPERATION, MAINTENANCE, & MONITORING COSTS			
A. ANNUAL MONITORING AND MAINTENANCE	\$2,400	\$2,400	\$9,600
Contingency on OM & M Costs - Years 1 - 30	\$200	\$200	\$1,920
Contingency on OM & M Costs - Years 1 - 5			
Contingency on OM & M Costs - Years 6-30			
OM & M Costs	\$2,600	\$2,600	\$11,520
TOTAL CAPITAL COSTS	\$4,328,119	\$4,839,494	\$7,334,250
NET PRESENT VALUE OF OM & M (30 YEARS @ 7% DISCOUNT RATE)	\$35,738	\$35,738	\$142,952
TOTAL COST	\$4,363,857	\$4,875,232	\$7,477,202

TABLE 17

COST SUMMARY
REMEDIAL ALTERNATIVE 3B – EXCAVATION AND OFF-SITE DISPOSAL
TO MEET PART 201 LAND USE AND PCB RISK-BASED LEVELS OF 2.5 MG/KG RESIDENTIAL AND 9.1 MG/KG COMMERCIAL AREAS
FEASIBILITY STUDY REPORT
PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

Description	Unit	Approx. Quantity	Unit Price	Estimated Cost		
				Subtotal	Total	
CAPITAL COSTS						
A. PRE-DESIGN INVESTIGATION						
1.0	Sampling and Analysis Work Plan (SAP)	LS	1	\$25,000	\$25,000	\$33,200
	Survey top of banks at Site	LS	1	\$2,000	\$2,000	
	Health and Safety Plan Update	LS	1	\$1,200	\$1,200	
	Multi-Area Quality Assurance Project Plan	LS	1	\$5,000	\$5,000	
2.0	SAP Implementation					\$108,100
	Project Set up (mark locations etc.)	LS	1	\$6,570	\$6,600	
	Private Utility Locate	LS	1	\$8,000	\$8,000	
	Field Activities	DA	17	\$2,900	\$49,300	
	Field Technicians					
	Sampling Equipment (push probe technology)					
	Expendables (PPE etc)					
	Temporary Lighting and Carbon Monoxide Control	LS	1	\$3,000	\$3,000	
	Concrete Coring	LS	1	\$3,000	\$3,000	
	Laboratory Analysis	LS	1	\$37,330	\$37,300	
	Investigation Derived Waste Disposal	DA	17	\$50	\$900	
3.0	Contingency on PDI Based on 50 % of SAP costs	LS	1	\$70,650	\$70,700	\$70,700
4.0	Remedial Action Plan	LS	1	\$60,000	\$60,000	\$60,000
TOTAL PRE-DESIGN COSTS						\$272,000
B. CONSTRUCTION						
1.0	Mobilization and Set up					\$226,200
	Mobilization and Set up	LS	1	\$45,700	\$45,700	
	Health and Safety	Monthly	4	\$28,450	\$113,800	
	Erosion Control	LS	1	\$16,060	\$16,100	
	Site Facilities					
	Temporary Facilities	Monthly	4	\$6,810	\$27,200	
	Decontamination Pad and Stations	LS	1	\$17,375	\$17,400	
	Staging Areas	LS	1	\$6,000	\$6,000	
2.0	Additional Preparation and/or Demolition (by Redevelopment Area)					\$138,000
	Residential 1	LS	1	\$12,680	\$12,700	
	Residential 2	LS	1	-	-	
	Residential 3	LS	1	\$1,225	\$1,200	
	Residential 4	LS	1	\$850	\$900	
	Waterfront Plaza	LS	1	-	-	
	Mixed Residential/Commercial Area 1	LS	1	\$600	\$600	
	Mixed Residential/Commercial Area 2	LS	1	\$56,625	\$56,600	
	Commercial Area 1	LS	1	-	-	
	Commercial Area 2	LS	1	-	-	
	Commercial Area 3	LS	1	-	-	
	Commercial Area 4	LS	1	\$65,980	\$66,000	

TABLE 17

COST SUMMARY
REMEDIAL ALTERNATIVE 3B – EXCAVATION AND OFF-SITE DISPOSAL
TO MEET PART 201 LAND USE AND PCB RISK-BASED LEVELS OF 2.5 MG/KG RESIDENTIAL AND 9.1 MG/KG COMMERCIAL AREAS
FEASIBILITY STUDY REPORT
PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

Description	Unit	Approx. Quantity	Unit Price	Estimated Cost	
				Subtotal	Total
3.0 Excavation (by Redevelopment Area)					\$279,900
Residential 1	CY	910	\$12	\$11,100	
Residential 2	CY	25	\$88	\$2,200	
Residential 3	CY	1,495	\$7	\$10,800	
Residential 4	CY	5,340	\$3	\$16,500	
Waterfront Plaza	CY	-	-	-	
Mixed Residential/Commercial Area 1	CY	40	\$90	\$3,600	
Mixed Residential/Commercial Area 2	CY	5,800	\$33	\$189,300	
Commercial Area 1	CY	12	\$104	\$1,300	
Commercial Area 2	CY	-	-	-	
Commercial Area 3	CY	-	-	-	
Commercial Area 4	CY	7,185	\$6	\$45,100	
4.0 Transportation and Disposal (by Redevelopment Area)					\$1,658,970
Residential 1 - Non Haz Non TSCA Soils	Ton	1,365	\$22	\$30,000	
Residential 2 - Non Haz Non TSCA Soils	Ton	38	\$22	\$800	
Residential 3 - Non Haz Non TSCA Soils	Ton	2,243	\$22	\$49,300	
Residential 4 - Non Haz Non TSCA Soils	Ton	8,010	\$22	\$176,200	
Residential 4 - Misc Debris	LS	1	-	\$600	
Waterfront Plaza - Non Haz Non TSCA Soils	Ton	-	\$22	-	
Mixed Residential/Commercial Area 1 - Non Haz Non TSCA Soils	Ton	60	\$22	\$1,300	
Mixed Residential/Commercial Area 1 - Misc. Debris	LS	-	\$125	\$1,675	
Mixed Residential/Commercial Area 2 - Non Haz Non TSCA Soils	Ton	8,535	\$22	\$187,200	
Mixed Residential/Commercial Area 2 - Misc. Debris	LS	1	-	\$8,245	
Commercial Area 1 - Non Haz Non TSCA Soils	Ton	18	\$22	\$400	
Commercial Area 2 - Non Haz Non TSCA Soils	Ton	-	-	-	
Commercial Area 2 - Misc. Debris	LS	-	-	-	
Commercial Area 3 - Non Haz Non TSCA Soils	Ton	-	-	-	
Commercial Area 3 - Misc. Debris	LS	-	-	-	
Commercial Area 4 - Non Haz Non TSCA Soils	Ton	3,782	\$22	\$83,200	
Commercial Area 4 - Misc. Debris	LS	-	-	\$3,550	
Commercial Area 4 - TSCA	Ton	7,000	\$160	\$1,116,500	
7.0 Restoration (by Redevelopment Area)					\$400,325
Residential 1	LS	1	-	\$22,500	
Residential 2	LS	1	-	\$5,070	
Residential 3	LS	1	-	\$30,275	
Residential 4	LS	1	-	\$80,800	
Waterfront Plaza	LS	-	-	-	
Mixed Residential/Commercial Area 1	LS	1	-	\$7,425	
Mixed Residential/Commercial Area 2	LS	1	-	\$139,455	
Commercial Area 1	LS	1	-	\$1,650	
Commercial Area 2	LS	-	-	-	
Commercial Area 3	LS	-	-	-	
Commercial Area 4	LS	1	-	\$113,150	

COST SUMMARY
REMEDIAL ALTERNATIVE 3B – EXCAVATION AND OFF-SITE DISPOSAL
TO MEET PART 201 LAND USE AND PCB RISK-BASED LEVELS OF 2.5 MG/KG RESIDENTIAL AND 9.1 MG/KG COMMERCIAL AREAS
FEASIBILITY STUDY REPORT
PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

<i>Description</i>	<i>Unit</i>	<i>Approx. Quantity</i>	<i>Unit Price</i>	<i>Estimated Cost</i>
				<i>Subtotal Total</i>
8.0 Demobilization Decontamination and Demobilization	LS	1	\$26,550	\$26,600
TOTAL CONSTRUCTION COST				<u>\$2,729,995</u>
C. ENGINEERING/OVERSIGHT				
1.0 Institutional Controls				\$50,000
2.0 Engineering/ Design (15 % of Construction Costs)				\$409,500
3.0 Construction Oversight (10 % of Construction Costs)				\$273,000
TOTAL ENGINEERING/OVERSIGHT COSTS				<u>\$732,500</u>
CONTINGENCY ON CAPITAL COSTS (25 %)				<u>\$865,624</u>
TOTAL CAPITAL COSTS				<u><u>\$4,328,119</u></u>
OPERATION, MAINTENANCE, & MONITORING COSTS				
A. ANNUAL MONITORING AND MAINTENANCE				
Monthly Operation and Maintenance	Month	12	\$200	\$2,400
CONTINGENCY ON OM & M COSTS (20 %)				<u>\$480</u>
TOTAL CAPITAL COSTS				<u>\$4,328,119</u>
NET PRESENT VALUE OF OM & M (30 YEARS @ 7 % DISCOUNT RATE)				<u>\$35,738</u>
TOTAL COST				<u><u>\$4,363,857</u></u>

TABLE 17B

COST SUMMARY NOTES
REMEDIAL ALTERNATIVE 3B – EXCAVATION AND OFF-SITE DISPOSAL
TO PART 201 LAND USE CRITERIA AND SITE SPECIFIC PCB RISK-BASED LEVELS
FEASIBILITY STUDY REPORT
PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

GENERAL NOTES

- A. Estimate for Remedial Alternative 3B - Excavation and Off-Site Disposal to Part 201 Land Use Criteria and Site specific calculated PCB Risk-Based Levels [2.5 milligrams/kilogram (mg/kg) for Residential Areas and 9.1 mg/kg for Commercial Areas] has been prepared based on available information at the time of this document. Redevelopment activities conducted, being conducted and anticipated for the Site by the City of Plainwell may affect the remediation costs. Costs presented in the Feasibility Study (FS) Report have taken into consideration anticipated redevelopment plans by the City of Plainwell. Redevelopment plans include demolition of non-historical buildings to the concrete slab as well as specific land use restrictions/designations for the Site as presented on Figure 1.4 of the FS Report. This cost estimate is expected to be within -30 percent to +50 percent of the actual remedial costs in accordance with United States Environmental Protection Agency (USEPA) guidance.
- B. Remediation activities for each of the 11 proposed redevelopment areas were estimated separately; however, the estimate assumes one mobilization and demobilization effort to conduct the work.
- C. The cost estimate assumes that new structures have not been constructed in areas that are planned for soil excavation and existing structures remain in place.
- D. Costs assume that additional soil investigation will not be conducted under building slabs unless otherwise noted in the pre-design notes below.
- E. Areas targeted for soil removal and off-Site disposal were determined based on an iterative/risk-based approach for arsenic and Site specific calculated levels for PCBs as detailed in Appendix A of the FS Revision 2.
- F. The estimated costs assume that excavation of impacted soils under the building slabs will not be conducted.
- G. The cost estimate includes abandonment and replacement costs of groundwater monitoring wells within excavation areas.
- H. Costs are based on 2014 dollars.
- I. All volumes are based on in-place measures unless otherwise stated.
- J. Abbreviations used in the "Unit" column in the Cost Estimate Table are as follows:
- CY = Cubic Yard
 - EA = Each
 - LS = Lump Sum
 - TN = Ton
 - LF= linear foot

TASK NOTES:**CAPITAL COSTS****A. INVESTIGATION/CONSTRUCTION****1.0 Pre-Design Investigation (PDI) Activities**

The following assumptions were made relative to the PDI activities in each of the redevelopment areas and reflected in the cost estimate.

- Generation of a Sampling and Analysis Plan (SAP).
- Update the Health and Safety Plan as necessary.
- Update the Multi-Area Quality Assurance Project Plan as necessary.
- Completion of the SAP - soil boring installation and soil sample collection to delineate the vertical and horizontal extent of impact. Soil borings are assumed to be collected via direct push method. PDI samples will be collected and submitted for laboratory analysis for specific parameters determined to exceed Preliminary Remediation Goals (PRGs) during the Remedial Investigation (RI). Delineation samples will not be collected in areas that were not selected for excavation activities (i.e., under building slabs, etc.)
- Quality Assurance/Quality Control samples are included on a 1 per 10 basis.
- A survey of the "top of bank" is included in the PDI cost estimate.
- All areas where subsurface work is to be conducted will be cleared through a public utility locate (i.e., MISS Dig), a private utility locate, review of available drawings, and discussions with individuals knowledgeable of the Site and utilities located thereon.

Residential Area 1

PRGs exceeded in Residential Area 1 include Part 201 non-residential and residential direct contact criteria for arsenic. Soil samples will be collected to delineate the extent of soil impacted with PCBs adjacent to the storm sewer line installed by the Michigan Department of Transportation (MDOT) in 2012.

- Allowance for 30 soil samples for PCBs
- Allowance for 12 soil samples for arsenic

Residential Area 2

The PRG exceeded in Residential Area 2 is Part 201 residential direct contact criteria for arsenic.

- Allowance for 24 soil samples for arsenic

Residential Area 3

The PRG exceeded in Residential Area 3 is Part 201 residential direct contact criteria for arsenic.

- Allowance for 56 soil samples for arsenic

Residential Area 4

PRGs exceeded in Residential Area 4 include Part 201 non-residential direct contact criteria for arsenic and lead. Residential direct contact criteria is exceeded at locations within Residential Area 4 for arsenic, benzo(a)pyrene, cyanide, dibenz(a,h)anthracene, lead and PCBs. Residential soil volatilization to indoor air inhalation criteria (SVIIC) was exceeded at one location for benzene.

- An allowance for 36 soil samples for arsenic
 - Benzene above the residential SVIIC at TP-308
 - An allowance for 4 soil samples for benzene was included in the estimate
 - Cyanide was above residential direct contact criteria at SB-302 in the shallow (0-1 foot) interval
 - Four samples for cyanide were included in the estimate
 - An allowance for 20 samples for lead was included in the estimate
 - The PNA parameters were identified in shallow samples (0-1.5 feet) below grade at DG3, DG4 and TP 302
 - Allowance for 12 PNA samples
- PCBs were above the Site specific calculated level for Residential areas at TP-313 and SB-301
- An allowance for 16 soil samples for PCBs was included in the estimate

Waterfront Plaza

PDI activities will not be specifically conducted within the Waterfront Plaza area.

Mixed Residential/Commercial Area 1

PRGs exceeded in Mixed Residential/Commercial Area 1 include Part 201 non-residential inhalation criteria for manganese and residential direct contact criteria for arsenic.

- Delineation samples will be collected around 2 locations (TP-306 and TP-334)
- A total of 12 soil samples for arsenic will be collected
- Four samples for manganese will be collected and analyzed around TP-334

Mixed Residential/Commercial Area 2

PRGs exceeded in Mixed Residential/Commercial Area 2 include Part 201 non-residential direct contact criteria for arsenic, benzo(a)pyrene, and lead. Residential direct contact criteria is exceeded at locations within Mixed Residential/Commercial Area 2 for arsenic, benzo(a)pyrene, dibenz(a,h)anthracene; benzo(a)anthracene, benzo(b)fluoranthene, indeno(1,2,3-cd)pyrene and lead.

Soil delineation by work area as follows:

Arsenic ONLY locations:

Building 25

- Allowance for 8 samples
- A portion of the concrete slab was removed during demolition

Building 28

- Allowance for 8 samples
- A portion of the concrete slab was removed during demolition

Train Shed

- Allowance for 4 samples

Coal Tunnel Area

- Allowance for 30 samples

Former Ash Silo Area (SB-2010 and SB-2011)

- Allowance for 12 samples

Former clarifier area (TP-344)

- Allowance for 8 samples

Area north of Building 3/Former Water Tower Area (TP-340, TP-342, TP-343)

- Allowance for 16 samples

Arsenic and Lead sample locations:

Area around SB-2013

- Allowance for 12 samples

Arsenic, PNAs and Lead sample locations:

Building 3A

- Allowance for 12 samples

Building 6A

- Allowance for 18 samples
- Technicians will be required to don respirators for this work
- The floor in the majority of this building is exposed soil

Arsenic and PNAs sample locations

Fuel Oil AST Area

- Allowance for 24 PNA soil samples
- Allowance for 12 arsenic samples

A total of 140 samples will be collected and analyzed for arsenic.

A total of 54 samples will be collected and analyzed for PNAs.

A total of 42 samples will be collected and analyzed for lead.

Commercial Area 1

PRGs exceeded in Commercial Area 1 include Part 201 non-residential inhalation criteria for manganese and the residential direct contact for arsenic.

- Delineation samples will be collected around SS-105
- Four soil samples will be collected from the 0-2 foot below grade interval and analyzed for arsenic and manganese

Commercial Area 2

Delineation efforts will not be conducted in Commercial Area 2.

Commercial Area 3

Delineation efforts will not be conducted in Commercial Area 2.

Commercial Area 4

Arsenic exceeds the Part 201 non-residential direct contact criteria PRG in Commercial Area 4. Residential direct contact criteria is exceeded at locations within Commercial Area 4 for arsenic, benzo(a)pyrene, and lead. PCBs are above the calculated risk-based PRG of 9.1 mg/kg in the area around MW-16.

Soil delineation by building / work area as follows:

Arsenic ONLY locations:

SB-2012

- Allowance for 4 samples

Parking lot area south of Building 17

- Allowance for 60 samples

Arsenic and Lead sample locations:

TP-341

- Allowance for 4 samples

Arsenic, PNAs and Lead sample locations:**Former Substation Area/North of Mill Buildings**

- Allowance for 30 samples

PCBs and Arsenic sample locations:**MW-16 Area**

- Allowance for 18 samples

A total of 116 samples will be collected and analyzed for arsenic.

A total of 30 samples will be collected and analyzed for PNAs.

A total of 18 samples will be collected and analyzed for PCBs.

A total of 34 samples will be collected and analyzed for lead.

2.0 Mobilization/Set-Up

The following assumptions were made relative to the mobilization/set-up in each of the redevelopment areas and reflected in the cost estimate.

- Mobilization and set-up includes: mobilization of personnel and equipment; construction survey work (e.g., excavation layout and verification sample locations); and geotechnical and chemical testing on backfill materials.
 - An allowance of \$8,000 to mobilize personnel and equipment was included in the estimate.
 - \$30,000 for survey work was included in the estimate.
 - Geotechnical and chemical analysis for imported materials was included in the estimate. One set of chemical analysis [Target Analyte List Metals, Target Compound List (TCL) for volatile organic compounds, TCL for semi-volatile compounds, and polychlorinated biphenyl (PCBs) per material (topsoil, general fill and 21AA/gravel)]. The topsoil sample will also be analyzed for pH, phosphorous, organic content, pesticides and herbicides.
- Health and Safety includes an on-Site Health and Safety Officer (HSO) for 4 months. Also included in the costs are: air monitoring equipment and calibration gases; a decontamination trailer; and disposable personal protection equipment (PPE).
- Air monitoring assumes real-time air monitoring will be conducted during all excavation work utilizing a photoionization detector (11.7 electronVolt [eV] lamp) and fugitive dust monitor(s). Air monitoring does not include the collection of samples for laboratory analysis or laboratory analytical costs.
- Erosion control includes an allowance for silt fence (4,000 LF) and geofabric to cover catch basins on the Site. Costs for erosion control measures specific to individual redevelopment areas (i.e., turbidity curtains, etc.) are included in individual redevelopment area estimates (e.g., Commercial Area 4).
- Site facility costs include electrical hookup and electricity for two office trailers (one for the contractor and one for the U.S. EPA) for 4 months. Other temporary facilities include portable sanitary services, a drinking water allowance and a small dumpster for worker general refuse. The expense of one Site truck for the duration of the services was included.
- Site facility costs include materials and construction of temporary decontamination pads and decontamination stations for workers. It was assumed that potable water could be obtained from the City of Plainwell for use during the project.
- Site facility costs include \$6,000 to for the installation and maintenance of a staging area for waste.
- A perimeter fence currently exists around the majority of the Site. The cost estimate assumes the fence will remain and can be utilized as a security measure to prevent access to the Site during construction activities.

3.0 Preparation/Pre-Excavation Work by Redevelopment Area

The following assumptions were made relative to the preparation/pre-excavation work in each of the redevelopment areas and reflected in the cost estimate.

- A Soil Erosion and Sedimentation Control Permit will be obtained from Allegan County. All other necessary permits will also be obtained prior to intrusive work at the Site.
- All areas where subsurface work is to be conducted will be cleared through a public utility locate (i.e., MISS Dig), a private utility locate, review of available drawings, and discussions with individuals knowledgeable of the Site and utilities located thereon.

Residential Area 1

Specific assumptions for preparation/pre-excavation work in Residential Area 1 under Remedial Alternative 3B are presented below.

- Trees and shrubs in the excavation areas will need to be cleared and grubbed.
- Turbidity curtain will be temporarily installed in the Kalamazoo River during excavation and backfill activities.
- One power pole will need to be relocated for the excavation work around SB-104.

Residential Area 2

No specific assumptions for preparation/pre-excavation work in Residential Area 2 under Remedial Alternative 3B were utilized.

Residential Area 3

Specific assumptions for preparation/pre-excavation work in Residential Area 3 under Remedial Alternative 3B are presented below.

- MW-15 will be abandoned.
- Clearing will be required in the area around MW-15.

Residential Area 4

Specific assumptions for preparation/pre-excavation work in Residential Area 4 under Remedial Alternative 3B are presented below.

- Clearing will be required in the area around SB-301/SG-4.
- Pavement by TP-302 will be saw cut.

Waterfront Plaza

No specific assumptions for preparation/pre-excavation work in Waterfront Plaza under Remedial Alternative 3B were utilized.

Mixed Residential/Commercial Area 1

The specific assumption for preparation/pre-excavation work in Mixed Residential/Commercial Area 1 under Remedial Alternative 3B is presented below.

- Pavement in the work areas will be saw cut prior to excavation to leave a clean line for restoration activities.

Mixed Residential/Commercial Area 2

Specific assumptions for preparation/pre-excitation work in Mixed Residential/Commercial Area 2 under Remedial Alternative 3B are presented below.

- The loading dock at the south end of Building 1 will be evaluated by a structural engineering evaluation to ensure excavation of the fuel oil line will not damage either the loading dock or Building 1. Excavation will not occur within Building 1.
- A demolition notice will be submitted to the State of Michigan for the demolition of Building 5A/part of the coal tunnel. Asbestos abatement may be necessary on pipe wrap found outside of Building 5A.
- Excavation of soils under the concrete slabs of the demolished buildings (3A, 25 and 28) will require the relocation of the backfill (less than 3 feet thick) prior to excavation.
- Fuel Oil No. 6 within the former coal tunnel will be removed from the tunnel before the tunnel itself is removed.
- The piping run from the former Fuel Oil No. 6 AST and Building 5 will be exposed at one end and drained of any residual fuel oil prior to removing the line.
- Monitoring well MW-19 will be abandoned prior to excavation activities in this area.
- Monitoring well MW-22 will be abandoned prior to removal of the former fuel oil line.
- Monitoring well MW-2 will be abandoned prior to excavation activities at SB-2010 and SB-2011.
- The concrete floor (Buildings 25 and 3A) will be saw cut prior to excavation (concrete will be broken out during excavation – but saw cut first to create clean lines for restoration).

Commercial Area 1

No specific assumptions for preparation/pre-excitation work Commercial Area 1 under Remedial Alternative 3B were utilized.

Commercial Area 2

No specific assumptions for preparation/pre-excitation work Commercial Area 2 under Remedial Alternative 3B were utilized.

Commercial Area 3

No specific assumptions for preparation/pre-excitation work Commercial Area 3 under Remedial Alternative 3B were utilized.

Commercial Area 4

Specific assumptions for preparation/pre-excitation work in Commercial Area 4 under Remedial Alternative 3B are presented below.

- Excavation of soils under the concrete slabs of the demolished buildings will require the relocation of backfill placed within the former basement cavities to surrounding grade (up to 9 feet thick) prior to excavation. An allowance for 5 working days to complete this work was included in the estimate at a cost of \$20,400.
- Turbidity curtain will be installed in the Mill Race in the area by MW-16 (along the Mill Race) and in the area of MW-3 prior to excavation activities.
- Monitoring of the Mill Race and Kalamazoo River for turbidity will be conducted during excavation activities.
- MW-16 will be abandoned prior to excavation work in that area.
- Protection of MW-3 (barriers) will be installed.
- A structural engineering evaluation of the pedestrian bridge for stability during excavation activities will be conducted. The evaluation will determine if shoring of the bridge is necessary. An allowance

of \$5,000 is included in the estimate to conduct the evaluation. Shoring costs have not been included in the estimate.

- The water flow of the Mill Race will be diverted in the excavation area. The methodology for this work to be determined in the pre-design phase of the project.
- Rip rap along the Mill Race will be removed and staged for re-use.
- Pavement in the work areas will be saw cut prior to excavation to allow for restoration activities.

4.0 Excavation by Redevelopment Area

Conceptual excavation areas for each of the Redevelopment areas are shown of Figures 3.12 through 3.23 of the FS Report (Revision 2).

The following assumptions were made relative to excavation in each of the redevelopment areas and reflected in the cost estimate.

- Excavation estimates assume dewatering will not be necessary and that all work can be completed in Level D PPE except Building 6A which will be conducted with supplied air (Level B) PPE.
- Standby time was not added to account for the time for laboratory analysis of verification samples. It was assumed that the project would proceed across the Site allowing for laboratory analysis to be conducted while another redevelopment area was being excavated or restored.

Specific assumptions to each redevelopment area, in addition to those presented above globally, are provided below.

Residential Area 1

Residential Area 1 is located at the far west end of the Site, where the majority of the former sludge dewatering lagoons were located. The former Mill wastewater treatment building, activated sludge tank and secondary clarifier were constructed over the lagoons. The wastewater treatment structures were demolished on behalf of the City of Plainwell in November and December 2013. The specific assumption for excavation in Residential Area 1 under Remedial Alternative 3B is presented below.

- Overburden present beyond the target excavation area that must be removed to achieve the full depth of excavation will be disposed of off Site.
- The rip rap at the Kalamazoo River outfall from the storm sewer line does not need to be removed.

Residential Area 2

Residential Area 2 is located between Residential Area 1 and Residential Area 3 and is positioned along the Kalamazoo River. This area was historically occupied by sludge dewatering lagoons (A, B, C) and a primary clarifier. The primary clarifier was demolished to the concrete slab in November 2013. No specific assumptions for excavation in Residential Area 2 under Remedial Alternative 3B are presented.

Residential Area 3

Residential Area 3 is located near the center of the Site. The former aeration basin location occupies the majority of the area. A former secondary clarifier was historically present in this area, which was demolished in November 2013 with the floor of the former clarifier remaining. Specific assumptions for excavation in Residential Area 3 under Remedial Alternative 3B are presented below.

- Material removed from the bottom of the aeration basin will require double handling due to the slopes of the former aeration basin and the depth of the excavation.

Residential Area 4

Residential Area 4 is positioned along the Kalamazoo River between Residential Area 3 and Mixed Residential Area 2. No aboveground structures are currently present on this area. A portion of this area was historically utilized by the Mill as a coal storage area. No specific assumptions for excavation in Residential Area 4 under Remedial Alternative 3B were made.

Waterfront Plaza

No excavation activities are anticipated in the Waterfront Plaza Area.

Mixed Residential/Commercial Area 1

Mixed Residential/Commercial Area 1 is located between Commercial Area 2 and Commercial Area 3 on the southern property line along Allegan Street. This area was once occupied by the former Specialty Minerals Building and associated above ground storage tanks. The Specialty Minerals building and ASTs were demolished to the concrete slab in December 2011. The specific assumption for excavation in Mixed Residential/Commercial Area 1 under Remedial Alternative 3B is presented below.

- Underground utilities encountered (TP-306) between the former Specialty Minerals Building and the main Mill Buildings will be capped at either end of the excavation.

Mixed Residential and Commercial Area 2

Mixed Residential and Commercial Area 2 is located between Residential Area 4 and Commercial Area 4 at the northern end of the Site along the Kalamazoo River. The majority of the area is occupied by Mill Buildings and pavement. Buildings 3A, 25 and 28 along with the eastern water tower, 200,000-gallon Fuel Oil AST, and the brine USTs, were demolished on behalf of the City of Plainwell. The majority of the concrete slabs were left in place for Buildings 3A and 28. Building 25 was part of the Site's historical wastewater treatment system and had a subsurface vault and system to pump the waste water from the Mill to the on-Site WWTP at the west end of the Site. The vault under the northern portion of Building 25 was not removed. The vault floor was cracked and the sidewalls removed to 4 feet below grade, then the vault was filled with imported general fill. The concrete slab under the remaining portion of Building 25 was left in place.

Specific assumptions for excavation in Mixed Residential/Commercial Area 2 under Remedial Alternative 3B are presented below.

- A storm sewer was installed through the west side of Mixed Residential/Commercial Area 2 in 2012 by the Michigan Department of Transportation (MDOT). The approximate location of the storm sewer is shown on Figure 3.18. Before conducting excavation work to remove the former fuel oil AST line and excavate the east side of the former fuel AST, the exact location of the storm sewer line will be determined, shoring of the line may be necessary during the removal of the fuel oil AST line.
- Soils in Building 6A will be removed using a vacuum extraction system.

Commercial Area 1

Commercial Area 1 is located in the far southwest portion of the Site. No structures or paved areas are currently present in this area that would require unique equipment or procedures to conduct the proposed remedial activities. This area of the Site has not been developed and was not part of historic Mill operations. The area specific assumption for excavation in Commercial Area 1 under Remedial Alternative 3B is presented below.

- A storm sewer was installed through this area in 2012 by the Michigan Department of Transportation (MDOT). The approximate location of the storm sewer is shown on Figure 3.19. Before conducting excavation work in the area of SS-105, the exact location of the line will be determined.

Commercial Area 2

Commercial Area 2 is located in the southwest central portion of the Site. Structures on this portion of the Site include the City of Plainwell Public Safety Building and associated paved parking and egress/ingress areas.

Excavation activities are not anticipated in the Commercial Area 2 for Remedial Alternative 3B.

Commercial Area 3

Commercial Area 3 is located adjacent to the former southwest corner of the Mill Buildings along Allegan Street. Structures on this area include a pump house and a former guard shack. Other historical features within this area have been demolished on behalf of the City of Plainwell. The Clay ASTs, Ammonia AST secondary containment structure, the Starch ASTs and Building 9C were demolished in 2012. The concrete slabs for all demolished features were left in place. Specific assumptions for excavation in Commercial Area 3 under Remedial Alternative 3B are presented below.

Excavation activities are not anticipated in the Commercial Area 3 for Remedial Alternative 3B.

Commercial Area 4

Commercial Area 4 is located on the eastern side of the Site. The majority of this area is covered with either pavement, buildings (vacant and occupied) or former building concrete slabs. Buildings (9A, 9B, 9C, 9D, 9E, 9F, and 23) were demolished on behalf of the City of Plainwell in 2012, with the majority of the former building concrete slabs left in place and backfilled to surrounding grade. The basement areas were backfilled with a combination of crushed concrete (from the buildings on Site), soil from an adjacent retaining wall that was removed, and imported gravel material and vary in thickness from 6 feet to 9 feet. Specific assumptions for excavation in Commercial Area 4 under Remedial Alternative 3B are presented below.

- Access to both the former substation area and around MW-16 will be restricted due to the distance between existing structures and either the Kalamazoo River or the Mill Race. Excavated soils will likely need to be double handled.

5.0 Transportation and Disposal by Redevelopment Area

The following assumptions were made relative to the transportation and disposal of materials in each of the redevelopment areas and reflected in the cost estimate.

- Soil volumes were converted to tonnage assuming a ratio of 1.5 tons per cubic yard for soils. Tonnage for concrete was based on 1.65 tons per cubic yard of material. Waste has been categorized as non-hazardous and non-TSCA soils; TSCA soil; TSCA debris; and miscellaneous debris.
- Transportation and disposal pricing is based on the non-hazardous, non-TSCA material being accepted at Waste Management Autumn Hills Landfill in Zeeland, Michigan. A cost of \$22.00 per ton for both transportation and disposal of non-hazardous, non-TSCA waste was used for the estimates.
- A disposal price of \$135.00 per ton was used for TSCA soils. For estimation purposes it was assumed that the TSCA soils would be transported to the Environmental Quality Company/U.S. Ecology Company Wayne Disposal Landfill #2, Belleville, Michigan for direct landfill disposal. Transportation of the soils was assumed to be conducted in lined 50 ton gravel trains. Transportation of each load of 50 tons was assumed to cost \$500.00.
- Transportation costs assume fuel prices for diesel will not exceed \$4.00 per gallon.
- Organic material generated from clearing activities was assumed to be chipped and left on Site.
- Concrete and asphalt will be disposed of off Site, not recycled.

Residential Area 1

The specific assumption for transportation and disposal work in Residential Area 1 under Remedial Alternative 3B is presented below.

- Waste was assumed to be non-hazardous, non-TSCA soil with a volume of 910 CY.

Residential Area 2

The specific assumption for transportation and disposal work in Residential Area 2 under Remedial Alternative 3B is presented below.

- Waste was assumed to be non-hazardous, non-TSCA soil with a volume of 25 CY.

Residential Area 3

The specific assumption for transportation and disposal work in Residential Area 2 under Remedial Alternative 3B is presented below.

- Waste was assumed to be non-hazardous, non-TSCA soil with a volume of 1,495 CY.

Residential Area 4

The specific assumption for transportation and disposal work in Residential Area 3 under Remedial Alternative 3B is presented below.

- Waste was assumed to be non-hazardous, non-TSCA soil with a volume of 5,340 CY.
- Allowance of \$600 for asphalt.

Waterfront Plaza

No specific assumptions for transportation and disposal work in Waterfront Plaza under Remedial Alternative 3B were utilized. Excavation activities will not be conducted within the Waterfront Plaza area.

Mixed Residential/Commercial Area 1

Specific assumptions for transportation and disposal work in Mixed Residential/Commercial Area 1 under Remedial Alternative 3B are presented below.

- Waste was assumed to be non-hazardous, non-TSCA soil with a volume of 40 CY.
- Allowance of 50 CY for asphalt disposal.

Mixed Residential/Commercial Area 2

Specific assumptions for transportation and disposal work in Mixed Residential/Commercial Area 2 under Remedial Alternative 3B are presented below.

- Waste was assumed to be non-hazardous, non-TSCA soil from Building 6A with a volume of 200 CY.
- Waste was assumed to be non-hazardous, non-TSCA soil from the Train Shed with a volume of 205 CY.
- Waste was assumed to be non-hazardous, non-TSCA soil from the coal tunnel area with a volume of 1,270 CY.
- Allowance of \$3,500 for miscellaneous debris from the coal tunnel area (bricks, concrete).
- Waste was assumed to be non-hazardous, non-TSCA soil from the fuel oil line with a volume of 525 CY.
- Allowance of \$600 for disposal of the fuel oil line piping.

- Waste was assumed to be non-hazardous, non-TSCA soil from the fuel oil No. 6 AST area with a volume of 2,500 CY.
- Allowance of \$1,200 for the concrete ring the tank was sitting on and buried concrete and asphalt.
- Waste was assumed to be non-hazardous, non-TSCA soil from the north end of the Mill Buildings (Buildings-3A, 25, 28, test pits-TP-340, TP-342, TP-343 and SB-2013) with a volume of 990 CY.
- Allowance of \$6,000 for miscellaneous debris from these areas at the north end of the Mill Building.

Commercial Area 1

Specific assumptions for transportation and disposal work in Commercial Area 1 under Remedial Alternative 3B are presented below.

- Waste was assumed to be non-hazardous, non-TSCA soil with a volume of 12 CY.

Commercial Area 2

Waste will not be transported off Site from Commercial Area 2 for Remedial Alternative 3B.

Commercial Area 3

Waste will not be transported off Site from Commercial Area 2 for Remedial Alternative 3B.

Commercial Area 4

Specific assumptions for transportation and disposal work in Commercial Area 4 under Remedial Alternative 3B are presented below.

- Waste was assumed to be non-hazardous, non-TSCA soil from the former substation area and north of the Mill Buildings with a volume of 2,510 CY.
- Waste was assumed to be TSCA soil from the area around MW-16 with a volume of 4,660 CY.
- Waste was assumed to be non-hazardous, non-TSCA soil from the area around boring BK5 with a volume of 15 CY.
- Allowance of \$250 for asphalt transportation and disposal.

6.0 Restoration by Redevelopment Area

The following assumption was made relative to Site restoration in each of the redevelopment areas and reflected in the cost estimate.

- Restoration activities include backfill (material and placement), compaction, compaction testing and any other location specific restoration that may be deemed necessary at this time.
- General fill from a local gravel pit at a delivered material cost of \$4.58 ton was used for the estimates. Unprocessed topsoil at a delivered price of \$18.98 cubic yard was also used where appropriate.
- A six-inch layer of unscreened topsoil will be placed over the compacted general fill in areas that were previously pervious (i.e., not paved or impervious). Topsoil will be hydroseeded, including mulch.
- Restoration for excavation areas under pavement will be backfilled with general fill and compacted to 95 percent of the proctor.
- A 6-inch layer of 21AA or equivalent will be placed on the compacted general fill and compacted to 95 percent or greater of the proctor where restoration includes replacing the pavement.
- Concrete will be replaced where removed during excavation activities (sidewalk along Building 17).
- Asphalt will be replaced where removed during excavation activities.

- Permanent markers will be installed to designate areas on Site where impacted soils above Part 201 clean up criteria based on land use, remain in place.

Residential Area 1

Specific assumptions for Site restoration in Residential Area 1 under Remedial Alternative 3B are presented below.

- Rip rap at the Kalamazoo River around the storm sewer does not need to be replaced.

Residential Area 2

No specific assumptions for Site restoration in Residential Area 2 under Remedial Alternative 3B were utilized.

Residential Area 3

Specific assumptions for Site restoration in Residential Area 3 under Remedial Alternative 3B are presented below.

- Backfill material will be imported general fill and overburden material removed to achieve excavation depth requirements but beyond the area exceeding cleanup criteria.
- MW-15 will be replaced.

Residential Area 4

No specific assumptions for Site restoration in Residential Area 4 under Remedial Alternative 3B were utilized.

Waterfront Plaza

No specific assumptions for Site restoration in Waterfront Plaza under Remedial Alternative 3B were utilized. Restoration will not be required in the Waterfront Plaza area.

Mixed Residential/Commercial Area 1

No specific assumptions for Site restoration in Mixed Residential/Commercial Area 1 under Remedial Alternative 3B were utilized.

Mixed Residential/Commercial Area 2

Specific assumptions for Site restoration in Mixed Residential/Commercial Area 2 under Remedial Alternative 3B are presented below.

- Building 6A currently has a dirt floor; restoration would not include a concrete floor.
- Concrete (former ash silos) will not be replaced at SB-2010.
- Concrete around the former 200,000 gallon fuel oil AST will not be replaced.
- Concrete removed for excavations at SB-216, SB-220, SB-222 and SB-223 will not be replaced.
- Additional backfill will be required to fill in the void space of the coal tunnel.
- MW-2, MW-19 and MW-22 will be replaced.

Commercial Area 1

No specific assumptions for Site restoration in Commercial Area 1 under Remedial Alternative 3B were utilized.

Commercial Area 2

No specific assumptions for Site restoration in Commercial Area 2 under Remedial Alternative 3B were utilized.

Commercial Area 3

No specific assumptions for Site restoration in Commercial Area 3 under Remedial Alternative 3B were utilized.

Commercial Area 4

Specific assumptions for Site restoration in Commercial Area 4 under Remedial Alternative 3B are presented below.

- Asphalt will be 3 inches thick.
- Geotextile and Rip rap will be installed along the Mill Race.
- The Mill Race will be returned to its normal flow path.
- The turbidity curtain will be removed from the Mill Race and Kalamazoo River.
- MW-16 will be replaced.

7.0 Demobilization

The following assumptions were made relative to the demobilization from the Site and reflected in the cost estimate.

- Costs included in the demobilization task include time for Site tear down and final decontamination of equipment, and demobilization of equipment and personnel. Demobilization activities were assumed to take five working days.

B. ENGINEERING/OVERSIGHT

1.0 Engineering/Design

The following assumption was made relative to the installation of engineering/design and reflected in the cost estimate.

- Engineering and project design/specifications were estimated to be 15 percent of the Construction Costs.

2.0 Construction Oversight

The following assumption was made relative to the construction oversight and reflected in the cost estimate.

- Construction oversight was estimated to be 10 percent of the Construction Costs.

TABLE 18:

ALTERNATIVE 3B
 SOIL BORINGS/LOCATIONS REQUIRING REMOVAL TO MEET THE PART 201 GENERIC CLEANUP CRITERIA (DIRECT CONTACT) FOR ARSENIC

Area	Proposed Soil Excavation Sample Locations	Soil Locations Left In Place Under Concrete Building Slabs	Arsenic Concentration µg/g	Arsenic RBC µg/g
Residential Area 1	SB-104 (5-7) ft BGS	-	92 J	7.6
	SB-104 (8-10) ft BGS	-	29 J	
Residential Area 2	SB-105 (1-3) ft BGS	-	17.5	7.6
	SB-125 (0-1) ft BGS	-	13.5	
Residential Area 3	MW-15 (0-2) ft BGS	-	19.9	7.6
	SB-134 (1.5-3.5) ft BGS	-	20.3	
	SB-136 (8-10) ft BGS	-	21.1	
	SB-137 (8-10) ft BGS	-	26.4	
	SB-139 (0-1) ft BGS	-	12.5	
	SB-140 (0-1) ft BGS	-	12.1	
	SB-140 (8-10) ft BGS	-	19/15	
Residential Area 4	DG4 (0-1.5) ft BGS	-	16	7.6
	SB-301 (0-1) ft BGS	-	21.6	
	SB-301 (5.5-7.5) ft BGS	-	55.8 J/14.2 J	
	TP-314 (6-8) ft BGS	-	25	
Mixed Residential/Commercial Area 1	TP-306 (0.5-1.5) ft BGS	-	20	7.6
	TP-306 (6-7) ft BGS	-	-/20	
Mixed Residential/Commercial Area 2	MW-19 (0-2) ft BGS	-	18	7.6
	SB-208 (0-1) ft BGS	-	30.8	
	SB-209 (0-1) ft BGS	-	21.9	
	SB-216 (0-4) ft BGS	-	19	
	-	SB-230 (0-1) ft BGS	24.3 J	
	-	SB-231 (0-1) ft BGS	17.6	
	-	SB-232 (0-1) ft BGS	49.6 J	
	-	SB-232 (6-8) ft BGS	804 J	
	-	SB-234 (0-1) ft BGS	15.9	
	-	SB-235 (3-5) ft BGS	28.8	
	-	SB-236 (0-1) ft BGS	13.2	
	SB-237 (0-1) ft BGS	-	39.6	
	SB-237 (2-4) ft BGS	-	57.9	
	SB-238 (0-1) ft BGS	-	39.3	
	SB-238 (2-4) ft BGS	-	49.7/46.7	
	-	SB-240 (0-1) ft BGS	12.6 J	
	-	SB-241 (0-1) ft BGS	13.6 J	
	-	SB-244 (0-1) ft BGS	13.6 J	
	-	SB-244 (4-6) ft BGS	18.4 J	
	SB-246 (3-4) ft BGS	-	21.8	
	SB-303 (0-2) ft BGS	-	12.8	
	SB-312 (0-1) ft BGS	-	95.4	
	SB-2010 (0-1) ft BGS	-	12.5	
	SB-2010 (7-9) ft BGS	-	17.5	
	SB-2013 (0-1) ft BGS	-	31.4	
	TP-340 (0-1) ft BGS	-	18.7	
	TP-340 (3-4) ft BGS	-	18.1	
	TP-342 (0-1) ft BGS	-	102	
	TP-342 (3.5-4) ft BGS	-	17.7	
	TP-343 (0-1) ft BGS	-	25.3	
TP-343 (3-4) ft BGS	-	19.6		
TP-344 (1-3) ft BGS	-	16.6		
TP-344 (4-6) ft BGS	-	28.3		

Table 19: Final Cleanup Levels for COCs in Soil

	Statewide Default Background Level	<u>Indoor Air</u>		Residential Infinite Source Volatile Soil Inhalation	Non-residential Infinite Source VSIC	<u>Ambient Air</u>					<u>Contact</u>		<u>Soil</u> Saturation Concentration Screening		
		Residential Soil Volatilization to Indoor Air Inhalation	Non-residential SVIAC			Residential Finite VSIC for 5 Meter Source	Non-residential Finite VSIC for 5 Meter	Residential Finite VSIC for 2 Meter Source	Non-residential Finite VSIC for 2 Meter Source	Residential Particulate Soil Inhalation (PSIC)	Non-residential PSIC	Residential Direct Contact		Non-residential Direct Contact	
<i>Units</i>															
<i>Volatile Organic Compounds (VOCs)</i>															
Benzene	mg/kg	-	1.6	8.4	13	45	34	99	79	230	380000	470000	180	840	400
Ethylbenzene	mg/kg	-	87	460	720	2400	1000	3100	2200	6500	10000000	13000000	22000	71000	140
Methylene chloride	mg/kg	-	45	240	210	700	590	1700	1400	4000	6600000	8300000	1300	5800	2300
Tetrachloroethene	mg/kg	-	11	21	170	210	480	490	1100	1100	2700000	1200000	200	930	88
Toluene	mg/kg	-	330	610	2800	3300	5100	36000	12000	36000	27000000	12000000	50000	160000	250
1,1,1-Trichloroethane	mg/kg	-	250	460	3800	4500	12000	15000	28000	31000	67000000	29000000	500000	1000000	460
Trichloroethene	mg/kg	-	1.0	1.9	11	14	25	25	57	58	130000	59000	110	660	500
1,2,4-Trimethylbenzene	mg/kg	-	4300000	8000000	21000000	25000000	50000000	60000000	50000000	60000000	8200000000	3600000000	32000000	100000000	110000
Xylenes (total)	mg/kg	-	6300	12000	46000	54000	61000	65000	130000	130000	290000000	130000000	410000	1000000	150
<i>Semi-Volatile Organic Compounds (SVOCs)</i>															
Benzo(a)anthracene	mg/kg	-	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	ID	ID	20	80	-
Benzo(a)pyrene	mg/kg	-	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	1500	1900	2	8	-
Benzo(b)fluoranthene	mg/kg	-	ID	ID	ID	ID	ID	ID	ID	ID	ID	ID	20	80	-
Carbazole	mg/kg	-	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	62000	78000	530	2400	-
4-Chloro-3-methylphenol	mg/kg	-	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	ID	ID	4500	15000	-
Dibenz(a,h)anthracene	mg/kg	-	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	ID	ID	2	8	-
Dibenzofuran	mg/kg	-	2000	3600	130	160	130	160	130	160	6700	2900	ID	ID	-
Fluoranthene	mg/kg	-	1000000	1000000	740000	890000	740000	880000	740000	880000	9300000	4100000	46000	130000	-
Fluorene	mg/kg	-	580000	1000000	130000	150000	130000	150000	130000	150000	9300000	4100000	27000	87000	-
Indeno(1,2,3-cd)pyrene	mg/kg	-	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	ID	ID	20	80	-
2-Methylnaphthalene	mg/kg	-	2700	4900	1500	1800	1500	1800	1500	1800	670000	290000	8100	26000	-
4-Methylphenol	mg/kg	-	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	6700000	2900000	11000	36000	-
Naphthalene	mg/kg	-	250	470	300	350	300	350	300	350	200000	88000	16000	52000	-
Pentachlorophenol	mg/kg	-	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	100000	130000	90	320	-
Phenanthrene	mg/kg	-	2800	5100	160	190	160	190	160	190	6700	2900	1600	5200	-
2,4,6-Trichlorophenol	mg/kg	-	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	1000000	1300000	710	3300	-

Table 19: Final Cleanup Levels for COCs in Soil

	Units	<i>Indoor Air</i>					<i>Ambient Air</i>					<i>Contact</i>		<i>Soil</i> Saturation Concentration Screening	
		Statewide Default Background Level	Residential Soil Volatilization to Indoor Air Inhalation	Non- residential SVIAC	Residential Infinite Source Volatile Soil Inhalation	Non- residential Infinite Source VSIC	Residential Finite VSIC for 5 Meter Source	Non- residential Finite VSIC for 5 Meter Source	Residential Finite VSIC for 2 Meter Source	Non- residential Finite VSIC for 2 Meter Source	Residential Particulate Soil Inhalation (PSIC)	Non-residential PSIC	Residential Direct Contact		Non- residential Direct Contact
Polychlorinated Biphenyls (PCBs) ⁽¹⁾															
Total PCBs	mg/kg	-	3000	16000	240	810	7900	28000	7900	28000	5200	6500	2.5	9.1	-
Metals															
Aluminum	mg/kg	6900	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	ID	ID	50000	370000	-
Antimony	mg/kg	-	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	13000	5900	180	670	-
Arsenic	mg/kg	5.8	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	720	910	7.6	37	-
Barium	mg/kg	75	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	330000	150000	37000	130000	-
Cadmium	mg/kg	1.2	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	1700	2200	550	2100	-
Chromium	mg/kg	18	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	330000	150000	790000	1000000	-
Cobalt	mg/kg	6.8	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	13000	5900	2600	9000	-
Copper	mg/kg	32	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	130000	59000	20000	73000	-
Iron	mg/kg	12000	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	ID	ID	160000	580000	-
Lead	mg/kg	21	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	100000	44000	400	900	-
Magnesium	mg/kg	-	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	6700000	2900000	1000000	1000000	-
Manganese	mg/kg	440	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	3300	1500	25000	90000	-
Mercury	mg/kg	0.13	48	89	52	62	52	62	52	62	20000	8800	160	580	-
Selenium	mg/kg	0.41	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	130000	59000	2600	9600	-
Silver	mg/kg	1	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	6700	2900	2500	9000	-
Sodium	mg/kg	-	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	ID	ID	1000000	1000000	-
Thallium	mg/kg	-	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	13000	5900	35	130	-
Vanadium	mg/kg	-	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	ID	ID	750	5500	-
Zinc	mg/kg	47	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	ID	ID	170000	630000	-
General Chemistry															
Cyanide (total)	%	0.39	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	250	250	12	250	-
Cyanide (total)	mg/kg	0.39	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	250	250	12	250	-
Nitrate (as N)	mg/kg	-	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	ID	ID	ID	ID	-
Phosphorus	mg/kg	-	NLV	NLV	NLV	NLV	NLV	NLV	NLV	NLV	67000	29000	1000000	1000000	-

Notes:
 -- No criterion promulgated under Part 201
 NLV - Hazardous substance is not likely to volatilize under most conditions.
 ID - Insufficient data to develop criterion
 NLL - Hazardous substance is not likely to leach under most soil conditions.
 mg/kg - milligrams per kilogram

⁽¹⁾ MDEQ (Michigan) Generic soil cleanup criteria for residential and nonresidential category, administrative rule R 299.48 effective

⁽²⁾ Footnote T, Footnotes for Generic Cleanup Criteria Tables, administrative rule R 299.49, effective December 30, 2013, refers the reader to TSCA for the determination of the applicability of TSCA, which is incorporated by reference into the Part 201 rules. Direct contact values are based on TSCA risk based values per 40 CFR 761.61(c).

TABLE 20
FINAL ECOLOGICAL CLEANUP LEVELS

FORMER PLAINWELL, INC. MILL PROPERTY
PLAINWELL, MICHIGAN

Constituent	95% UCL Concentration (mg/kg)	Avian PRG (mg/kg)	Mammalian PRG (mg/kg)	Final Ecological PRG (mg/kg)	95% UCL < Final Ecological PRG	Risk Management Required to Meet RAO
<i>Semi-Volatile Organic Constituents (SVOCs)</i>						
Carbazole	0.083	---	0.672	0.672	Yes	No
<i>Polycyclic Aromatic Hydrocarbons (PAHs)</i>						
High Molecular Weight PAHs	19.9	69.6	59.6	59.6	Yes	No
<i>Inorganic Constituents</i>						
Cadmium	0.95	23.0	2.01	2.01		
Copper	143	634	6,334	634	Yes	No
Lead	181	140 ^a /812 ^b	7,212	140 ^a /812 ^b	Yes	Yes
Mercury	1.53	3.19	76.8	3.19	Yes	No
Selenium	0.74	---	9.09	9.09	Yes	No
Zinc	333	1,705	9,142	1,705	Yes	No

Notes:

PRG - Preliminary Remediation Goal

RAO - Remedial Action Objective

UCL - Upper Confidence Limit

mg - milligram

kg - kilogram

^a - Lower end PRG based on LOAEL of 8.75 mg/kg-day^b - Upper end PRG based on LOAEL of 42.7 mg/kg-day