ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE

OPERABLE UNIT 5
AREA 1

Kalamazoo, Michigan

Record of Decision

U.S. Environmental Protection Agency Region 5

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Chicago, IL 60604

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LIST OF ACRONYMS AND ABBREVIATIONS

AOC	Area of Contamination
AR	Administrative Record
ARARs	Applicable or Relevant and Appropriate Requirements
BAF	Bioaccumulation Factor
BERA	Baseline Ecological Risk Assessment
BHHRA	Baseline Human Health Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CDM	Camp, Dresser, McKee
CIP	Community Involvement Plan
COC	Contaminants of Concern
CRP	Community Relations Plan
CSM	Conceptual Site Model
CWA	Clean Water Act
CY	Cubic Yard
EC	Engineering Control
EPA	United States Environmental Protection Agency
EPC	Exposure Point Concentrations
FPS	Flood Plain Soil
FRG	Final Remediation Goal
FS	Feasibility Study
GP	Georgia Pacific
HI	Hazard Index
HQ	Hazard Quotient
IC	Institutional Control
LOAEL	Lowest Observed Adverse Effects Level
LTM	Long-Term Monitoring
MCL	Maximum Contaminant Level
MDCH	Michigan Department of Community Health
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
Mg/kg	Milligrams per kilogram
Mg/l	Milligrams per liter
MNR	Monitored Natural Recovery
NCP	National Contingency Plan
ND	Non Detect
NOAEL	No Observed Adverse Effects Level
NREPA	Natural Resources and Environmental Protection Act
O&M	Operation and Maintenance
OU	Operable Unit
PCB	Polychlorinated Biphenyl
PPB	Parts per Billion
PPM	Parts per Million
PRP	Potentially Responsible Party
RA	Remedial Action

RAL	Remedial Action Level
RAO	Remedial Action Objective
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RD	Remedial Design
RI	Remedial Investigation
RM	River Mile
ROD	Record of Decision
SRI	Supplemental Remedial Investigation
SRI/FS	Supplemental Remedial Investigation and Feasibility Study
State	State of Michigan
SWAC	Surface Weighted Average Concentration
TAG	Technical Assistance Grant
TBERA	Terrestrial Baseline Ecological Risk Assessment
TCRA	Time-Critical Removal Action
TEQ	Toxicity Equivalence
TRV	Toxicity Reference Values
TSCA	Toxic Substances and Control Act
Ug/l	Microgram per liter
UU/UE	Unlimited Use and Unrestricted Exposure

Part 1 – Declaration

1.1 Site Name and Location

Allied Paper, Inc./Portage Creek/Kalamazoo River site
CERCLA SITE ID# MID006007306
Operable Unit 5 Area 1
Kalamazoo County and Allegan County, Michigan

1.2 Statement of Basis and Purpose

This decision document presents the Selected Remedy for Operable Unit 5 (OU5) Area 1 at the Allied Paper, Inc./Portage Creek/Kalamazoo River site located in Kalamazoo, Michigan (the Site) (see Figure 1).

OU5 encompasses 77 miles of the Kalamazoo River from Morrow Dam east of Kalamazoo to the river mouth at Lake Michigan, plus a 3-mile stretch of Portage Creek in Kalamazoo (see Figure 2). Area 1 is the most upstream segment of the site and includes the 22-mile reach of the Kalamazoo River from Morrow Dam to the former Plainwell Dam as well as the 3-mile stretch of Portage Creek from Alcott Street to its confluence with the Kalamazoo River (see Figure 3).

The Selected Remedy was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. Section 9601 *et seq.* (CERCLA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan, 40 C.F.R. Part 300 (NCP). This decision is based on information contained in the Administrative Record file (AR) for OU5 of the Site.

The State of Michigan (State) concurs with the Selected Remedy.

1.3 Assessment of Site

The response action selected in this Record of Decision (ROD) is necessary to protect human health and the environment from actual or threatened releases of hazardous substances into the environment.

1.4 Description of Selected Remedy

The primary risks associated with OU5 of the Site are to human receptors through consumption of PCB-contaminated fish and ecological receptors through exposure to PCB-contaminated soil, which have become contaminated due to erosion and runoff of PCB-contaminated soil and sediment in Portage Creek and the Kalamazoo River. The

U.S. Environmental Protection Agency (EPA) is selecting sediment alternative S-3A and floodplain soil alternative FPS-4A as the remedy (Selected Remedy) for Area 1 of OU5 to address these risks.

EPA's Sediment Alternative – Alternative S-3A: Removal of Hot Spot Areas and Portions of Crown Vantage Side Channel, Monitored Natural Recovery (MNR), Institutional Controls (ICs), and Engineering Controls (ECs)

The sediment cleanup portion of the Selected Remedy includes ten main components:

1. Removal of impacted sediment in at least five areas containing high levels of PCBs (hot spots) and in the Crown Vantage side channel, and MNR, ICs, and ECs throughout Area 1. The hot spots (KPT-19, KPT-20, KRT-4, KRT-5/FF-19, and S-IM1) are located within the stretch of Area 1 known as the remedial reach (spanning from river mile RM69.3 to RM72.3). The remedial reach includes Section 3 and the adjacent portions of Sections 2 and 4 (see Figure 5).

2. Additional sampling throughout the remedial reach will be performed during remedial design (RD) to further delineate the removal boundaries around the known hot spots and to identify other locations for remediation within the remedial reach. Sampling will be conducted in accordance with an EPA-approved work plan.

3. Additional sampling will occur in Section 8 of Area 1 to document post-time-critical removal action (TCRA) conditions.

4. Long-term monitoring (LTM) and ICs/ECs will be implemented until final remediation goals (FRGs) are achieved. The LTM program will confirm the ongoing effects of natural processes that were and are to be enhanced by removal and remedial actions and document the continued declines in PCB concentrations in various media, resulting in reductions in risk and ecological exposures. The monitoring program will be designed to supplement the current program that includes fish and water column monitoring. The final components of the LTM program will be defined during RD.

5. The anticipated average removal depth in the identified hot spots ranges from 24 to 40 inches, based on current data from the remedial reach. The need for, and effectiveness of, a thin-layer cap will be evaluated during RD.

6. Typical silt curtain controls and surface water monitoring will be employed for turbidity and PCB migration from removal areas. Restoration will be conducted where disturbances to the existing vegetation and natural habitats will occur within upland, wetland, and riverbank areas due to the construction of support facilities and implementation of remedial activities. Excavated channel edges will be stabilized, and formerly vegetated upland areas that are disturbed for river access will be restored in kind with topsoil and revegetated with native seed mixes and woody plantings.

7. Removal of PCB-containing sediment will also serve to remove other constituents detected in Area 1 sediment, including organic constituents and metals. Removal, along with an assumed thin-layer cap addition for management of residuals, provides protection to ecological receptors from exposure to PCBs as well as these other constituents. The collocation of non-PCB constituents with PCBs in the sediment does not imply that they came from a similar source area or that they are related to paper mill recycling processes. Rather, their collocation is likely a result of shared fate and transport mechanisms.

8. Calculations show that the surface weighted average concentration (SWAC) for the remedial reach will be reduced from 1.76 milligrams per kilogram (mg/kg) to 1.09 mg/kg following the remedial action (RA) construction work. This alternative relies on natural recovery processes to achieve the FRGs and remedial action objectives (RAOs) over time.

9. The Selected Remedy will reach FRGs for smallmouth bass within 32 years after ROD issuance. The time to complete construction will be approximately 1 to 2 years, at an estimated cost of $13,100,000 to $16,600,000 (depending on the number of hot spot areas to be remediated).

10. Site-specific fish consumption advisories established and publicized by the State will continue to define risks posed to anglers and their families from consumption of PCB-containing fish. These advisories are already in place for Area 1, and the advisory for each fish type will remain in effect until fish tissue PCB concentrations achieve RAOs for the fish specified. The advisories will be reviewed and verified annually as a component of the site ICs which will include posting and maintenance of fish advisory signs.

EPA's Preferred Floodplain Soil Alternative – Alternative FPS-4A: Removal (remedial action level (RAL) 20), ICs, and ECs

The selected floodplain soil portion of the Selected Remedy includes five main components:

1. Excavation of floodplain soil in the former Plainwell Impoundment with PCB concentrations greater than a RAL of 20 mg/kg in contiguous areas of one-quarter acre or larger, and the placement of clean backfill/topsoil in excavated areas to restore floodplain grade elevations (see Figure 6).

a) The actual excavation areas/footprints will be determined during RD based on additional floodplain soil sampling. The sampling area will include floodplains outside the former Plainwell Impoundment TCRA study area. This sampling will also be performed prior to or during RD.

b) Excavation will be completed to remove contaminated soil in the ecological exposure zone. A geotextile fabric will be placed over the completed excavation area that will be backfilled with six inches of fill soil and a minimum six-inch topsoil cover to support revegetation and restoration of ecological habitat.

2. Excavation or capping of floodplain surface soil in current residential use areas with PCBs greater than 2.5 mg/kg. The sampling area will be determined and the sampling completed as part of the RD. The currently-known residential areas are highlighted in Figure 3-10 of the FS report, which can be located in the AR.

3. Alternative FPS-4A includes ICs, ECs, and LTM. ECs are to be implemented to ensure that floodplain material does not erode into the Kalamazoo River. LTM is required to evaluate backfill erosion, vegetative cover, and ECs over time. Periodic maintenance will be carried out as necessary to repair or maintain the integrity of these systems. ICs (land use restrictions) also will be implemented to protect/restrict future land use changes.

4. This alternative results in 98 percent to 100 percent of home ranges for ecological receptors being below the floodplain soil FRG of 11 mg/kg following completion of the RA construction work. The time to complete construction is approximately 1 year, at an estimated cost of $6,800,000.

5. Additional sampling will be conducted to determine whether any of the natural floodplain areas within Area 1 exceed the residential FRG. Areas exceeding the FRG will be remediated as described above, capped, and/or an IC/EC placed on the area.

This Selected Remedy will be the first of seven remedial decisions and remedial actions for OU5 of the Site. Remedial investigations (RIs) are ongoing in other areas of OU5. When the RIs are completed, Feasibility Studies (FS), Proposed Plans, and RODs will be developed to select final remedies for Areas 2 through 7 of OU5.

1.5 Statutory Determinations

The Selected Remedy set forth in this ROD achieves the statutory and regulatory mandates set forth in CERCLA Section 121 and the NCP. Specifically, the Selected Remedy addresses exposure to PCBs in a manner that is protective of human health and the environment, complies with applicable or relevant and appropriate Federal and State requirements (ARARs), and is cost effective.

The Selected Remedy does not meet the CERCLA statutory preference for treatment because no source materials constituting principal threats will be addressed within the scope of this action. 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 RA to ensure that the Selected Remedy is, or will be, protective of human health and the environment. Periodic review of the remedy's protectiveness will be needed every five years until the PCB concentration in fish tissue meets the remediation goals set forth in this ROD.

Under the Toxic Substances Control Act (TSCA), EPA finds that the PCBs remaining on Site as part of the Selected Remedy will not pose an unreasonable risk of injury to human health or the environment pursuant to 40 C.F.R. Part 761.61(c).

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 without treatment, and considering State and community acceptance.

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 AR for OU5 of the Site.

Information Item	Section in Record of Decision
Chemicals of concern and their respective concentrations	2.5
Baseline risk represented by the chemicals of concern	2.7
Cleanup levels established for chemicals of concern and the basis for these levels	2.8
How source materials constituting principal threats are addressed	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 the ROD	2.2, 2.6
Potential land and groundwater use that will be available at the Site as a result of the Selected Remedy	2.6
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	2.10
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)	2.12

1.7 Authorizing Signature

EPA, as the lead agency for the Site, formally authorizes this ROD.

Richard C. Karl, Director
Superfund Division
U.S. Environmental Protection Agency
Region 5

9-28-15
Date

The State of Michigan Department of Environmental Quality (MDEQ), as the support agency for the Site, formally concurs with this ROD. MDEQ's concurrence letter is included in Appendix 1.

Part 2 – Decision Summary

2.1 Site Name, Location, and Brief Description

2.1.1 Name, Identification Number, Official Site Address, Location

Allied Paper, Inc./Portage Creek/Kalamazoo River site
CERCLA SITE ID# MID006007306
420 East Alcott Street, Kalamazoo, Michigan 49001

The Site is located in both Allegan and Kalamazoo Counties of southwest Michigan (see Figure 1).

2.1.2 Site Type and Brief Description

The Site was listed on the National Priorities List (NPL) in August 1990 and consists of former disposal areas, former paper mill properties, and contaminated sediments, banks, and floodplains of the Kalamazoo River and Portage Creek.

EPA often divides complex cleanup sites into smaller, more manageable sections called operable units or OUs. The entire site currently comprises six different OUs:

- OU1 – Allied Paper, Inc./Bryant Mill Pond;
- OU2 – Willow Boulevard/A-Site Landfill;
- OU3 – King Highway Landfill;
- OU4 – 12th Street Landfill;
- OU5 – 77 miles of the Kalamazoo River and 3 miles of Portage Creek; and
- OU7 – former Plainwell Paper Mill Property.

OUs 1-4 and 7 are source-area OUs. The RODs for those OUs will address contaminated soils and paper-waste residuals in certain mill areas and land-based disposal areas. OU5 encompasses 77 miles of the Kalamazoo River from Morrow Dam east of Kalamazoo to the river mouth at Lake Michigan, plus a 3-mile stretch of Portage Creek in Kalamazoo. EPA divided OU5 into seven different areas (see Figure 2). This ROD addresses Area 1. EPA designated OU6 as a placeholder for certain other source areas at the Site, but currently is not used as a designation for any ongoing activities or geographic areas.

Area 1 of OU5 is the most upstream segment of the Site and includes the 22-mile reach of the Kalamazoo River from Morrow Dam to the former Plainwell Dam as well as the 3-mile stretch of Portage Creek from Alcott Street to its confluence with the Kalamazoo River (see Figure 3). Portage Creek is a tributary of the Kalamazoo River and flows into the River approximately three miles downstream of OU1, OU2, OU3, OU4, and OU7 are located at or adjacent to the Kalamazoo River at Area 1 of OU5. Area 1 flows through the communities of Comstock, Kalamazoo, Parchment, and Plainwell. Sediment, fish, and floodplain soils are the media of concern in Area 1.

EPA has divided Area 1 into distinct Kalamazoo River sections based on variations in the physical and chemical characteristics of the sediment within this stretch of OU5. The Area 1 segments are defined by landmarks and river mile (RM) measurements that indicate the miles from the mouth of the Kalamazoo River at Lake Michigan to that section, as listed below and shown on Figure 4:

- Section 1: Morrow Dam (RM76.50) to King Highway (RM73.10);
- Section 2: King Highway (RM73.10) to Portage Creek (RM71.65);
- Section 3: Portage Creek (RM71.65) to Mosel Avenue (RM70.00);
- Section 4: Mosel Avenue (RM70.00) to D Avenue (RM65.10);
- Section 5: D Avenue (RM65.10) to Railroad Bridge (RM59.40);
- Section 6: Railroad Bridge (RM59.40) to Plainwell No. 2 Dam (RM58.20);
- Section 7: Plainwell No. 2 Dam (RM58.20) to Main Street, Plainwell (RM56.65);
- Section 8: Main Street, Plainwell (RM56.65) to former Plainwell Dam (RM54.75); and
- Mill Race: Plainwell No.2 Dam (RM58.20) to confluence near Main Street (RM56.60).

2.1.3 Lead and Support Agencies and Source of Cleanup Funds

Since the start of the investigation effort in 1993, EPA and the State initiated interagency negotiations to determine which government agency should act as the lead agency and which as support agency in the remedial process. The roles of EPA and the State related to the Site and each OU are set forth in a series of Site-wide Memoranda of Understandings, which are part of the AR for the Site. At present, EPA is the lead agency for all response actions and enforcement at OU5.

EPA has issued general notice letters to multiple potentially responsible parties (PRPs) at the Site. Work done to date in Area 1 of OU5 was completed in large part by PRPs; however, in 2011, 2012, and 2013, EPA funded a response action at the Portage Creek portion of Area 1. At this time, EPA anticipates the PRPs to fund and/or implement the response action detailed in this ROD.

2.2 Site History and Enforcement Activities

EPA listed the Site on the NPL in 1990. As mentioned directly above, OUs 1-4 and 7 consists of several former paper mill properties including landfills and waste lagoons located along the Kalamazoo River and Portage Creek, disposal areas for wastes generated by those mills, and areas in and along the River and Creek to which those wastes were discharged or migrated. Since 1990, there were several response actions at many of the OUs of the Site. Described below in Sections 2.2.1 and 2.2.2 are the activities and response actions related to Area 1 of OU5.

The Site is primarily contaminated with PCBs that were found in the waste streams at paper mills, although other industrial operations also used PCBs along the Kalamazoo River. The former paper mills recycled and/or de-inked and re-pulped carbonless copy paper that contained PCBs as an ink carrier. For the most part, the mill operators discharged wastewater directly into Portage Creek and the Kalamazoo River and left dewatered wastes, commonly referred to as residuals, in on-site dewatering lagoons or disposed of the PCB-contaminated residuals in upland or wetland areas along the Kalamazoo River and Portage Creek.

Six former hydroelectric dams are located along the Kalamazoo River within the Site boundaries. In the 1970s, the State partially dismantled three dams (Plainwell, Otsego, and Trowbridge). This activity dropped the water level, and the contaminated sediment that was once under water is now PCB-contaminated floodplain soil. Lowering of the water levels also increased bank erosion. EPA and MDEQ currently estimate that there are approximately 113,000 pounds of PCBs in the Kalamazoo River sediment and floodplain soil.

To date, remediation work along the Kalamazoo River, Portage Creek, and the adjacent OUs has included multiple PCB source control and elimination activities. These activities have addressed the most significant known sources of PCBs and help support reductions in PCB levels in fish tissue.

In February 2007, EPA issued two separate AOCs: one that allowed the PRP group to conduct a series of SRIs/FSs at OU5 and a second to conduct a removal at the former Plainwell Impoundment Area (discussed below).

2.2.1 Site Investigations and Related Enforcement Activities

The Michigan Department of Natural Resources (MDNR) first became concerned about the presence of PCBs in the Kalamazoo River in 1971, after routine surface water and

biota sampling at the mouth of the river indicated that PCBs were discharging from the river into Lake Michigan. During the summer of 1972, MDNR conducted an extensive survey of PCB levels in sediments of the Kalamazoo River. In 1990, the Site was listed on the NPL as a Superfund site. CERCLA site investigations began in 1993. Over the years, various parties – including PRPs, EPA, and the State – collected an extensive body of data from a variety of environmental media. At OU5 (Areas 1 through 7), more than 15,000 samples were collected and analyzed prior to 2007. The samples were analyzed for various constituents including PCBs, metals, polycyclic aromatic hydrocarbons, and pesticides.

Sediment data for Area 1 were collected under various sampling programs, starting with the original remedial investigation (RI) work in 1993/1994. Data from the original RI were used to develop an understanding of spatial and historical PCB trends in sediment in Area 1. These data were supplemented in 2000 by additional sediment sampling.

The baseline human health risk assessment (BHHRA) for the Site was completed by MDEQ 's contractor, Camp, Dresser, McKee (CDM), in 2003 as part of the original RI. The BHHRA evaluated potential current and future risks to people who may live or engage in recreational activities near the Kalamazoo River and its floodplains along all seven areas of OU5, including risks to subsistence and sport anglers who may consume fish caught from the Kalamazoo River. Additionally, the Michigan Department of Community Health (MDCH) prepared a Health Consultation for the Site in 2002.

In 2007, SRI/FS work began. The major reports generated from the SRI/FS include:

- Area 1 SRI/FS Work Plan;
- Multi-Area FS Documents – To guide the Area 1 FS and provide consistency and efficiency across all seven areas of OU5, four multi-area FS planning documents were prepared as the first step in developing the FS Reports;
- Area 1 SRI Report;
- Area 1 Alternatives Screening Technical Memorandum; and
- Area 1 FS Report.

EPA conditionally approved the Area 1 SRI Report on June 28, 2012, and gave final approval of the report on August 21, 2012. EPA approved the Area 1 FS Report on November 4, 2014.

In addition, as part of the SRI, the BHHRA was updated in 2012 to reflect the results of additional fish tissue samples collected since the time of its original issuance in 2003. The 2012 BHHRA provided updated risk and hazard estimates for subsistence and sport anglers associated with exposures to PCBs released into the Kalamazoo River system. Bank soil and sediment sampling was conducted in 2003 and 2005-2006, respectively, in the former Plainwell Impoundment area. From 2007 through 2009, field investigations were performed in Area 1 as part of the SRI and added more than 4,100 PCB data points

for Area 1 sediment and soil. The primary intent of the SRI work was to address localized data gaps.

2.2.2 Response Actions and Related Enforcement Activities

EPA has conducted or overseen cleanup activities within or along Area 1 of OU5 since 1998, with the goal of controlling PCB sources. These activities have included TCRAs in and along Portage Creek and the Kalamazoo River, as well as interim and final remedial actions at former paper mill properties and disposal areas (e.g., at other OUs). Below are brief summaries of the removal actions that were conducted in Area 1 of OU5. More detailed information is available in various documents contained in the AR.

Bryant Mill Pond TCRA

An important effort in reducing PCB concentrations in the river and creek was the Bryant Mill Pond TCRA. The former Bryant Mill Pond, located within OU1, is a 29-acre area on Portage Creek that was the furthest upstream source of PCBs to OU5, with PCB concentrations prior to the removal action as high as 1,000 mg/kg. EPA conducted a TCRA in 1998-1999 and removed 150,000 cubic yards (cy) of sediment and floodplain soil. Excavated materials were placed in former dewatering lagoons at OU1 and capped. The lagoons are located on higher ground and are protected from stream flows by a stabilized dike.

Post-removal PCB concentrations in sediment excavation areas were below 0.46 mg/kg, and 92 percent of post-removal samples overall were below the PCB performance standard goal of 1 mg/kg. PCB concentrations in Portage Creek surface water in the former Bryant Mill Pond area were reduced by two orders of magnitude following the TCRA, and PCB concentrations in fish tissue were reduced by one order of magnitude. These fish tissue concentrations continue to decline in carp and whole body white suckers since the completion of the removal action.

Plainwell Impoundment TCRA

Under a 2007 Administrative Order on Consent (AOC), Georgia Pacific (GP) and Millennium Holdings, LLC (Millennium), two PRPs, conducted a TCRA at the area within Area 1 of OU5 known as the former Plainwell Impoundment. The 2007-2009 TCRA removed approximately 126,700 cy of sediment and soil and addressed roughly 7,625 linear feet of riverbank, and the contaminated materials were disposed of at off-site commercial landfills. The PRPs completed the required post-removal monitoring and maintenance for this TCRA in 2013. Pursuant to the AOC, the State continues post-removal monitoring and maintenance and will continue to do so until the remedial action implementing this ROD begins.

The TCRA design incorporated removal of sediment and soil, with bank stabilization to prevent erosion and downstream migration of PCBs after removal of the Plainwell Dam. Near-shore sediment was generally excavated 40 feet outward from the river bank, down

to the native gravel riverbed, with a sediment performance standard goal of 1 mg/kg PCBs. Sediments in the center of the river that could not be easily reached by the excavation equipment, and had PCB concentrations less than 50 mg/kg were left in place. This "prism" of mid-channel sediment was expected to gradually erode over time. The TCRA also excavated stable river banks (at a 3:1 slope) with an additional minimum 30-foot-wide area of soils adjacent to the new top of bank in all accessible areas with a goal of removing PCB-contaminated material exceeding 5 mg/kg (or 4 mg/kg adjacent to residential areas). The PRPs excavated a 150-foot-wide area of soils adjacent to the river at the area where the Plainwell Dam was located to achieve more stable river banks with a lower slope (10:1). Other known floodplain areas with PCB concentrations exceeding 50 mg/kg also were excavated. As a result of the removal of the Plainwell Dam, the Kalamazoo River now flows freely through that area, as it did prior to construction of the dam.

Post-removal surface sediment sampling results ranged from non-detect to 48 mg/kg, with an average PCB concentration of 1.7 mg/kg. For floodplain soils, post-removal sampling results showed that the SWAC is 6.6 mg/kg, compared to the pre-TCRA soil SWAC of 17 mg/kg. Post-removal sampling of the mid-channel prism sediment found average PCB concentrations of less than 0.6 mg/kg. Bathymetric monitoring of the prism sediment was performed twice per year to assess prism erosion, and the AOC goal of an 80 percent decrease in the prism was achieved in 2010, seventeen months after the dam was removed. Between 2006 and 2011, adult fish tissue concentrations declined between approximately 2 and 10 percent.

As part of the Plainwell Impoundment TCRA, five quarterly[1] groundwater sampling events were conducted in a network of 15 monitoring wells. PCBs were not detected in groundwater.[2]

Plainwell No. 2 Dam Area TCRA

Under a 2009 AOC, GP carried out a TCRA in the portion of Area 1 of OU5 known as the Plainwell No. 2 Dam area. The TCRA targeted riverbank soil, sediment in a portion of a historical oxbow channel, and soil in a floodplain area next to the oxbow. This TCRA removed approximately 15,700 cy of material and addressed roughly 10,000 linear feet of riverbank, and the contaminated materials were disposed of in off-site commercial landfills.

Similar to the earlier Plainwell Impoundment TCRA, a 30-foot-wide area of soils adjacent to the river was excavated in areas where PCB concentrations exceeded 5 mg/kg (or 4 mg/kg adjacent to residential areas). Other floodplain areas with known PCB concentrations exceeding 50 mg/kg also were excavated. The sediment performance standard goal was the same as for the Plainwell Impoundment TCRA (1 mg/kg).

[1] Quarterly sampling means sampling was conducted four times per year, roughly every 3 months.
[2] Based on this information, in conjunction with groundwater information from other site OUs and knowledge of the nature of the PCB contamination at the site, EPA has concluded that groundwater is not a medium of concern at Area 1 of OU5.

The post-removal sediment SWAC in the oxbow area was 6.6 mg/kg, compared to the pre-TCRA sediment SWAC of 18 mg/kg. For floodplain soils, the post-removal SWAC is 2.4 mg/kg, compared to the pre-TCRA soil SWAC of 3.2 mg/kg. Between 2009 and 2011, wet weight fish tissue concentrations decreased by approximately 50 percent for carp and young-of-year smallmouth bass and approximately 30 percent for adult smallmouth bass.

Portage Creek TCRA

From 2011-2013, EPA conducted a TCRA in a portion of Portage Creek, between Reed Street and the creek's confluence with the Kalamazoo River. Sediment concentrations were as high as 590 mg/kg and floodplain soil concentrations were as high as 72 mg/kg. The TCRA removed a total of 23,727 cy of soil and sediment from targeted, high-priority areas of Portage Creek and its floodplains. Areas with PCB concentrations greater than 10 mg/kg were targeted for removal. Similar to prior TCRAs in Area 1, the Portage Creek TCRA used a PCB performance standard goal of 1 mg/kg for sediments.

The majority of areas remediated during the Portage Creek TCRA were backfilled with two to six feet of clean fill material to return Portage Creek to its original grade. Post-removal monitoring to verify the effectiveness of the TCRA will include surface water monitoring, soil and sediment confirmation monitoring, fish tissue monitoring, and monitoring/maintenance of erosion controls. EPA's estimated post-removal PCB SWAC in Portage Creek sediment is 1.88 mg/kg, compared to an estimated pre-TCRA SWAC of 6.1 mg/kg.

2.3 Community Participation

After the Site was listed on the NPL in 1990, the State entered into an agreement with EPA, by which MDEQ served as the lead Agency for the Site and EPA acted in a support role. In 1991, MDEQ developed a Community Relations Plan (CRP), held public meetings, and addressed community concerns. In 2002, EPA assumed the role of lead Agency and began its public involvement with a community involvement workshop in March 2002. Subsequently, EPA held various public meetings and issued fact sheets related to various aspects of the Site cleanup. In 2006, EPA finalized its Community Involvement Plan (CIP) for the Site. The CIP replaced the 1991 CRP. It provides background information on the Site, recommends activities for EPA to continue to inform the public and local officials concerning progress at the site, and encourages community involvement during the site cleanup.

Since 2007, EPA has conducted two public meetings per year and distributed fact sheets discussing relevant cleanup activities within Area 1 of OU5 and anticipated future land and river uses. EPA has also conducted Site tours during the Plainwell Impoundment, Plainwell 2, and Portage Creek removal actions. On December 11, 2014, EPA held a public meeting regarding the Area 1 FS report and presented all of the relevant

information to the public and answered questions. On May 19, 2015, EPA held a public meeting for the Area 1 Proposed Plan and took comments from the public.

In 1999, the Kalamazoo River Watershed Council was issued a Technical Assistance Grant (TAG) of $50,000 to assist in document review relative to all aspects of the Site. The TAG expired in 2008.

EPA has regularly provided relevant information and written updates to interested Tribes regarding all aspects of cleanup activities at the Site.

2.4 Scope and Role of Operable Unit or Response Action

This ROD for Area 1 of OU5 will be the first of seven RDs and RAs for OU5 for the Site. Remedial Investigations are ongoing in other areas of OU5. When RIs are completed, Feasibility Studies, Proposed Plans, and RODs will be developed to select final remedies for Areas 2 through 7 of OU5. EPA has conducted response work in phases generally working upstream to downstream, utilizing an iterative approach within each area of OU5. This approach is consistent with EPA's policy which is set forth in OSWER Directive 8258.6-08, "Principles for Managing Contaminated Sediment Risks at Hazardous Waste Sites," dated February 12, 2002. Additionally, the NCP states at 300 C.F.R. Section 430(a)(1)(ii):

> "Sites should generally be remediated in Operable Units when....phased analysis and response is necessary or appropriate given the size or complexity of the site...."

The primary objective of this response action is to address the risks to human health and the environment due to PCBs in sediments and soil in the Kalamazoo River and watershed. PCB concentrations remain elevated in Kalamazoo River sediments, in the water column, in the fish, and in the floodplain soil. Removal of the PCB-contaminated sediments will result in reduced PCB concentrations in fish tissue, thereby accelerating the reduction in future human health and ecological risks. In addition, by addressing the sediments, the remediation will control a source of PCBs to the water column, which contributes to fish tissue concentrations and transports PCBs into downstream reaches of the River and eventually to Lake Michigan. Finally, by addressing PCB-contaminated floodplain soils, this response action addresses risks to human health and the environment by reducing direct contact exposure of high levels of PCBs to people and wildlife.

2.5 Site Characteristics

OU5 encompasses 77 miles of the Kalamazoo River from Morrow Dam east of Kalamazoo to the river mouth at Lake Michigan, plus a 3-mile stretch of Portage Creek in Kalamazoo (see Figure 2). Area 1 is the most upstream segment of the Site and includes the 22-mile reach of the Kalamazoo River from Morrow Dam to the former Plainwell Dam as well as the 3-mile stretch of Portage Creek from Alcott Street to its confluence with the Kalamazoo River (see Figure 3).

Physical Characteristics

Most of Area 1 is a free-flowing river with relatively rapid flow velocity. Free-flowing conditions are present with the exception of low-head former diversion structures upstream of the town of Plainwell at the former Plainwell No. 2 Dam. The part of the Kalamazoo River that flows through downtown Kalamazoo generally has lower flow velocities, resulting in thicker deposits of sediment in some areas.

The river bottom is predominantly sand and gravel with some fine-grained sediment. Fine-grained sediment occurs in areas along the channel margins and in side channels. The average depth of water in the Kalamazoo River ranges from 2.4 to 6.2 feet, and in Portage Creek average water depth ranges from 0.8 foot to 1.5 feet.

Based on groundwater monitoring conducted as part of the Plainwell Impoundment TCRA, in conjunction with groundwater monitoring data from other site OUs and knowledge of the nature of the PCB contamination at the site, EPA has concluded that groundwater is not a medium of concern at Area 1 of OU5.

Nature and Extent of Contamination

Sediment

As part of the Phase I SRI, 128 locations along 16 transects were probed between Morrow Dam and Main Street in Plainwell. From these transects, 183 sediment samples from 44 sediment cores were analyzed for PCBs, and concentrations ranged from non-detect (ND) to 210 mg/kg. Additional surface sediment samples were later collected from transect locations previously sampled during 1993/1994 and 2000. During this sampling event, 52 surface sediment samples were collected between Morrow Dam and Main Street and analyzed for PCBs; concentrations ranged from ND to 13 mg/kg.

Additional sampling was also conducted in the Plainwell No. 2 Dam Area. From this study area, 262 sediment samples from 60 sediment core locations were analyzed for PCBs; concentrations ranged from ND to 100 mg/kg.

An Area 1 side channel survey was performed to identify and evaluate potential sediment/PCB depositional areas that could exist in side channels adjacent to the Kalamazoo River. A total of 34 sediment samples from 10 sediment core locations from selected side channel and oxbow areas were analyzed for PCBs; concentrations ranging from ND to 6.1 mg/kg.

In 2000, the stretch of the river between Crown Vantage landfill and the Plainwell No. 2 Dam was resampled to evaluate and characterize the size and orientation of potential PCB-containing sediment deposits in these areas. A total of 48 sediment samples from 11 core locations were analyzed for PCBs; concentrations ranged from ND to 21 mg/kg.

Forty-two sediment cores were collected from six hot spot assessment areas (e.g., locations where transect samples indicated PCB concentrations of 50 mg/kg or greater), resulting in 234 sediment samples. The samples were analyzed for PCBs, total organic carbon, solids, and grain size; concentrations ranging from ND to 310 mg/kg.

Most PCBs currently in sediment are associated with low energy depositional areas of the river. Most of the river channel in Area 1 is in a condition of dynamic equilibrium (except for the former Plainwell Impoundment following the 2007-2009 TCRA). Dynamic equilibrium defines a condition where sediment settles out of the water column during receding flows but is susceptible to movement during increasing flows. The river in the former Plainwell Impoundment is a non-depositional area following removal of the Plainwell Dam.

PCBs are broadly distributed over the 22-mile reach of Area 1, mostly in pockets of fine-grained material. PCB concentrations greater than 50 mg/kg in sediment were identified as hot spot areas during SRI sampling events. The areas of these hot spots range from approximately 0.025 acre to 1.4 acres. Concentrated deposits of PCBs remain in sediments near the City of Kalamazoo and in a side channel next to the Crown Vantage landfill area.

Surface-Weighted Average Concentration

A SWAC is a method of spatially calculating the average concentration of a constituent in the sediment surface. Samples are collected throughout the area of concern, representative subareas are generated for each sample location, and a subarea-weighted average concentration is calculated to produce the SWAC. The subareas may be generated using several different methods such as grids or stream tubes. More details about the SWAC calculation methods are provided in the Area 1 SRI and FS reports in the AR.

Table 1 shows the SWACs that were calculated for Area 1, including Sections 1 through 8 and the Plainwell Mill Race. Confidence limits were developed for the SWAC calculations to confirm that the SWAC estimates represent conservative values for each river section. (A separate SWAC was calculated for the Crown Vantage side channel, as discussed below.) SWAC values were calculated using data from the 0-6" sediment interval. (Note: although technically not SWACs, area-weighted average concentrations for other, non-surface depth intervals also were calculated and are shown in Table 1. This data for other sediment depth intervals will be discussed later in this ROD.)

The 0-6" SWAC values in Table 1 indicate that river Section 3, which has a relatively high SWAC compared to the surrounding sections, should be the focus of additional evaluation to identify appropriate remedial alternatives. Although the SWACs for Sections 2 and 4 are relatively low, with SWAC concentrations less than 1 mg/kg, sample results identified PCB hot spots in these two sections. Therefore, remedial alternatives for sediment hot spot areas in river Sections 2 and 4 were also developed. The area spanning

river Section 3 and portions of river Sections 2 and 4 is the remedial reach for which sediment remedial alternatives are developed and is illustrated in Figure 5.

Additional hot spots are not expected outside the remedial reach due to the low PCB concentrations observed outside this area. As shown in Table 1, the SWACs for all other sections and intervals were less than 1 mg/kg with the exception of Section 8. The listed SWAC for Section 8 includes some sediment concentrations measured prior to the Plainwell Impoundment TCRA, and, therefore, is not representative of present-day PCB concentrations in that section, which are expected to be much lower following the TCRA. Additional sampling is needed in Section 8 to confirm current conditions in that part of the river.

A separate SWAC was calculated for the Crown Vantage side channel, which is located in Section 4 approximately 1.5 miles downstream of the remedial reach. Based on the calculated SWAC of 8.2 mg/kg, sediment remedial alternatives also were developed for the Crown Vantage side channel.

As noted earlier, EPA completed the TCRA activities in Portage Creek in 2013. The post-TCRA sediment SWAC in Portage Creek is estimated to be 1.8 mg/kg. Portage Creek is part of Area 1 of OU5 and will be included in the Area 1 inspections and LTM program to assess restored bank conditions and to document ongoing natural recovery.

Floodplain Soil

Beginning with the original RI and continuing through the SRI, the purpose of floodplain soil investigations was to evaluate PCB deposition in formerly-impounded areas, assess whether past flooding events transported PCBs to the floodplain, and characterize the nature and extent of PCB-impacted floodplain soil.

The floodplain investigation during the original RI involved five Kalamazoo River floodplain sampling transects established between the confluence of Portage Creek and the city of Allegan. In addition, six transects were sampled to characterize the nature and extent of PCB contamination within the boundaries of the former Plainwell Impoundment.

As part of the SRI, soil samples were collected from floodplain areas within Area 1. These included top-of-bank soil cores from Section 7, floodplain and adjacent soil samples near the Crown Vantage landfill in Section 4, and samples from the historically-inundated area upstream of the Plainwell No. 2 Dam Area in Section 6. Most of the floodplain soil samples were collected near the dams in the former Plainwell Impoundment and the Plainwell No. 2 Dam area. Because several sampling locations subsequently were excavated as part of the TCRAs completed in these two areas, the PCB data associated with those locations where PCBs were removed are no longer representative of current conditions. As a result, additional sampling will be performed as part of the RD.

The floodplain soil data were grouped into four geographic subareas of Area 1, as follows:

- Soil Area 1 is the reach from Morrow Dam to the railroad bridge at the upstream end of the Plainwell No. 2 Dam Area. Data include floodplain transect data, focused soil data within this reach, and the Crown Vantage soil data;
- Soil Area 2 is the Plainwell No. 2 Dam Area. Data include floodplain soil samples, bank samples, and other soil samples that fall within this reach;
- Soil Area 3 is the area between the Plainwell No. 2 Dam and Main Street, Plainwell. Data include top-of-bank samples from along the river and the mill race; and
- Soil Area 4 is the reach from Main Street, Plainwell to the former Plainwell Dam. Data include top-of-bank and floodplain soil samples.

These soil area divisions were established based on the premise that the dams, and the different characteristics of each area, had an important influence on depositional conditions. For example, where the river flow slowed through the impoundment behind the former Plainwell Dam and in the frequently-inundated area around the two flow control structures of the Plainwell No. 2 Dam Area, PCB-containing sediment tended to settle out of the water column. As a result, the PCB concentrations in floodplain soil (including exposed former sediment in the former Plainwell Impoundment) in Soil Areas 2 and 4 are higher than those in the natural floodplains surrounding the free-flowing sections of the river.

Table 2 summarizes the soil data for the four Soil Areas. As shown in the table, PCB concentrations are lower in Soil Area 1, which has natural floodplains and no dams, than the other areas. Other conclusions drawn from the data include the following:

- Surface soil PCB concentrations are lowest in Soil Areas 1 and 3, which are not directly influenced by dams, and are highest in Soil Areas 2 and 4;
- Mean surface soil PCB concentrations follow a similar pattern, with lower surface soil concentrations in Soil Areas 1 and 3 than in Soil Areas 2;
- For subsurface soils, the maximum PCB concentration was lowest in Soil Area 1 and highest in Soil Area 4; and
- Mean soil PCB concentrations (any depth) were lowest in Soil Area 1 and highest in Soil Area 4.

Additionally, higher PCB concentrations and frequency of detections occur downstream of the Plainwell No. 2 Dam Area in the top-of-bank samples (Soil Area 3) and in the former Plainwell Impoundment (Soil Area 4).

In the Plainwell No. 2 Dam Area (Soil Area 2), most of the higher PCB concentrations are found within the top 0.5 foot, and the average thickness of PCB-containing soil is approximately 1.4 feet. In the former Plainwell Impoundment (Soil Area 4),

PCB-containing soil is found at greater depths (approximately 1 foot to 3 feet). The average thickness of the PCB-containing layer in the former Plainwell Impoundment is estimated to be approximately 3.4 feet.

Floodplain Soil SWAC

Exposed former sediment in the floodplains of the former Plainwell Impoundment and the Plainwell No. 2 Dam Area were the primary focus of the TCRAs completed in those areas. The pre-TCRA soil PCB SWAC in the former Plainwell Impoundment and the Plainwell No. 2 Dam Area were 17 mg/kg and 3.2 mg/kg, respectively. Data representative of post-TCRA soil PCB levels indicate the current floodplain soil SWAC in the former Plainwell Impoundment is 6.6 mg/kg. In the Plainwell No. 2 Dam Area, the current post-removal SWAC is 2.4 mg/kg.

The restored riverbanks and the clean soil placed over removal areas serve as a buffer in many locations between the river and the PCBs remaining in the exposed former sediment (e.g., materials that were underwater when the dam was fully operational but are now located in the floodplain). In both TCRA locations, the riverbanks and revegetated areas are monitored and maintained to provide erosion control. Floodplain soil data show that flooding of the Kalamazoo River has not resulted in appreciable accumulation of PCBs in the natural floodplains (e.g., areas not influenced or inundated by the historical operations of dams). Targeted sampling performed in low-lying areas indicate the average PCB concentration in the natural floodplain soil in Area 1 upstream of the railroad bridge on the upstream edge of the Plainwell No. 2 Dam Area is less than 1 mg/kg across sample depths and within the surface soil. Additional details are provided in Section 6.3 of the SRI Report.

Portage Creek floodplain soil with elevated PCB levels was addressed during the Portage Creek TCRA.

Contaminants of Concern

As described in the generalized CSM, PCBs are the primary contaminants of concern (COCs). The available data indicate that exposure to PCBs will drive risks at the Site, and that management of risks due to PCB exposure will also address risks associated with other non-PCB constituents.

During the investigation of Areas 1 and 2 of OU5, samples collected from various media in and along Kalamazoo River and Portage Creek, including soil, sediment, surface water, and biota (fish tissue), were selectively analyzed for non-PCB constituents. Samples were analyzed for metals, volatile organic compounds, semi-volatile organic compounds, pesticides, and polychlorinated dibenzo-*p*-dioxins/polychlorinated dibenzofurans (dioxins and furans). The results of these analyses are presented and evaluated in Appendix M of the SRI Report. Many non-PCB constituents were detected in all media. The Area 1 data suggest that several non-PCB constituents with an affinity

for fine-grained organic particles – similar to that of PCBs – are collocated with PCBs as a result of similar transport and deposition mechanisms.

A more thorough evaluation of non-PCB constituents detected in Areas 1, 2, and 3 of OU5 was completed in July 2015 and concluded that PCBs are the primary COC and risk driver in Area 1. As such, this ROD, in relation to residential floodplain soils within the geographic boundary of Area 1 of OU5, addresses only PCB-contaminated soils.

Conceptual Site Model

A conceptual site model (CSM) was developed for Area 1 of OU5 based on site characteristics and results from the SRI investigations. The CSM tells the story of how and where the PCB contamination moved and what impacts such movement may have had upon human health and the environment.

As described in the CSM, PCBs are the primary COC. Site data shows that exposure to PCBs will drive risks at the Site, and that the management of risks due to PCB exposure will also address risks associated with other non-PCB constituents. PCB levels in fish are linked to concentrations in sediment and surface water through the food chain. Risks to humans and aquatic ecological receptors are driven by the consumption of PCB-contaminated fish. Human health risk estimates show concentrations of PCBs in fish tissue result in exceedances of EPA target levels for both cancer and non-cancer risks; this will be further discussed in the "Summary of Site Risks" section of this ROD.

The primary transport mechanism is PCB uptake through the food chain via PCB-contaminated sediment that already exists in the river and that continues to enter the river by erosion of PCB-contaminated bank material. External sources of PCBs to Area 1 as well as background sources of PCBs from areas upstream of Area 1 (which have mean background PCB sediment concentrations of 0.31 mg/kg) are expected to sustain low levels of PCBs in fish tissue in the long term, even with control of known potential source areas associated with historical papermaking operations.

The media of concern in Area 1 are sediments, fish, and floodplain soils. The targeted remediation areas in Area 1 are currently known hot spot areas in river Sections 2 and 4, the Crown Vantage side channel, and river Section 3. Remedial alternatives for sediments will address the potential for bank soil erosion and transport. Remedial alternatives for sediments will include additional post-TCRA sampling in Section 8 during the RD. As noted earlier, the calculated SWAC for Section 8 is primarily based on pre-TCRA data, and sampling during the RD will provide current representative sediment PCB concentrations. Floodplain soil in the former Plainwell Impoundment study area is targeted for remediation. In addition, an evaluation of natural floodplains outside the impoundment areas in Area 1 for potential residential exposure to PCB concentrations is needed. Residential property sampling during RD is planned.

2.6 Current and Potential Future Land and Resource Uses

Land use along the river and creek in Area 1 varies, with industrial, commercial, municipal, recreational, and residential areas near the population centers of Comstock, Kalamazoo, Parchment, and Plainwell. Between the population centers, land use is dominated by large areas of State-owned forested land and privately-owned forested and agricultural properties. These are interspersed with residential and recreational parcels. There is no known active tribal land use. Appendix C of the Area 1 SRI report describes the current and future land use assessment. MDEQ has designated the Kalamazoo River as a Natural River according to the Natural River Act (Part 305 of P.A. 451 of 1994).

2.7 Summary of Site Risks

This section summarizes the risks to human health and the environment that are posed by the contamination.

Baseline Human Health Risk Assessment

In addition to fish consumption by anglers, several other potential exposure pathways were described in the 2003 BHHRA that are relevant to Area 1, as follows:

- *Consumption of turtles:* Although this pathway was evaluated qualitatively as a potential exposure pathway, the BHHRA concluded that the overall exposure and risks to receptors ingesting turtles would be less than that of anglers. The analytical data that exist for turtle tissue indicate that PCB concentrations are less than that for smallmouth bass and carp fish tissue;
- *Consumption of waterfowl*: This exposure pathway was considered in the BHHRA. However, because of data limitations with waterfowl samples, CDM did not complete a qualitative evaluation or quantify risk estimates for this exposure pathway;
- *Direct contact with river sediment (by swimmers or waders):* Direct contact exposures to river sediment during recreational activities (e.g., swimming, wading) were determined not to be an important means of exposure to PCBs, based on the Health Consultation prepared by the MDCH. As a result, such exposures were not evaluated further in the BHHRA;
- *Exposure to in-stream surface water (by swimmers or waders):* Due to the relatively low ingestion rates of surface water, the low solubility of PCBs in water, and the low dermal absorption of PCBs, the BHHRA concluded that this pathway could be assumed to be without risk;
- *Exposure to air:* Inhalation of particulates and volatile emissions from exposed floodplain soil and sediment were quantitatively evaluated in the BHHRA, but inhalation of volatile emissions from surface water was not quantitatively evaluated; and
- *Direct contact with floodplain soil and exposed sediment:* Residential developments exist next to the floodplains in the former Plainwell Impoundment, the Plainwell No. 2 Dam Area, and in other locations throughout Area 1. The

BHHRA quantitatively evaluated direct contact pathways (dermal contact and incidental ingestion) that may be relevant to residents (the most highly-exposed receptor group) or recreational visitors.

Fish Advisory

MDCH has issued a fish advisory for parts of Portage Creek and the Kalamazoo River, extending from Morrow Lake Dam to Lake Michigan. For the river area from Morrow Lake Dam to the Allegan Dam (which is located in Area 6), and on Portage Creek downstream of Monarch Mill Pond (which is located just upstream of OU1), the advisory currently recommends that the general population not consume carp, catfish, suckers, smallmouth bass or largemouth bass from these areas. Between Allegan Dam and Lake Michigan, the advisory recommends that the general public not consume carp, catfish, or northern pike. Healthy adult males are advised to eat no more than one meal per week of all other species. For women of childbearing age and children under 15 years of age, no consumption of any species is recommended for fish caught above Allegan Dam (including Area 1).

MDCH's fish consumption advisory is only a recommendation, is not legally binding, and has limited effectiveness in protecting human anglers from Kalamazoo and Allegan Counties. A survey from 1994 showed that anglers ate on average two meals per month of various species taken from contaminated reaches of the river, including bass, catfish, panfish, bullheads, and carp. More than 10 percent of anglers ate more than one meal per week of these various species. This survey confirmed that the Kalamazoo River is an important recreational resource and may serve as an important source of food for certain human populations.

BHHRA Conclusions

The likelihood of any kind of cancer resulting from exposure to carcinogens at a Superfund site is generally expressed as an upper bound incremental probability, such as a "1 in 10,000 chance" (expressed as 1×10^{-4}). In other words, for every 10,000 people exposed to the site contaminants under reasonable maximum exposure conditions, one extra cancer may occur 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 risk of cancer individuals face from other causes such as smoking or too much sun. The risk of cancer from other causes is estimated to be as high as one in three. The potential for non-cancer health effects is evaluated by comparing an exposure level over a specified time period (such as a lifetime) with a "reference dose" derived for a similar exposure period. A reference dose represents a level that is not expected to cause any harmful effect. The ratio of exposure to toxicity is called a hazard quotient (HQ). An HQ < 1 indicates that the dose from an individual contaminant is less than the reference dose, so non-cancer health effects are unlikely. The hazard index (HI) is generated by adding the HQs for all COCs that affect the same target organ (such as the liver). An HI < 1 indicates that, based on the sum of all HQs from different contaminants and exposure routes, non-cancer health effects from all contaminants are unlikely. An HI > 1 indicates that site-related

exposures may present a risk to human health. EPA's acceptable risk range is defined as a cancer risk range of 1×10^{-6} to 1×10^{-4} and an HI < 1. Generally, RA at a site is warranted if cancer risks exceed 1×10^{-4} and/or if non-cancer hazards exceed an HI of 1.

The BHHRA for the site (including Area 1) presented estimated cancer risks and non-cancer hazards for several populations of anglers consuming fish from the Kalamazoo River and for residential and recreational receptors exposed to floodplain soil adjacent to the former Plainwell, Otsego, and Trowbridge Impoundments.

Risk characterization for anglers was performed for three potential populations: central tendency sport anglers, high-end sport anglers, and subsistence anglers.[3] Two exposure scenarios for the three angler populations were included in the BHHRA. The first assumed a diet of 100 percent pelagic (non-bottom feeding) fish species and the second assumed a mixed species diet (76 percent pelagic species and 24 percent bottom-feeding species).

The BHHRA showed that potential excess cancer risks and non-cancer hazards exceeded acceptable levels for the fish ingestion pathway for all three angler populations. Cancer risks and non-cancer hazards were highest for the subsistence angler (2×10^{-3} and an HI of 123, respectively). Cancer risks and non-cancer hazards were lowest for the central tendency sport angler (3×10^{-4} and an HI of 17, respectively). Adverse health effects associated with PCB exposure include increased risk of liver cancers and reproductive and immunological impairment. The highest risks and hazards are associated with a mixed species diet, and were highest in the vicinity of the recent Area 1 TCRAs described earlier in this document. The BHHRA did not take into account recent reductions of PCB concentrations in sediment and soil due to the TCRAs.

For residents and recreationists potentially exposed to floodplain surface soil, it should be noted that the BHHRA estimated the excess cancer risks and non-cancer hazards based on pre-TCRA concentrations, thereby likely overestimating the risks and hazards associated with current and future exposures in the TCRA locations.

For the three areas evaluated (e.g., the floodplain areas around the former Plainwell and Plainwell 2 impoundments, the Otsego Dam, and the Trowbridge Dam), estimated risks for residents exposed to average floodplain surface soil concentrations were within EPA's acceptable risk range but were greater than MDEQ's cancer risk threshold of 1×10^{-5}. Excess cancer risk estimates exceeded the acceptable risk range when the maximum detected concentration for each area was used.

For residential receptors exposed to floodplain soil via multiple routes (e.g., ingestion, dermal contact, and inhalation of fugitive dust), HIs for the reproductive endpoint exceeded 1 for all three areas when maximum concentrations were used, but were less than 1 using average floodplain soil concentrations. HIs for immunological endpoints

[3] Central tendency sport anglers were estimated to consume an average of 0.015 kg fish tissue/day (24 half-pound meals/year). High-end sport anglers were estimated to consume 0.078 kg fish tissue/day (125 half-pound meals/year). Subsistence anglers were estimated to consume 0.11 kg fish tissue/day (179 half-pound meals/year).

exceeded 1 for all three areas using both average and maximum floodplain soil concentrations.

Excess cancer risks and non-cancer hazards for recreationists exposed to average floodplain surface soil concentrations were within EPA's acceptable risk range and less than MDEQ's cancer risk threshold of 1×10^{-5} in all three areas evaluated. Potential cancer risks were still within EPA's acceptable risk range when the maximum floodplain soil concentration was used, but were greater than MDEQ's cancer risk threshold. HIs were greater than 1 when maximum soil concentrations were used.

As noted earlier, fish advisories are currently in place to address risks to humans from consumption of fish. There are currently no restrictions in place to control human exposures to sediment, soil, or surface water.

In summary, the fish ingestion pathway poses unacceptable risks and hazards to anglers. Additionally, potential exposure to maximum floodplain soil concentrations may pose unacceptable risks and hazards to residents and recreationists. The highest risks from exposure to floodplain soils are 2- and 25-times lower than those for the central tendency sports angler and subsistence angler scenarios, respectively. The BHHRA made assumptions using best professional judgment and available scientific literature on risk assessments. The risk assessment for floodplain surface soil was based on pre-TCRA soil concentrations, which would tend to overestimate current and future risks for residents and recreationists. The overall risk to human health attributable to Area 1 is an upper-bound *probability* of adverse health effects, not a statement of actual health effects.

Baseline Ecological Risk Assessment

As part of the original RI, CDM prepared a baseline ecological risk assessment (BERA) for OU5 that identified terrestrial and aquatic receptors and exposure pathways. During the SRI, an updated Area 1 terrestrial BERA (TBERA), covering terrestrial birds and mammals, was conducted and included as Appendix B to the Area 1 SRI Report. The methods and approaches incorporated in the Area 1 TBERA built on the information in the BERA and the CSM. The TBERA also accounted for updated risk assessment guidance and scientific research, additional sampling results, a December 2008 peer review panel report, two completed TCRAs in Area 1, and source control activities completed or underway at the former mill properties and landfill OUs in Area 1 since the BERA was completed. The Area 1 TBERA did not revisit the aquatic portion of the BERA but carried forward those associated conclusions.

The BERA was conducted to evaluate potential adverse effects to terrestrial and aquatic ecological receptors associated with PCB exposures in surface water, sediment, surface soil, and biota. Representative ecological receptors included aquatic plants, aquatic macroinvertebrates, game fish, forage fish, rough fish, terrestrial invertebrates, small burrowing omnivorous mammals, semi-aquatic herbivorous mammals, small semi-aquatic carnivorous mammals, and top mammalian and avian predators. The BERA evaluated complete exposure pathways that included the following:

- Surface water – direct contact, uptake, ingestion, or ingestion of prey;
- In-stream sediment/interstitial water – direct contact, ingestion, or ingestion of prey; and
- Surface soil/floodplain sediment and soil – direct contact, ingestion, or ingestion of vegetation/prey.

The BERA concluded the following:

- Most aquatic biota, such as invertebrates and fish, are not expected to be adversely affected by direct contact with and ingestion of surface water because of relatively low PCB toxicity to most aquatic biota;
- PCB contamination of surface water and streambed sediment may adversely affect sensitive piscivorous predators, such as mink, through the consumption of PCB-contaminated fish; and
- Terrestrial and semi-aquatic biota are potentially at risk from floodplain sediment and surface soil, depending on life cycle characteristics (e.g., foraging behavior, diet, mobility) and predicted sensitivity to PCBs.

The development of the Area 1 TBERA was a coordinated effort among GP, EPA, the State, and the U.S. Fish and Wildlife Service. The participants agreed on key inputs and elements of the terrestrial assessment, including establishing the focus of the Area 1 TBERA on the former Plainwell Impoundment and the Plainwell No. 2 Dam Area. These two areas were the focus of recently-completed TCRAs that addressed PCBs, so the participants agreed to focus on assessing residual risks to terrestrial receptors associated with PCB exposure via the food chain in those two areas. Representative receptors were selected as the most highly-exposed species likely to inhabit Area 1. The representative receptors included insectivorous birds (house wren), vermivorous mammals (short-tailed shrew), vermivorous birds (American robin and American woodcock), carnivorous mammals (red fox), and carnivorous birds (red-tailed hawk).

To evaluate risks for receptors with individual foraging ranges smaller than the two assessment areas (e.g., the American robin, American woodcock, house wren, and short-tailed shrew), a "moving-window" approach was used to approximate the receptor-specific exposure units. This approach provides a continuous measure of exposure for each pre-determined home range size across the entire area instead of non-overlapping, discrete home ranges. Exposure point concentrations (EPCs) for wide-ranging receptors (e.g., red fox and red-tailed hawk) were assessed for the two areas separately using unbiased floodplain soil data. Area-wide EPCs were estimated as an area-weighted mean. At the request of EPA, risk associated with exposure to dioxin (specifically, dioxin toxicity equivalence or TEQ) was also considered for a subset of the receptors/exposure scenarios.

HQs[4] were calculated using three approaches to model potential PCB exposure to terrestrial wildlife. Approach 1, the Dietary Approach, estimated average daily doses based on floodplain soil and tissue ingestion, was calculated for both total PCBs (birds and mammals) and TEQs (small mammals only). The other two approaches, for birds only, were included at the request of EPA. In Approach 2 (Egg-Based Approach), egg-based exposure to both PCBs and TEQs for robins, woodcocks, and house wrens was estimated by modeling egg tissue concentrations from floodplain soil concentrations using a bioaccumulation factor (BAF). An alternate Egg-Based Approach via Dietary Ingestion (Approach 3) was also used to estimate egg-based exposure by incorporating a dietary exposure model to estimate egg tissue TEQ concentrations for the American robin (e.g., using a floodplain-soil to soil-invertebrates to egg BAF). Avian receptor evaluations included HQs based on high-sensitivity and mid-range-sensitivity toxicity reference values (TRVs). A TRV is a quantitative measure of the toxicity of a chemical to the species of concern, and the TBERA utilized TRV information from research literature. More detailed information regarding the TBERA is available in the Area 1 TBERA Report.

The Area 1 TBERA conclusions are summarized as follows:

- Risk to vermivorous mammals is possible, but unlikely based on the low magnitude of shrew HQs (maximum Lowest Observed Adverse Effects Level (LOAEL) HQ of 1.2), low frequency of possible home ranges with LOAEL HQs greater than 1.0, and the results of the Housatonic River[5] shrew study. Based on estimated No Observed Adverse Effects Level (NOAEL) dietary HQs, carnivorous mammals (represented by the red fox with a home range more than ten times as large as either area) have acceptable risks that are well below 1.0 for both the former Plainwell Impoundment and the Plainwell No. 2 Dam Area;
- Moderate- to low-sensitivity insectivorous birds (represented by the house wren) are not at risk;
- High-sensitivity insectivorous birds (also represented by the house wren) have a potential for risk based on the egg-based HQs (Approach 2), but unacceptable risk is not likely based on dietary HQs (Approach 1);
- Highly-exposed (e.g., greater than 40 percent terrestrial invertebrates), moderate- to low-sensitivity vermivorous birds (represented by the American robin) are not considered at risk; and
- Highly-exposed, moderate- to low-sensitivity vermivorous birds (represented by the American woodcock) are not considered at risk.

In summary, risk to vermivorous avian species in Area 1 is considered unlikely based on mid-range sensitivity TRVs because LOAEL HQs were less than 1.0. High-sensitivity TRVs resulted in HQs greater than 1.0 for both dietary (in former Plainwell Impoundment only) and egg-based exposures; however, no small-ranging, highly-

[4] The meaning of an HQ was previously described in the "Baseline Human Health Risk Assessment" section of this ROD.

[5] The Housatonic River is a Superfund site in western Massachusetts and Connecticut with PCB-contaminated sediments and soils.

exposed, high-sensitivity vermivores were observed at the site in over 30 years of surveys conducted by the Kalamazoo River Nature Center. Given the low probability that highly-exposed (e.g., greater than 40 percent terrestrial invertebrates in diet), high-sensitivity avian vermivores are present in Area 1, ecologically-significant adverse effects on vermivorous birds in Area 1 are possible, but not likely. Carnivorous birds (represented by the red-tailed hawk) are not considered to be at risk.

2.8 Remedial Action Objectives

Remedial action objectives (RAOs) are goals for protecting human health and the environment. RAOs are developed to address the contaminant levels and exposure pathways that present unacceptable current or potential future risk to human health and the environment. The development of RAOs and cleanup levels, known as FRGs, is the first step in identifying and screening remedial alternatives for addressing the COCs and media of concern.

Remedial Action Objectives for Area 1

The following four RAOs were developed for PCB-containing media in Area 1:

- **RAO 1: Protect people who consume Area 1 Kalamazoo River fish from exposure to PCBs that exceed protective levels.** This RAO is expected to be progressively achieved over time by meeting the following targets for fish tissue and sediment:
    - Reduction in fish tissue to the Michigan fish advisory level for smallmouth bass to two meals per month (0.11 mg/kg total PCB concentration) within 30 years[6];
    - Achievement of a non-cancer HI of 1 and a 10^{-5} cancer risk within 30 years for the high-end sport angler (100 percent bass diet; 125 meals/year)[7]; and
    - The above fish tissue goals for bass will be achieved by reducing the sediment PCB SWAC in each of the eight sections of the river in Area 1 to 0.33 ppm or less following completion of the remedial action.

- **RAO 2: Protect aquatic ecological receptors from exposure to concentrations of PCBs in sediment that exceed protective levels for local populations.** This RAO is designed to protect fish-eating birds and mammals by reducing fish tissue PCB concentrations to levels that do not harm the sustainability of local populations of these receptors[8].

- **RAO 3: Protect terrestrial ecological receptors from exposure to concentrations of PCBs in soil that exceed protective levels.** This RAO is intended to protect local populations of birds and mammals by reducing PCB concentrations in soil to levels that do not harm the sustainability of local populations of these receptors.

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[6] This specific target is a goal of the remedial action, but it is not a FRG.
[7] The non-cancer and cancer risk levels described here are what drive the FRGs for RAO 1.
[8] See the FRG table on page 31.

- **RAO 4: Reduce transport of PCBs from Area 1 to downstream areas of the Kalamazoo River and Lake Michigan.** This RAO includes reducing the potential for erosion and downstream migration of PCB-impacted sediment and riverbank soil.

Final Remediation Goals/Cleanup Levels

FRGs are risk-based or ARAR-based chemical-specific concentrations that help further define the RAOs. This ROD establishes the final remediation goals and/or cleanup levels. FRGs are also used to define the extent of contaminated media requiring remedial action, and are the targets for the analysis and selection of long-term remedial goals.

The BHHRA developed a series of risk-based concentrations (RBCs) for total PCBs in fish, sediment, and floodplain soil intended to be protective of anglers, recreationists, and residents, while the BERA and TBERA developed RBCs for sediment and floodplain soil intended to be protective of sensitive wildlife receptors. The RBCs are calculated, chemical-specific concentrations below which no significant health effects are anticipated for a receptor. For human receptors, Area 1 RBCs correspond to a target risk for carcinogenic effects of 1×10^{-5} and a target hazard index of 1 for non-carcinogenic effects. For ecological receptors, RBCs correspond to a target HQ of 1. RBCs for ecological receptors represent a risk range based on NOAEL and LOAEL risk estimates for each receptor group.

Selection of Fish Tissue Final Remediation Goals

The selection of a fish tissue FRG was a multi-step process that considered the RBC_{fish} values generated for each receptor, the likely exposure scenario to be frequently encountered, and the background levels of PCBs in fish tissue. Although a subsistence angler scenario was included in the calculation of RBC_{fish}, this pathway represents a worst-case scenario that is not expected to be frequently encountered compared to sport anglers. The RBC_{fish} would likely reflect a diet that is weighted toward the 100 percent smallmouth bass consumption scenario (over a mixed carp and bass species scenario) because the smallmouth bass is a popular sport fish on the Kalamazoo River. The range of RBC_{fish} for sport anglers is from 0.042 mg/kg to 0.187 mg/kg (non-lipid corrected). The upper end of this range is similar to the mean background concentration in smallmouth bass fillets in Morrow Lake immediately upstream of Area 1 (0.23 mg/kg). Another background reference area further upstream of Area 1 (Ceresco) had mean smallmouth bass fillet concentrations of 0.03 mg/kg. The upper end of this range is also protective of women of childbearing age and young children consuming one half-pound meal/month from the Site.

For RAO 1, the fish tissue FRGs for total PCBs are 0.042 mg/kg for carcinogenic effects (based on a risk of 1×10^{-5}) and 0.072 mg/kg for non-carcinogenic effects (based on an HI of 1). These FRGs are based on risk estimates to sport anglers and sensitive populations, and take into account background considerations.

For RAO 2, the fish tissue FRG for total PCBs is 0.6 mg/kg, which is protective of mink (the most sensitive ecological receptor).

Selection of Sediment FRGs

The selection of a sediment FRG considered the human health RBC_{sed} values associated with the human receptors who consume fish. MDEQ conducted an independent evaluation and has recommended a sediment FRG of 0.33 mg/kg. MDEQ concluded that this FRG value is appropriate for sediment because it is sufficiently protective of the high-end sport angler. This FRG value also corresponds to MDEQ's historical PCB detection limit that has previously been used as a screening and target level in Michigan, and that has become a precedent value in the State for PCB site cleanup efforts under Michigan's Natural Resources and Environmental Protection Act, Part 201. Further, this FRG is close to the mean background sediment concentration of 0.31 mg/kg.

A FRG of 0.33 mg/kg is protective of both human and ecological receptors. Sediment concentrations below 0.33 mg/kg are not likely to bioaccumulate in fish tissue to levels that present unacceptable risks and hazards to human populations and will promote the achievement of the fish tissue RAOs over time.

Selection of Floodplain Surface Soil FRGs

The selection of a floodplain surface soil FRG was based on the range of site-specific RBC_{soil} values calculated for human recreationists and ecological receptors, with the ecological RBC_{soil} values driving the selection of the FRG because they were much lower than the values for human receptors. Although ecological risk was predominantly associated with high-sensitivity insectivorous and vermivorous birds and vermivorous mammals in the Area 1 TBERA, a range of RBC_{soil} was calculated based on the protection of multiple wildlife receptors. A detailed analysis of the uncertainty associated with the TBERA RBCs is provided in Attachment 1 of Appendix G of the FS Report.

A FRG of 11 mg/kg is based on protectiveness of 1-acre home ranges for maximum exposed mammals. Based on the analysis presented in the Area 1 FS Report and the post-TCRA conditions at the former Plainwell Impoundment, a FRG of 11 mg/kg is shown to currently be protective of 82 percent of the possible 1-acre home ranges within the former Plainwell Impoundment for maximally-exposed mammalian receptors (e.g., the shrew). Current post-TCRA conditions at the Plainwell No. 2 Dam Area are protective of 100 percent of the possible 1-acre shrew home ranges. A FRG of 11 mg/kg PCBs is also assumed to be protective of avian receptors as it represents a balance between risk and uncertainty associated with the various methodologies and assumptions used in the TBERA to calculate risk to avian receptors.[9] Evaluation of the dietary and/or egg-based RBCs indicates that the FRG of 11 mg/kg in floodplain soil is protective of the various ecological receptors.

[9] A FRG of 11 mg/kg is below the dietary high-sensitivity RBCs calculated for the house wren and American robin and within the mid-range and high-sensitivity dietary RBCs calculated for the American woodcock. A FRG of 11 mg/kg falls between the egg-based RBCs for mid-range and high-sensitivity avian receptors.

A floodplain soil FRG of 11 mg/kg is also protective of human recreational receptors. However, for floodplain surface soil in current or potential residential use areas, a FRG of 2.5 mg/kg is recommended to protect residential receptors.

Summary of FRGs

The table below summarizes the various FRGs for Area 1. The ability to meet the various risk-based fish tissue FRGs will be evaluated during the five-year review process following the Area 1 remedial action. These reviews will consider factors identified during LTM that may limit overall fish tissue and sediment recovery (e.g., fish tissue or sediment concentrations approaching background levels, which include atmospheric deposition and/or other non-site sources of PCBs to the river system).

FRGs/Cleanup Levels for Area 1 of OU5	
Media	**FRG for Total PCBs**
Fish Tissue	0.042 mg/kg (RAO 1, cancer risk of 1×10^{-5}) 0.072 mg/kg (RAO 1, non-cancer HI of 1) 0.6 mg/kg (RAO 2, ecological receptors)
Sediment	0.33 mg/kg (SWAC in each river section)
Floodplain Soil	11 mg/kg (all areas except residential) 2.5 mg/kg (residential areas)

2.9 Description of the Alternatives

Remedy Components

For purposes of developing potential remedial alternatives, the FS identified the various sediment and floodplain areas that would require remediation based on the RAOs and FRGs for Area 1.

Sediment Remediation Areas

The PCB SWAC analysis was used as a screening tool to evaluate the distribution of PCBs and to identify potential remediation locations in Area 1. The SWACs provide predictions of the average exposure concentration in a specified area. The SWACs for Sections 1 through 8 (shown in Table 1) are based on limited (e.g., widely-spaced) data. Additional samples will be collected in the areas targeted for remediation during RD to further define the sediment remediation area.

The results of the SWAC analysis show that the PCB SWAC in Section 3 was relatively high compared to the other sections. As a result, Section 3 was selected as a candidate for RA evaluation. The sediment FRG will be met by reducing the SWACs to 0.33 mg/kg through the removal of sediment and/or through natural recovery processes.

The calculated SWACs for the Crown Vantage side channel are 8.2 mg/kg. Therefore, remedial alternatives also were developed for that area.

The Portage Creek TCRA has not yet met the sediment FRG (the post-TCRA SWAC was 1.8 mg/kg) but is expected to meet the sediment FRG over time through natural recovery processes. Therefore, no further active cleanup measures are proposed for that section of Area 1.

As noted earlier in this ROD, the Section 8 SWACs were calculated using primarily pre-TCRA data and, as a result, are not representative of current conditions. The current conditions in Section 8 of Area 1 will be further evaluated during RD.

In addition to the SWAC analysis, a geomorphic-PCB analysis was conducted. Based on that analysis, remedial alternatives were developed for known hot spot areas (e.g., areas with multiple samples showing PCB concentrations greater than 50 mg/kg) in Section 3, as well as for known hot spot areas in Sections 2 and 4 (even though the SWACs for Sections 2 and 4 are less than or near 1 mg/kg). The geomorphic-PCB analysis also indicated higher PCB concentration along the edges of the river channel relative to the middle of the river channel in Section 3, so those areas along the edges of the river channel in Section 3 were also selected for further evaluation.

Based on the above evaluations, the portion of Area 1 spanning the hot spots in Sections 2, 3, and 4, and including the areas within Section 3 with higher concentrations along the edges of the river channel, were designated as the remedial reach (see Figure 5). Remedial alternatives were then developed for the remedial reach and the Crown Vantage side channel.

Floodplain Soil Remediation Areas

During the FS, EPA, MDEQ, and GP evaluated a range of potential RAL values for soils. A RAL is a value that would trigger cleanup. In Area 1, the concept is that cleanup of floodplain soil would be triggered based upon the number of potential 1-acre home ranges[10] exceeding the floodplain soil FRG (11 mg/kg). Potential RALs were evaluated based on an assessment of the following factors: the incremental risk reduction that would be achieved, the desire to protect 95 percent to 100 percent of the receptors (shrew, house wren, and American robin under the dietary model), and the incremental area and soil volume associated with each value. As a result of that evaluation, a RAL of 20 mg/kg was selected for floodplain soil since it provides the greatest incremental risk reduction. A RAL of 20 mg/kg was applied to the former Plainwell Impoundment and Plainwell 2 Dam areas. However, a floodplain soil remedial alternative using a RAL of 0.5 mg/kg also was developed for comparison purposes.

[10] The maximally-exposed mammalian receptor, the shrew, has a smaller home range (1 acre) than the maximally-exposed avian receptors (which have home ranges of 2 acres), so 1 acre was chosen as the area to which a RAL would be applied.

Based on the findings of the SRI and the nature and extent of floodplain soil contamination (discussed earlier in this ROD), floodplain soils in the former Plainwell Impoundment and the Plainwell No. 2 Dam Area were selected for further evaluation. Available floodplain soil data from the former Plainwell Impoundment show the area exceeding a RAL of 20 mg/kg comprises approximately 7 acres and 15,000 cy of floodplain soil. Current soil concentrations in the Plainwell No. 2 Dam Area do not exceed a RAL of 20 mg/kg.

As discussed in Section 2.8 of this ROD, a floodplain soil FRG of 11 mg/kg is protective of ecological and human recreational receptors, and a separate FRG of 2.5 mg/kg is protective of human residential receptors. The available data from areas within Area 1 representative of potential residential exposure were evaluated, and show that nearly all of the natural floodplain areas appear to meet the residential FRG. However, the data are limited, and more data are needed to determine whether any of the natural floodplain areas exceed the residential FRG.

A range of alternatives was developed for soil and sediment to achieve Area 1 RAOs. Remedial alternatives were developed by assembling combinations of appropriate remedial technologies. Although the floodplain soil and sediment alternatives are related, to simplify the evaluation, the alternatives are being presented and evaluated as two separate groups. The Area 1 sediment and floodplain soil alternatives are described below. Additional details are available in the Area 1 FS Report.

2.9.1 Common Elements

Section 121(d) of CERCLA requires that Superfund remedial actions meet ARARs. A complete listing of ARARs can be found in Tables 2-1, 2-2, and 2-3 of the Area 1 FS. The location-specific ARARs common to each response action evaluated here establish restrictions on dredging and grading activities and pertain to the management of waste or hazardous substances in specific protected locations, such as riverbeds, wetlands, floodplains, historic places, and sensitive habitats.

The action-specific ARARs are technology-based or activity-based requirements or limitations on actions taken with respect to remediation. These requirements are triggered by particular remedial activities that are selected to accomplish the remedial objectives. The action-specific ARARs indicate the way in which the selected alternative must be implemented, as well as specify levels for discharge.

Chemical-specific ARARs are health- or risk-based numerical values or methodologies that establish concentration or discharge limits, or a basis for calculating such limits, for particular substances, pollutants, or contaminants.

Sediment cleanup levels are subject to Michigan's Natural Resources and Environmental Protection Act of 1994 (NREPA) Part 201. Part 201 also applies to concentrations of COCs in sediment that can adversely affect biota and their habitats. While Part 201 does not include generic sediment cleanup criteria, Part 201 allows development of

site-specific cleanup levels if such criteria better reflect best available information concerning the toxicity or exposure risk posed by the hazardous substance or other factors, and to meet the other requirements of Part 201, including, but not limited to, the risk standards set forth at MCL 324.20120a and 20120b.

PCB-contaminated sediments removed as part of the RA must be handled in accordance with storage and disposal requirements set forth in the TSCA regulations at 40 C.F.R. Part 761. TSCA regulations at 40 C.F.R. Part 761.61 further provide cleanup and disposal levels for PCBs in soil that either remain in place or are removed from Area 1 during remedial action.

The Clean Water Act (CWA) establishes effluent standards for contaminants such as PCBs in navigable waters of the United States and regulates quality standards for surface waters. The ambient water quality criterion for navigable waters is 0.001 microgram per liter (μ g/L) total PCBs (40 C.F.R. Part 129.105 - Toxic Pollutant Effluent Standards). The PCB water quality criteria established by the CWA for protection of aquatic life for continuous concentration (chronic) is 0.014 µg/L and for protection of human health is 0.000064 µg/L in freshwater.

The other components that are common to all of the alternatives except the "no further action" alternative are presented here as a group in order to limit redundancy in the subsequent discussion of the individual alternatives. These common components are:

- All active remedial alternatives include a long-term monitoring program. In addition to an LTM program, all active remedial alternatives include maintenance of institutional and erosion controls (e.g., ICs and ECs) until long-term goals are achieved;
- Active remedial alternatives also include additional sampling to document post-TCRA conditions and additional sampling for hot spot areas in the Remedial Reach from RM70.5 to RM72.25;
- Identification of the remedial area footprints will be confirmed through additional sampling during the RD;
- The LTM program will confirm the ongoing effects of natural processes and document the continued declines in PCB concentrations in various media, resulting in reductions in risk and ecological exposures. It is anticipated that the monitoring program will be designed to supplement the current program that includes fish and water column monitoring;
- The final components of the LTM program will be defined during the RD; however, for developing cost estimates, it is assumed that the LTM program would include the following activities:

    - Fish monitoring annually for the first five years, then once every five years for the remainder of the LTM period. Fish samples would be collected within locations spanning Area 1 and the reference/background areas. The actual sampling locations would be specified during the RD. Smallmouth bass and carp would be collected at each sampling location. Adult carp and both adult

(fillet) and young-of-year (whole body) smallmouth bass would be collected and analyzed for total PCBs and lipid content;
  - Surface water quality monitoring would occur annually for the first five years then once every five years for the remainder of the LTM period to support EPA's five-year reviews. Samples would be collected representing each of the eight Sections of Area 1. Water samples would be analyzed for total PCBs;
  - Sediment samples would also be collected to support EPA's five-year reviews by monitoring ongoing recovery conditions and natural attenuation in selected portions of Area 1. A sampling plan for surface water, fish, and sediment would be developed and approved by EPA during RD;
  - Visual inspections of riverbank erosion would occur annually for the first five years then once every five years for the remainder of the LTM period. Additional inspections would be conducted after major storm/flooding events, as necessary; and
  - Biological samples may be collected from terrestrial areas to evaluate the effectiveness of floodplain remedies.

- Site-specific fish consumption advisories established and publicized by the State will continue to manage risks posed to anglers and their families from consumption of PCB-containing fish. These advisories are already in place for Area 1, and the advisory for each fish type will remain in effect until fish tissue PCB concentrations achieve RAOs for the fish specified. The advisories will be reviewed and verified annually as a component of the ICs. The fish consumption advisories issued by MDCH are only a recommendation, are not legally binding, and have limited effectiveness in protecting human health. Fish advisories, alone, would not be an appropriate remedial alternative;
- Use of a proposed RAL of 20 mg/kg for most of the floodplain soil alternatives. The RAL value of 20 mg/kg is based on an assessment of the following factors: the incremental risk reduction that would be achieved; the desire to protect 95 percent to 100 percent of the receptors (shrew, house wren, and American robin under the dietary model); and the incremental area and soil volume associated with each potential RAL value. Selecting a RAL of 20 mg/kg provided the largest incremental risk reduction in the impounded floodplain areas and was used to develop floodplain soil alternatives. However, a floodplain soil remedial alternative using a RAL of 0.5mg/kg also was developed for comparison purposes; and
- Additional sampling will be conducted to determine whether any of the natural floodplain areas exceed the residential FRG.

<u>Sediment Remedial Alternatives</u>

S-1: No Further Action

Estimated Capital Cost: $0
Estimated Annual O&M Cost: $0
Estimated Present Worth Cost: $0
Estimated Total Cost: $0

Estimated Construction Timeframe: None

Regulations governing the Superfund program require that the "no action" alternative be evaluated generally to establish a baseline for comparison. The No Further Action remedial alternative, S-1, would rely on natural recovery processes following the TCRAs and various OU source control activities previously completed and/or ongoing in and next to Area 1. No active remediation or monitoring would be conducted under this alternative. The time to reach protective levels and compliance with FRGs is estimated to be 87-192 years, but no monitoring would be conducted to document progress toward achievement of FRGs. No cost is associated with this alternative.

S-2: MNR, ICs, and ECs

Estimated Capital Cost: $0
Estimated Annual O&M Cost: $12,600
Estimated Present Worth Cost: $1,400,000
Estimated Total Cost: $2,700,000
Estimated Construction Timeframe: None

This alternative applies MNR and ICs/ECs. It relies on natural recovery processes following the completed and/or ongoing active remediation activities (e.g., the TCRAs and various OU source control activities in and adjacent to Area 1) for further improvements beyond current conditions in Area 1 sediment, including progress toward achieving RAOs. These processes include deposition of cleaner sediment from the watershed, mixing of surface and cleaner sediment, and, possibly, biodegradation. The evaluation of MNR includes implementation of an LTM program to confirm the ongoing effects of natural processes and document the continued declines in PCB concentrations in various media, as described above. Existing ICs/ECs (fish consumption advisories and warning signs) would continue under this alternative. The time to reach protective levels and compliance with FRGs under alternative S-2 is estimated to be 87-192 years after ROD issuance. Cost is estimated at $2,700,000.

S-3A: Removal of Hot Spot Areas and Crown Vantage Side Channel, MNR, ICs, and ECs – EPA'S RECOMMENDED SEDIMENT ALTERNATIVE

Estimated Capital Cost: $10,390,000
Estimated Annual O&M Cost: $12,600
Estimated Present Worth Cost: $11,900,000
Estimated Total Cost: $13,100,000 to $16,600,000
Estimated Construction Timeframe: 2 years

Alternative S-3A includes the removal of impacted sediment in at least five hot spot areas and the Crown Vantage side channel, with MNR, ICs, and ECs throughout Area 1. The five identified hot spots (identified on Figure 5 as KPT-19, KPT-20, KRT-4, KRT-5/FF-19, and S-IM1) are located within the stretch of Area 1 known as the Remedial Reach (spanning from RM69.3 to RM72.3). The Remedial Reach includes Section 3 and the

adjacent portions of Sections 2 and 4 (see Figure 5). Additional sampling of the Remedial Reach would be performed during RD to further delineate the removal boundaries around the known hot spots and to identify other locations for remediation within the Remedial Reach.

The upper end of the cost estimate range for this alternative includes the remediation of two additional, currently unknown hot spots, in the event that additional hot spot areas are identified during RD. The mass of PCBs that would be removed from the river through this alternative is estimated to be approximately 390 kg. The anticipated average removal depth in the identified hot spots ranges from 24 to 40 inches, based on current data from the Remedial Reach. The estimated total volume that would be removed is approximately 19,500 cy.

The cost estimate for this alternative assumes that residuals management in the form of a thin-layer cap[11] addition would occur in approximately 50 percent of the area. The need for and effectiveness of a thin-layer cap would be evaluated during RD. LTM and ICs/ECs would be implemented until FRGs are achieved.

Alternative S-3A assumes a construction season of 8 months per year, with construction activities following design, permitting, and obtaining the necessary land access agreements. Typical silt curtain controls and surface water monitoring would be employed for turbidity and PCB migration from removal areas. Calculations show that the SWAC for the Remedial Reach would be reduced from 1.76 mg/kg to 1.09 mg/kg PCB following the RA work. This alternative would then rely on natural recovery processes to achieve the FRGs and RAOs over time, and would include LTM.

Restoration would be conducted where disturbances to the existing vegetation and natural habitats would occur within upland, wetland, and riverbank areas due to the construction of support facilities and implementation of remedial activities. Excavated channel edges would be stabilized, and formerly vegetated upland areas that are disturbed for river access would be restored with topsoil and revegetated with native seed mixes and woody plantings.

Removal of PCB-containing sediment would also serve to remove other constituents detected in Area 1 sediment, including organic constituents and metals. Removal, along with an assumed thin-layer cap addition for management of residuals, would provide protection to ecological receptors from exposure to PCBs as well as these other constituents. The collocation of non-PCB constituents with PCBs in the sediment does not imply that they came from a similar source area or that they are related to paper mill recycling processes. Rather, their collocation is likely a result of shared fate and transport mechanisms.

This alternative would reach FRGs for smallmouth bass within 32 years after ROD issuance. The time to complete construction would be approximately 1 to 2 years, at an

[11] Note: the thin layer cap is a 6 inch sand/gravel cap that may be used in areas after a hot spot is excavated to enhance recovery and serve as backfill. The details will be worked out during RD.

estimated cost of $13,100,000 to $16,600,000 (this estimate range accounts for additional hot spot areas to be remediated).

S-3B: Removal of Hot Spot Areas, In-Situ Capping for Crown Vantage Side Channel, MNR, ICs, and ECs

Estimated Capital Cost: $9,350,000
Estimated Annual O&M Cost: $12,600
Estimated Present Worth Cost: $10,900,000
Estimated Total Cost: $12,200,000 to $15,700,000
Estimated Construction Timeframe: 2 years

Alternative S-3B includes the same activities described above for Alternative S-3A for removing 15,600 cy of sediment in the known hot spot areas in the Remedial Reach, but would cap rather than remove the sediment in the Crown Vantage side channel. The cap for the Crown Vantage side channel would cover approximately 1.2 acres.

The Crown Vantage side channel was evaluated for capping activities because this area represents an environment that is amenable to capping. It lies outside the main river channel and is a backwater except during flooding events. Under Alternative S-3B, the side channel would be cut off from its connection to the river at the downstream end, capped, and armored to prevent erosion during floods, ice scour, etc. The cap would be designed in accordance with EPA and U.S. Army Corps of Engineers guidance to provide long-term isolation and to provide for stability, integrity, and protectiveness. Cap installation would be performed from land using conventional earth-moving equipment. The engineered cap would consist of a geotextile layer and a 12-inch-thick sand isolation layer overlain by a 6-inch gravel armor layer. The final cap composition, configuration, and transitions would be determined during RD.

Remedial design sampling and LTM would be the same as for Alternative S-3A, with additional inspection and maintenance for the Crown Vantage side channel area cap. This alternative assumes that additional ECs for erosion control would be needed.

This alternative would reach FRGs for smallmouth bass within 32 years after ROD issuance. The time to complete construction would be approximately 1 to 2 years, at an estimated cost of $12,200,000 to $15,700,000 (this estimate range accounts for additional hot spot areas to be remediated).

S-4A: Removal of Hot Spot Areas, Crown Vantage Side Channel, and Section 3 River Channel Edges, MNR, ICs, and ECs

Estimated Capital Cost: $30,990,000
Estimated Annual O&M Cost: $12,600
Estimated Present Worth Cost: $32,500,000
Estimated Total Cost: $33,700,000 to $37,200,000
Estimated Construction Timeframe: 4 years

Alternative S-4A includes the same activities described above for Alternative S-3A, but would also excavate sediment along the edges of the Section 3 river channel that exceeds 1 mg/kg total PCBs. The total estimated removal volume for the four hot spot areas, Crown Vantage side channel, and the Section 3 channel edges is 63,900 cy, spanning approximately 15 acres. The edge removal in Section 3 would span roughly 80 percent of each bank, or 1.4 miles along each side of the river. The mass of PCBs that would be removed from the river edges is an additional 54 kg above that estimated in Alternative S-3A, for a total estimated mass of 444 kg of PCBs removed. Calculations show that the SWAC for the Remedial Reach would be reduced from 1.76 mg/kg to 0.6 mg/kg PCB following the RA work. This alternative would then rely on natural recovery processes to achieve the FRGs and RAOs over time. Remedial design sampling and LTM would be the same as other sediment alternatives, with additional EC inspections and erosion control maintenance for the Section 3 edges.

This alternative would reach FRGs for smallmouth bass within 25 years after ROD issuance. The time to complete construction would be approximately 4 years, at an estimated cost of $33,700,000 to $37,200,000 (this estimate range accounts for additional hot spot areas to be remediated).

S-4B: Removal of Hot Spot Areas and Section 3 Channel Edges, In-situ Capping for Crown Vantage Side Channel, MNR, ICs, and ECs

Estimated Capital Cost: $29,380,000
Estimated Annual O&M Cost: $12,600
Estimated Present Worth Cost: $31,000,000
Estimated Total Cost: $32,300,000 to $35,800,000
Estimated Construction Timeframe: 4 years

Alternative S-4B includes the same activities described above for Alternative S-4A for removing 59,900 cy of sediment in the known hot spot areas and Section 3 river edges, but would cap rather than remove the sediment in the Crown Vantage side channel (as described in Alternative S-3B). The cap for the Crown Vantage side channel would cover approximately 1.2 acres. Remedial design sampling and LTM would the same as for Alternative S-3B, with additional EC inspections and erosion control maintenance for the Section 3 edges.

This alternative would reach FRGs for smallmouth bass within 25 years after ROD issuance. The time to complete construction would be approximately 4 years, at an estimated cost of $32,300,000 to $35,800,000 (this estimate range accounts for additional hot spot areas to be remediated).

S-5: Area 1-Wide Removal (RAL 1), MNR, ICs, and ECs

Estimated Capital Cost: $305,000,000
Estimated Annual O&M Cost: $12,600

Estimated Present Worth Cost: $223,000,000
Estimated Total Cost: $202,000,000 to $337,000,000
Estimated Construction Timeframe: 10 years

Alternative S-5 includes the removal of sediment exceeding a RAL of 1 mg/kg total PCBs throughout the river in Area 1. The extent of excavation required for this alternative was estimated in two ways to provide remediation area and volume ranges associated with this alternative. The lower bound was estimated using the stream tube geometry created for the Area 1 SWAC calculations, in conjunction with different excavation depth assumptions for river sediments based on available information, and assuming an excavation depth of 24 inches for the Crown Vantage side channel. The upper bound was estimated by assuming that a gross average of 12 inches would be excavated from about 60 percent of Area 1, including all of the fine-grained sediment areas (estimated to be about 20 percent of the total Area 1 surface area) plus half of the remaining surface area comprised of medium and mixed/distributed coarse/fine-grained sediment. Bank sediment/soils were also included in the upper-bound estimate, resulting in the excavation of about 60 percent of the total surface area of Area 1, plus the Crown Vantage side channel area. More details regarding these two estimation methods are provided in the Area 1 FS Report.

The calculated lower-bound excavation area and volume calculated for Alternative S-5 is 140 acres and 300,000 cy, respectively. The upper-bound excavation area and volume is 300 acres and 490,000 cy, respectively.

Post-remedial SWAC calculations for Alternative S-5 reflect an Area 1-wide change in SWACs. The sediment FRG (0.33 mg/kg total PCBs) would be achieved upon completion of excavation activities, and removal of PCB-containing sediment would also serve to remove other non-PCB constituents detected in Area 1 sediment.

This alternative would reach FRGs for smallmouth bass within 45 years after ROD issuance. Implementation of this alternative is estimated to require 10 years, utilizing three crews working simultaneously. The estimated cost for this alternative ranged between $202,000,000 and $337,000,000, depending on the size of the area requiring remediation.

Floodplain Soil Remedial Alternatives

FPS-1: No Further Action

Estimated Capital Cost: $0
Estimated Annual O&M Cost: $0
Estimated Present Worth Cost: $0
Estimated Total Cost: $0
Estimated Construction Timeframe: none

The No Further Action alternative considers only the results of removal action and source control activities previously completed in and next to Area 1. Under this alternative, no additional sampling, active remediation or monitoring would be conducted in the floodplains. Natural recovery processes would occur; however, a rate of deposition for such natural recovery processes is unknown, and monitoring would not be conducted under this alternative. The primary mechanism for natural attenuation of PCBs in surface soil is anticipated to be the deposition of cleaner sediment during periodic flooding events, filtering of storm runoff from upland areas, and accumulation of vegetative debris. This deposition, over a very long period of time, would eventually become a natural cap, which would reduce the bioavailability of PCBs in floodplain soil.

The time to reach protective levels and compliance with FRGs could be very lengthy. Because monitoring would not be conducted, it is possible that protective levels would never be reached. The cost of Alternative FPS-1 is $0.

FPS-2: MNR, ICs, and ECs

Estimated Capital Cost: $970,000
Estimated Annual O&M Cost: $20,700
Estimated Present Worth Cost: $1,200,000
Estimated Total Cost: $1,300,000
Estimated Construction Timeframe: none

Under Alternative FPS-2, no further active floodplain soil remediation would be conducted beyond the removal action and source control activities previously completed in and next to Area 1. Progress toward achieving FRGs would rely on natural recovery processes and the maintenance of existing ECs. ICs would also be implemented to restrict disturbance of the soil surface to allow these natural recovery processes to occur. Ongoing natural recovery processes would reduce PCB concentrations and risk from exposure over a very long period of time, but these processes would act at relatively slow rates; the actual rate of natural recovery in the floodplains is currently unknown. LTM would be conducted as part of this alternative, including soil core sampling over time and depositional studies to quantify the rate of recovery. Floodplain status inspections would be performed to inspect the previously-installed ECs in Area 1 and monitor for erosion.

The time to reach protective levels and compliance with FRGs could be very lengthy, and it is possible that protective levels would never be reached. The cost of Alternative FPS-2 is estimated at $1,300,000.

FPS-3: Capping (RAL 20), ICs, and ECs

Estimated Capital Cost: $3,500,000
Estimated Annual O&M Cost: $21,000
Estimated Present Worth Cost: $3,600,000
Estimated Total Cost: $3,800,000
Estimated Construction Timeframe: 1 year

Alternative FPS-3 includes capping 7 acres of floodplain soil in the former Plainwell Impoundment with PCB concentrations greater than a RAL of 20 mg/kg in contiguous areas of one-quarter acre or larger, and implementation of ICs/ECs with LTM. The anticipated locations of remedial areas for this scenario are shown on Figure 6; the actual cap areas/footprints would be determined during RD based on additional floodplain soil sampling. Capping would be achieved by placing 6 inches of borrow material and 6 inches of topsoil over the remediation area to provide a new ecological habitat zone (e.g., the top 6 inches), plus a 6-inch buffer. LTM would be required to verify cap performance over time, and periodic maintenance would be carried out as necessary to preserve or restore the integrity of the caps. ICs restricting land use would be implemented for the cap areas to limit disturbance of the caps.

Alternative FPS-3 would result in 98 percent to 100 percent of home ranges for ecological receptors being below the floodplain soil FRG of 11 mg/kg. The time to implement this alternative after design completion is estimated to be approximately 1 year, at an estimated cost of $3,800,000.

FPS-4A: Removal (RAL 20), ICs, and ECs – EPA'S RECOMMENDED FLOODPLAIN SOIL ALTERNATIVE

Estimated Capital Cost: $6,400,000
Estimated Annual O&M Cost: $21,000
Estimated Present Worth Cost: $6,600,000
Estimated Total Cost: $6,800,000
Estimated Construction Timeframe: 1 year

Alternative FPS-4A includes the excavation of 11,300 cy of floodplain soil in the former Plainwell Impoundment with PCB concentrations greater than a RAL of 20 mg/kg in contiguous areas of one-quarter acre or larger, the placement of clean backfill/topsoil in excavated areas to restore floodplain grade elevations, and the implementation of ICs/ECs and LTM. The total excavation footprint would be approximately 7 acres (the same as the areas that would be capped under Alternative FPS-3), as shown on Figure 6. The actual excavation areas/footprints would be determined during RD based on additional floodplain soil sampling. Excavation would be completed to a target standard depth of 12 inches to remove contaminated soil in the ecological exposure zone (e.g., the top 6 inches), plus a 6-inch buffer. A geotextile fabric would be placed over the completed excavation area. Backfill would include 6 inches of fill soil and a minimum 6-inch topsoil cover to support revegetation and restoration of ecological habitat. LTM would be required to evaluate backfill erosion, vegetative cover, and ECs over time. Periodic maintenance would be carried out as necessary to repair or maintain the integrity of these systems. ICs (land use restrictions) would be implemented.

Alternative FPS-4A would result in 98 percent to 100 percent of home ranges for ecological receptors being below the floodplain soil FRG of 11 mg/kg. The time to

implement this alternative after design completion is estimated to be approximately 1 year, at an estimated cost of $6,800,000.

FPS-4B: Removal (RAL 0.5), ICs, and ECs

Estimated Capital Cost: $471,000,000
Estimated Annual O&M Cost: $21,000
Estimated Present Worth Cost: $335,000,000
Estimated Total Cost: $486,000,000
Estimated Construction Timeframe: 10 years

Alternative FPS-4B includes the excavation of 1,400,000 cy of floodplain soil containing PCBs at concentrations greater than 0.5 mg/kg throughout Area 1, placement of backfill with topsoil, restoration, ECs for erosion, and implementation of ICs. As indicated earlier, a soil remedy with a RAL of 0.5 was developed as a total removal scenario for comparison to other floodplain soil alternatives. Soil sampling for PCBs in the floodplain would be performed prior to or during RD. The total extent of floodplain soil removal would likely encompass approximately 850 acres of riparian habitat to a removal depth of 12 inches, resulting in a total neatline removal volume of approximately 1,400,000 cy. Post-removal backfill consisting of up to 6 inches of borrow fill (700,000 cy) and 6 inches of topsoil (700,000 cy) would be placed over the excavation areas. This alternative would include implementation of an LTM program including inspections to evaluate conditions of the vegetative cover and ECs.

Alternative FPS-4B would achieve the floodplain soil FRG of 11 mg/kg immediately after completion of construction activities. The time to implement this alternative following design completion is estimated to be greater than 10 years, at an estimated cost of $486,000,000.

2.10 Comparative Analysis of Alternatives

Section 121(b)(1) of CERCLA presents several factors that EPA is required to consider in its assessment of alternatives. Building upon these specific statutory mandates, the NCP articulates nine evaluation criteria to be used in assessing the individual remedial alternatives. The purpose of this evaluation is to promote consistent identification of the relative advantages and disadvantages of each alternative, thereby guiding selection of remedies offering the most effective and efficient means of achieving site cleanup goals. While all nine criteria are important, they are weighed differently in the decision-making process depending on whether they evaluate protection of human health and the environment or compliance with federal and state ARARs (threshold criteria), consider technical or economic merits (primary balancing criteria), or involve the evaluation of non-EPA reviewers that may influence an EPA decision (modifying criteria).

Each of the nine evaluation criteria are discussed below with respect to the alternatives under consideration for this RA. In addition, Tables 3 and 4 provide a qualitative summary of how the sediment and floodplain soil cleanup alternatives, respectively,

compare against the nine criteria. More details regarding the evaluation and comparison of the cleanup alternatives against the nine criteria can be found in the Area 1 FS Report.

Sediment Alternatives

Overall Protection of Human Health and the Environment

Alternatives S-1 and S-2 might eventually be protective of human health and the environment, but the length of time it would take for river sediments to reach protective levels through natural recovery processes is unreasonably lengthy (estimated at 87 years). However, because monitoring would not be conducted under alternative S-1, recovery rates and the achievement of protective levels for Alternative S-1 would not be documented.

Alternatives S-3A and S-3B, which remove PCB-containing sediment in the Area 1 hot spots and which either remove or cap the Crown Vantage side channel sediment, would provide protection of human health and the environment. These alternatives would reduce overall PCB exposure risk to humans and ecological receptors and would support the reduction in PCB concentrations in fish tissue over time.

Alternatives S-4A and S-4B include the removal of the river edges in Section 3 and would provide similar overall protection of human health and the environment as described for alternatives S-3A and S-3B. Alternatives S-4A and S-4B would reduce overall exposure risk to humans and ecological receptors and support the reduction in PCB concentrations in fish tissue more quickly than S-3A and S-3B because larger volumes of contaminated materials would be removed.

Alternative S-5, which removes sediment exceeding 1 mg/kg PCBs throughout Area 1, would provide protection of human health and the environment, but achieving protection would be hampered by the long construction period (10 years). The extensive construction activities could also negatively impact wildlife habitat.

Compliance with ARARs

Alternatives S-1 and S-2 might eventually meet most ARARs through natural recovery, but it would take between 87 and 192 years for this to occur. Because monitoring would not be conducted under alternative S-1, compliance with ARARs under Alternative S-1 would not be documented.

Alternatives S-3A, S-3B, S-4A, and S-4B would meet ARARs. Appropriate control measures would be implemented during construction such that the substantive requirements of the action- and location-specific ARARs would be achieved.

Alternative S-5 would comply with ARARs, but would take longer to meet them (compared to alternatives S-3A, S-3B, S-4A, and S-4B) due to the longer construction period.

Long-term Effectiveness and Permanence

Alternative S-1 would not provide for tracking or confirmation of future achievement of RAOs, so long-term effectiveness would not be demonstrated or documented.

Alternative S-2 might eventually be effective, but it may be 87-192 years before the effectiveness of the remedy can be demonstrated through LTM.

Alternatives S-3A and S-3B would both be effective in the long term and permanent. The degree of long-term effectiveness and permanence of these two alternatives are similar, as both involve the removal of the hot spot areas in the Remedial Reach. Alternative S-3A also removes the Crown Vantage side channel sediment while alternative S-3B caps that area. Both alternatives then rely on MNR to achieve the FRGs over time.

Contaminated sediment excavation in the Remedial Reach and excavation or capping in the Crown Vantage side channel would reduce the overall SWAC, reduce PCB exposure and improve fish tissue concentrations, and remove (or cap) buried PCB-containing sediment that could otherwise be re-exposed or eroded in the future. LTM, ICs, and ECs would be required until FRGs are achieved. Alternatives S-3A and S-3B would achieve the fish tissue FRGs for smallmouth bass within 32 years.

The long-term effectiveness of alternatives S-4A and S-4B are predicted to be similar to S-3A and S-3B. Added LTM and maintenance would be required for ECs to control erosion along the riverbanks and excavated channel areas. Ecological habitat recovery time would be lengthy due to the extent of disturbance in Section 3. However, the time to achieve the fish tissue FRGs for smallmouth bass would be reduced to 25 years.

Alternative S-5 would have a high degree of long-term effectiveness and permanence, as all sediment exceeding a RAL of 1 mg/kg total PCBs would be removed. Sediment FRGs would be met after completion of 10 years of excavation work, reducing ecological risk and future potential erosion and downstream migration. The time to achieve the fish tissue FRGs for smallmouth bass is estimated at 45 years.

Reduction of Toxicity, Mobility, or Volume through Treatment

None of the sediment alternatives employ treatment technologies to reduce the toxicity, mobility, or volume of the contaminated materials. However, alternatives S-3A, S-3B, S-4A, S-4B, and S-5 would remove significant volumes of PCB-contaminated sediment within Area 1, thereby reducing the ability of the PCB-contaminated sediment to be mobilized into the river in the future. Capping of the Crown Vantage side channel (alternatives S-3B and S-4B) would decrease the mobility of that PCB-contaminated sediment from entering the river system. Due to the nature of the contamination, the PCB-contaminated sediments do not lend themselves to cost-effective treatment.

Short-term Effectiveness

Alternatives S-1 and S-2 would not have any adverse short-term impacts, because active construction work is not associated with these alternatives. However, no mitigative measures would be in place to reduce exposures to human and ecological receptors, and it would take a long time (87 to 192 years) until FRGs and RAOs were achieved.

Under alternative S-3A, the removal of hot spot areas and Crown Vantage side channel materials would result in immediate reductions in sediment SWACs. There is the potential for PCB concentrations in the water column to temporarily increase during implementation of the cleanup due to disturbance of contaminated sediment. This risk would be managed through ECs such as silt curtains, sheet pile or porta-dams to isolate the sediment-removal work area. Temporary impacts to stream bank and channel bottom habitats during removal would be localized and reversible. Risks to workers during excavation activities would be controlled through safe work practices and training. Potential impacts to the public during implementation of the cleanup work, including disruptions and intrusions to neighboring residents, equipment and truck traffic, and material handling and staging operations, would be managed by monitoring in active work areas, safe work practices, public communication, and training. The implementation period for alternative S-3A would be approximately 1 to 2 years.

The short-term effectiveness of alternative S-3B would be similar to S-3A, with slightly less construction worker and public risk associated with capping (instead of removing) the sediments in the Crown Vantage side channel. The implementation period for alternative S-3B would be the same as alternative S-3A, 1 to 2 years.

The short-term effectiveness of alternatives S-4A and S-4B are predicted to be similar to each other. These alternatives would have a greater potential for short-term impacts than alternatives S-3A and S-3B due to the longer construction period (4 years) and increased amount of construction work required. Similar to alternatives S-3A and S-3B, the removal of contaminated sediment would result in immediate reductions in sediment SWACs. However, under alternatives S-4A and S-4B, much of the riverbank wooded habitat and channel habitat along the 1.7 miles of Section 3 would be destroyed. Restoration of native vegetative cover and habitat/wildlife recovery would be lengthy under these alternatives.

The extensive excavation work throughout Area 1 required by alternative S-5 would have the greatest degree of short-term impacts because of the long construction period, estimated at 10 years. Compared to the other alternatives, the potential for sediment resuspension and migration during excavation work would be increased under alternative S-5, with multiple crews working simultaneously, and with work continuing for a decade. The hard armoring required to control in-stream erosion would significantly alter the river habitat, and disturbance and/or destruction of sensitive riparian habitat may be necessary due to the need for access routes and support areas. Truck traffic along local haul routes during sediment removal and transport off-site would be frequent and prolonged.

Implementability

Alternatives S-1 and S-2 could be easily implemented. No active measures are associated with alternative S-1, and alternative S-2 would include only LTM and inspections. The ICs and ECs for erosion control currently in place at the TCRA areas would continue to be inspected and maintained under both alternatives.

Alternatives S-3A and S-3B are similar regarding their implementability. Alternative S-3B would be slightly easier to implement than alternative S-3A, as capping the Crown Vantage side channel would be easier than excavating that area. However, the capped area in alternative S-3B would require long-term maintenance. Sediment removal or capping under these two alternatives requires the construction of roads and staging areas to access the various hot spot locations and the Crown Vantage side channel. Sediment removal and dewatering would be performed using conventional equipment, which is readily available. Transport of dewatered material to an approved off-site landfill would be required, and these services are also readily available. Both alternatives are technically and administratively feasible to design and implement.

Alternatives S-4A and S-4B are similar regarding their implementability. Alternative S-4B would be slightly easier to implement than alternative S-4A, as capping the Crown Vantage side channel would be easier than excavating that area. However, the capped area in alternative S-4B would require long-term maintenance. In addition to the remedy components and activities included as part of alternatives S-3A and S-3B (see implementability discussion above), alternatives S-4A and S-4B would require the construction of additional roads and staging areas on both sides of the river in Section 3 for edge excavation, making these alternatives more challenging to implement than alternatives S-3A and S-3B. However, both alternatives S-4A and S-4B are technically and administratively feasible to design and implement.

Alternative S-5 would be the most difficult to implement. The effort required to construct access roads and staging areas along the river would be extensive. Access along all 22 miles of Area 1 would be difficult to achieve, both physically and administratively. Achieving work completion in 10 years (assuming a construction season of 8 months each year) would require three crews working simultaneously. Removal and dewatering of sediments would be performed through the use of conventional equipment, which is readily available. Transport of extensive quantities of dewatered material to an approved offsite landfill would be required, and these services are also available.

Cost

The estimated costs for each alternative have an expected accuracy of +50 to -30 percent. Costs for the sediment alternatives range from zero to $337 million, as listed below:

Alternative S-1	$0
Alternative S-2	$2,700,000
Alternative S-3A	$13,100,000 to $16,600,000
Alternative S-3B	$12,200,000 to $15,700,000
Alternative S-4A	$33,700,000 to $37,200,000
Alternative S-4B	$32,300,000 to $35,800,000
Alternative S-5	$202,000,000 to $337,000,000

Alternative S-5 is the most-costly alternative because 490,000 cubic yards of sediment would be removed throughout Area 1 and transported for offsite disposal. The costs for alternatives S-3A, S-3B, S-4A, and S-4B are an order of magnitude lower than the cost for Alternative S-5. Other than the "no action" alternative, alternative S-2 is the least-costly alternative because the only remedy components that have associated costs are LTM and inspections.

The final cost estimate for the selected sediment remedy will be developed and refined during the RD.

State Agency Acceptance

The State concurs with the Selected Remedy for Area 1 of OU5. MDEQ's concurrence letter is included in Appendix 1.

Community Acceptance

During the public meeting, the community expressed acceptance of Alternative S-3A. A full response to public comments is included later in this ROD in Part 3 - Responsiveness Summary.

Floodplain Soil Alternatives

Overall Protection of Human Health and the Environment

Alternatives FPS-1 and FPS-2 might eventually be protective of human health and the environment, but the length of time it would take to reach protective levels is difficult to estimate. Data regarding depositional rates in the floodplain are not currently available. The time required for deposition of enough clean material over contaminated areas to reach protective levels is not known, but could be very lengthy. Monitoring would not be conducted under alternative FPS-1, so any recovery of the floodplain areas would not be documented.

Alternatives FPS-3 and FPS-4A would be protective of human health and the environment. Capping or removal of soil areas greater than one-quarter acre in size that exceed a RAL of 20 mg/kg would result in 98 percent to 100 percent of home ranges for ecological receptors being below the 11 mg/kg floodplain soil FRG. Non-PCB constituents including metals and organic compounds are collocated with PCBs in Area 1

soil, so capping or removal would also protect ecological receptors from exposure to those constituents.

Alternative FPS-4B also would be protective of human health and the environment. Removal of soil areas greater than one-quarter acre in size that exceed a RAL of 0.5 mg/kg, estimated to require the excavation of 1,400,000 cy of floodplain soil, would result in all floodplain soils within Area 1 achieving the FRG. However, such protectiveness would come at the cost of destroying 850 acres of riparian habitat along approximately 17 miles of river.

Compliance with ARARs

Alternatives FPS-1 and FPS-2 might eventually comply with ARARs, but for the same reasons discussed above, it is difficult to predict when such compliance would occur. Monitoring would not be conducted under alternative FPS-1, so any recovery of the floodplain areas to levels that comply with ARARs would not be demonstrated or documented. Alternative FPS-2 would require additional data collection in the future to establish depositional rates and time to reach chemical-specific ARARs.

Alternatives FPS-3 and FPS-4A would comply with ARARs, but alternative FPS-3 would require a permit waiver to disturb the riparian stream buffer/floodplain area, potentially increasing the elevation in the floodplain with the cap. Alternative FPS-3 would also require a site-specific TSCA equivalency demonstration and deed/access restrictions to leave in place PCB concentrations outside the range of acceptable risk to a resident.

Alternative FPS-4B also would comply with ARARs, but it could be difficult to obtain a waiver for destruction of 850 acres of riparian habitat.

Long-term Effectiveness and Permanence

Alternatives FPS-1 and FPS-2 might eventually be effective in the long term, but it is difficult to predict when that might occur. Natural recovery rates in the floodplains are not currently known and would not be demonstrated or documented under alternative FPS-1. Although the effectiveness of alternative FPS-2 also is not known, the rate of recovery could be determined based on sampling over time.

Alternative FPS-3 includes capping which would be effective in the long term. The cap would require LTM, land use restrictions to limit future disturbance of the cover soil, and inspections/maintenance for erosion controls and revegetated areas. Inspections and maintenance would include inspecting existing bank erosion controls in the Plainwell TCRA areas.

Alternative FPS-4A includes removal of contaminated floodplain soil exceeding a RAL of 20 mg/kg. This would be effective in protecting receptors from exposure to surface soil in the long term. The excavated area would require ICs to limit disturbance of the

backfill/cover soil. Inspections/maintenance of the erosion controls and revegetated areas also would be required.

Alternative FPS-4B would remove PCBs from all areas of the floodplains exceeding a RAL of 0.5 mg/kg, providing long-term effectiveness and permanence in terms of exposure to site contaminants. However, this would come at the cost of extensive habitat destruction.

Reduction of Toxicity, Mobility or Volume through Treatment

None of the floodplain soil alternatives employ treatment technologies to reduce the toxicity, mobility, or volume of the contaminated materials. However, alternative FPS-3 would cap contaminated soils and alternatives FPS-4A and FPS-4B would remove significant volumes of contaminated soil within Area 1, thereby reducing the ability of the PCB-contaminated soil to be mobilized into the river in the future. Due to the nature of the contamination, the PCB-contaminated soils do not lend themselves to cost-effective treatment.

Short-term Effectiveness

Alternatives FPS-1 and FPS-2 would not have any adverse short-term impacts, as no active construction work is associated with these alternatives. However, mitigative measures would not be conducted to reduce exposures to human and ecological receptors until such time as protective levels might be achieved, rendering these alternatives not effective in the short term. The length of time it would take to meet FRGs and RAOs is difficult to estimate, as data regarding depositional rates in the floodplain are not currently available, but could be prolonged.

Alternatives FPS-3 and FPS-4A would be effective in the short term, as the exposure risk would be eliminated immediately upon cap completion (FPS-3) and upon removal of soils and backfilling of the excavation areas (FPS-4A). Moderate damage to habitat over the 7 acres of capped and/or excavated soil and the required support areas (e.g., roads and staging areas) would be addressed by revegetating the disturbed areas to initiate habitat recovery. Risks to workers would be managed through safe work practices and training. Potential impacts to the public during implementation of the cleanup work, including disruptions and intrusions to neighboring residents, equipment and truck traffic, and material handling and staging operations, would be managed by monitoring in active work areas, safe work practices, public communication, and training. The implementation period for alternatives FPS-3 and FPS-4A would be approximately 1 year.

The extensive excavation work required by alternative FPS-4B would have the greatest degree of short-term impacts because of the long construction period (more than 10 years) and extensive habitat destruction throughout Area 1, rendering this alternative not effective in the short term. Potential impacts to the public during implementation of the cleanup work would include the same sort of impacts discussed above for FPS-3 and FPS-4A, but such impacts would continue for more than 10 years.

Implementability

Alternatives FPS-1 and FPS-2 could be easily implemented. No active measures are associated with alternative FPS-1, and alternative FPS-2 would include only LTM, inspections, and maintenance of existing ECs for erosion control.

Alternatives FPS-3 and FPS-4A are relatively straightforward and implementable. Access roads and staging areas would need to be constructed to implement work; some support areas previously used for TCRA implementation may be available for reuse. Property access and permits/waivers would be needed to work in the floodplain. Conventional earthmoving equipment for capping or excavation work is readily available. For removal activities conducted under FPS-4A, dewatering and water management systems are readily available and would be similar to those used during TCRA implementation. Revegetation and erosion controls would be implemented using experience gained from the previous TCRAs.

For alternative FPS-4B, the area of impact would be excessive. Conventional equipment for excavation, dewatering, and transportation of soils is readily available. However, obtaining access agreements for such a large-scale cleanup area, including private residential and commercial properties along approximately 17 miles of river, would be difficult and potentially impossible, even with compensation. Obtaining an approval/waiver for this level of wetland/riparian habitat destruction would be unlikely.

Cost

The estimated costs for each alternative have an expected accuracy of +50 percent to -30 percent. Costs for the floodplain soil alternatives range from zero to $486 million, as listed below:

Alternative FPS-1	$0
Alternative FPS-2	$1,300,000
Alternative FPS-3	$3,800,000
Alternative FPS-4A	$6,800,000
Alternative FPS-4B	$486,000,000

Alternative FPS-4B is the most-costly alternative because 1.4 million cubic yards of soil would be removed throughout Area 1 and transported for offsite disposal. The costs for alternatives FPS-2, FPS-3, and FPS-4A are two orders of magnitude lower than the cost for alternative FPS-4B. Other than the "no action" alternative, alternative FPS-2 is the least-costly alternative because the only remedy components that have associated costs are LTM, inspections and the maintenance of existing ECs.

The final cost estimate for the selected floodplain soil remedy will be developed and refined during the RD.

State Agency Acceptance

The State concurs with the Selected Remedy for Area 1 of OU5. MDEQ's concurrence letter is included in Appendix 1.

Community Acceptance

During the public meeting, the community expressed acceptance of Alternative FPS-4A. A full response to public comments is included later in this ROD in Part 3 - Responsiveness Summary.

2.11 Principal Threat Wastes

The principal threat concept is applied to the characterization of "source material" at a Superfund site. Source material is material that includes or contains hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contaminants to groundwater, surface water or air, or acts as a source for direct exposure. EPA has defined principal threat wastes as those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur.

EPA has not identified any principal threat wastes at OU5 of the site. The PCB-contaminated soil and sediment throughout OU5 are re-worked and re-deposited materials that were mixed with water, soil, and sediment throughout Area 1. The concentrations of PCBs at OU5 are considered to be low-level threat wastes.

2.12 Selected Remedy

The selected sediment and floodplain soil remedy for Area 1 of OU5 is described below.

EPA's selected sediment remedy – Alternative S-3A: Removal of Hot Spot Areas and Crown Vantage Side Channel, MNR, ICs, and ECs

EPA believes that sediment alternative S-3A is the most appropriate sediment cleanup remedy for Area 1 of OU5. The Selected Remedy consists of the following main components:

1. Removal of impacted sediment in at least five hot spot areas and the Crown Vantage side channel, with MNR, ICs, and ECs throughout Area 1. The five identified hot spots (KPT-19, KPT-20, KRT-4, KRT-5/FF-19, and S-IM1) are located within the stretch of Area 1 known as the remedial reach (spanning from RM69.3 to RM72.3). The remedial reach includes Section 3 and the adjacent portions of Sections 2 and 4 (see Figure 5).

2. Additional sampling throughout the remedial reach will be performed during RD to further delineate the removal boundaries around the known hot spots and to identify

other locations for remediation within the remedial reach. Sampling will be conducted in accordance with an EPA-approved work plan. The mass of PCBs to be removed from the river through this alternative is estimated to be approximately 390 kg.

3. Additional sampling will occur in Section 8 of Area 1 to document post-TCRA conditions.

4. LTM and ICs/ECs will be implemented until FRGs are achieved. The LTM program will confirm the ongoing effects of natural processes and will document the continued decline in PCB concentrations in various media, resulting in reductions in risk and ecological exposures. The final components of the LTM program will be defined during RD.

5. The anticipated average removal depth in the identified hot spots ranges from 24 to 40 inches. The estimated total volume to be removed is approximately 19,500 cy. The need for and effectiveness of a thin-layer cap will be evaluated during RD.

6. Typical silt curtain controls and surface water monitoring will be employed for turbidity and PCB migration from removal areas. Where disturbances to the existing vegetation and natural habitats occur within upland, wetland, and riverbank areas due to the construction of support facilities and implementation of RA, properties will be restored in kind. Excavated channel edges will be stabilized, and formerly vegetated upland areas that are disturbed for river access will be restored with topsoil and revegetated with native seed mixes and woody plantings.

7. Removal of PCB-containing sediment will also serve to remove other constituents detected in Area 1 sediment, including organic constituents and metals. Removal, along with an assumed thin-layer cap addition for management of residuals, provides protection to ecological receptors from exposure to PCBs and other constituents.

8. Calculations show that the SWAC for the remedial reach will be reduced from 1.76 mg/kg to 1.09 mg/kg following the remedial action construction work. The Selected Remedy relies on natural recovery processes to achieve the FRGs and RAOs over time.

9. The Selected Remedy will reach FRGs for smallmouth bass within 32 years after ROD issuance. The time to complete construction would be approximately 1 to 2 years, at an estimated cost of $13,100,000 to $16,600,000 (depending on the number of hot spot areas to be remediated).

10. Site-specific fish consumption advisories established and publicized by the State will continue to reduce risks posed to anglers and their families from consumption of PCB-containing fish. These advisories are already in place for Area 1, and the advisory for each fish type will remain in effect until fish tissue PCB concentrations achieve RAOs for the fish specified. The advisories will be reviewed and verified annually as a component of the ICs.

EPA's Selected Floodplain Soil Remedy – Alternative FPS-4A: Removal (RAL 20), ICs, and ECs

EPA believes that floodplain soil alternative FPS-4A is the most appropriate soil cleanup remedy for Area 1 of OU5. The Selected Remedy for floodplain soil consists of the following main components:

1. Excavation of 11,300 cy of floodplain soil in the former Plainwell Impoundment with PCB concentrations greater than a RAL of 20 mg/kg in contiguous areas of one-quarter acre or larger, and the placement of clean backfill/topsoil in excavated areas to restore floodplain grade elevations. The total excavation footprint is approximately 7 acres (see Figure 6).

2. The actual excavation areas/footprints will be determined during RD based on additional floodplain soil sampling. Soil sampling in Area 1 for PCBs in the floodplain outside the former Plainwell Impoundment TCRA study area will also be performed prior to or during RD.

3. Excavation will be completed to a target standard depth of 12 inches to remove contaminated soil in the ecological exposure zone (e.g., the top 6 inches), plus a 6-inch buffer. A geotextile fabric will be placed over the completed excavation area. Backfill includes 6 inches of fill soil and a minimum 6-inch topsoil cover to support revegetation and restoration of ecological habitat.

4. Alternative FPS-4A includes ICs, ECs, and LTM. ECs will be implemented to ensure the floodplain material does not erode into the river. LTM is required to evaluate backfill erosion, vegetative cover, effectiveness of the remedy, and ECs over time. Periodic maintenance will be carried out as necessary to repair or maintain the integrity of these systems and sampling of biota may be conducted to evaluate the effectiveness of the remedy. ICs (land use restrictions) also will be implemented to protect/restrict future land use changes.

5. This alternative results in 98 percent to 100 percent of home ranges for ecological receptors being below the floodplain soil FRG of 11 mg/kg following completion of the RA construction work. The time to complete construction is approximately 1 year, at an estimated cost of $6,800,000.

6. Additional sampling will be conducted to determine whether any of the natural floodplain areas within Area 1 exceed the residential FRG. Areas exceeding the FRG would be remediated as described above, capped, and/or an IC/EC placed on the area.

Rationale for the Selected Remedy

Sediment Remedy

EPA believes that sediment remedy S-3A provides the best balance of the evaluation criteria among all the sediment alternatives. Alternative S-3A is protective of human health and the environment, meets all federal and state ARARs, achieves the RAOs for this remedial action, is straightforward in its implementation, and is effective in the long term and permanent.

Alternative S-3A provides long-term and permanent protection against exposure to contaminated materials by excavating approximately 19,500 cubic yards of PCB-contaminated sediment from at least five hot spot areas and the Crown Vantage side channel, and then relying on MNR, in conjunction with ICs and ECs, to achieve the FRGs and RAOs over time. Alternative S-3A is effective in the short term, as it results in immediate reductions in sediment SWACs while posing easily manageable risks to workers and the local community during implementation. Alternative S-3A is administratively and technically implementable and can be completed within 2 years.

Alternative S-3A is cost-effective because it significantly reduces SWACs in the remedial reach through source removal with minimal habitat destruction, achieves FRGs for smallmouth bass within 32 years (only 7 years longer than Alternatives S-4A and S-4B), and requires no long-term maintenance of capped material (as in Alternative S-3B), at less than half the cost of alternatives S-4A or S-4B.

Alternative S-3A does not reduce the toxicity, mobility, or volume of the contamination through treatment because the relatively low-level PCB contamination that is present does not lend itself to any cost-effective treatment.

Floodplain Soil Alternative

EPA believes that floodplain soil alternative FPS-4A provides the best balance of the evaluation criteria among all the floodplain soil alternatives. Alternative FPS-4A is protective of human health and the environment, meets all federal and state ARARs, achieves the RAOs for this proposed remedial action, is straightforward in its implementation, and is effective in the long term and permanent.

Alternative FPS-4A provides long-term and permanent protection against exposure to contaminated soils by excavating approximately 7 acres of floodplain soil exceeding the RAL of 20 mg/kg in the Plainwell Impoundment, resulting in 98 percent to 100 percent of home ranges for ecological receptors being protected. Alternative FPS-4A is effective in the short term, as the exposure risk is eliminated immediately upon soil removal and backfilling of the excavation areas while posing easily-manageable risks to workers and the local community during implementation. Alternative

FPS-4A is administratively and technically implementable and can be completed within 1 year.

Although alternative FPS-4A costs more than alternative FPS-3, alternative FPS-4A is cost effective because it achieves FRGs immediately upon completion of the construction work with limited habitat destruction, and removes the contaminated soil instead of capping it (as in Alternative FPS-3), resulting in a greater degree of long-term effectiveness and permanence. In addition, it does not reduce floodplain storage due to adding cap material or require long-term maintenance of a cap (as in Alternative FPS-3).

Alternative FPS-4A does not reduce the toxicity, mobility, or volume of the contamination through treatment because the relatively low-level PCB contamination that is present does not lend itself to any cost-effective treatment.

Expected Outcomes of the Selected Remedy

The selected sediment remedy (S-3A) will reduce the risks to human health and the environment by reducing PCB concentrations in smallmouth bass fish tissue to levels within EPA's acceptable risk range. This will be accomplished by removing contaminated sediments from hotspots identified within the Remediation Area and through natural river recovery processes. The time to reach fish tissue FRGs is approximately 32 years.

The selected floodplain remedy (FPS-4A) will reduce risks to ecological receptors in the former Plainwell floodplain by excavating approximately 7 acres of floodplain soil. The ecological risk FRG will be met in 98 percent to 100 percent of home ranges immediately upon completion of construction.

Cost of the Selected Remedy

The estimated cost of implementing the selected sediment remedy is $13,100,000. The estimated cost of implementing the selected floodplain soil remedy is $6,800,000. The information in the cost estimates is based on the best available information regarding the anticipated scope of the remedial alternatives. Changes in the cost elements are likely to occur as a result of new information and data collected during the engineering design and remedy implementation. This is an order-of-magnitude engineering cost estimate that is expected to be within +50 to -30 percent of the actual project cost.

ARARs for the Selected Remedy

The ARARs for the Selected Remedy are discussed above in Section 2.10 and can be found in Tables 2-1, 2-2, and 2-3 of the Area 1 FS.

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 sediment remedy S-3A provides overall protection of human health and the environment from impacted sediments. Sediment remedy S-3A removes PCB-contaminated sediment from Area 1 hot spots and removes the Crown Vantage side channel sediment. This remedy reduces overall PCB exposure risk to humans and ecological receptors and supports the reduction in PCB concentrations in fish tissue over time.

The selected floodplain soil remedy FPS-4A provides overall protection of human health and the environment from impacted soils. Floodplain soil remedy FPS-4A removes soil areas greater than one-quarter acre in size that exceed a RAL of 20 mg/kg within the Plainwell Impoundment resulting in 98 percent to 100 percent of home ranges for ecological receptors being below the 11 mg/kg floodplain soil FRG.

Compliance with Applicable or Relevant and Appropriate Requirements

The Selected Remedy is expected to comply with the federal and state ARARs that are specific to this RA. The ARARS for this action are discussed above in Section 2.10 and can be found in Tables 2-1, 2-2, and 2-3 of the Area 1 FS.

Cost-Effectiveness

In EPA's judgment, the selected sediment and floodplain soil remedies are cost effective and represent 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)(I)(ii)(D)). Sediment remedy S-3A is cost-effective because it significantly reduces SWACs in the Remedial Reach through source removal with minimal habitat destruction, achieves FRGs for smallmouth bass within 32 years (only 7 years longer than Alternatives S-4A and S-4B), and requires no long-term maintenance of capped material (compared to Alternative S-3B), at less than half the cost of alternatives S-4A or S-4B.

Floodplain soil remedy FPS-4A is cost effective because it achieves FRGs immediately upon completion of the construction work with limited habitat destruction and removes the contaminated soil instead of capping it (as in Alternative FPS-3), resulting in a greater degree of long-term effectiveness and permanence. In addition, it does not reduce floodplain storage due to adding cap material or require long-term maintenance of a cap (compared to Alternative FPS-3).

Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable/Preference for Treatment as a Principal Element

Sediment remedy S-3A and floodplain soil remedy FPS-4A do not reduce the toxicity, mobility, or volume of the contamination through treatment because the relatively low-level PCB contamination is not considered by EPA to be a principal threat waste, and the contamination does not lend itself to any cost-effective treatment.

Sediment remedy S-3A provides long-term and permanent protection against exposure to contaminated materials by excavating approximately 19,500 cubic yards of PCB-contaminated sediment from at least five hot spot areas and the Crown Vantage side channel, and then relying on MNR, in conjunction with ICs and ECs, to achieve the FRGs and RAOs over time. The sediment remedy is effective in the short term, as it results in immediate reductions in sediment SWACs while posing easily-manageable risks to workers and the local community during implementation.

Floodplain soil remedy FPS-4A provides long-term and permanent protection against exposure to contaminated soils by excavating approximately 7 acres of floodplain soil exceeding the RAL of 20 mg/kg in the Plainwell Impoundment, resulting in 98 percent to 100 percent of home ranges for ecological receptors being protected. Alternative FPS-4A is effective in the short term, as the exposure risk is eliminated immediately upon soil removal and backfilling of the excavation areas while posing easily-manageable risks to workers and the local community during implementation.

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.

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, statutory review of the remedy protectiveness will be conducted every five years until the PCB concentration in fish

tissue meets the remediation goals set forth in this ROD. Two five-year reviews have already been conducted at the Site, and Area 1 of OU5 will be included in future five-year reviews.

2.14 Documentation of Significant Changes

The PP for Area 1 of OU5 of the Site was issued for public comment on May 4, 2015. The Proposed Plan identified Sediment Alternative S-3A and Floodplain Soil Alternative FPS-4A as the Preferred Alternatives. The Proposed Plan public comment period ran from May 4, 2015 through July 3, 2015. CERCLA Section 117(b) and NCP Section 300.430(f)(5)(iii) require an explanation of any significant changes from the remedy presented in the Proposed Plan that was published for public comment. Based upon its review of the written and oral comments submitted during the public comment period, EPA has determined that no significant changes to the remedy, as originally identified in the Proposed Plan, are necessary or appropriate.

Part 3 - Responsiveness Summary

In accordance with CERCLA Section 117, 42 U.S.C. Section 9617, EPA released the Proposed Plan and AR on May 4, 2015, and the public comment period ran through July 3, 2015, to allow interested parties to comment on the Proposed Plan. EPA held a public meeting regarding the Proposed Plan on May 19, 2015, at the Kalamazoo Nature Center, Kalamazoo, Michigan. Approximately 40 people attended the meeting. Representatives from EPA, MDEQ, and MDNR were present at the public meeting. A written transcript from the public meeting is available in the AR.

The AR index is attached as Appendix 2 to this ROD. EPA, in consultation with MDEQ, carefully considered all information found in the AR prior to selecting the remedy documented in this ROD. Complete copies of the Proposed Plan, AR, and other pertinent documents are available at:

The Kalamazoo Public Library 315 South Rose Kalamazoo, MI 49007	EPA Region 5 Superfund Division Records Center 77 West Jackson Boulevard Chicago, IL 60604

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 is included in the AR.

3.1 Comments from the Community:

1. Comment from Kenneth Kornheiser:

The proposed plan aims to reduce PCB levels in fish to the level acceptable for sports

anglers. Sport anglers are figured to eat two bass per month. However, it acknowledges that there are a large number of subsistence anglers, and it also acknowledges that fish consumption advisories are inadequate for protecting subsistence anglers and their families. So, I would suggest that the potentially responsible parties are potentially responsible for poisoning all of those subsistence anglers and their families; and even though it is not typically part of the remedial action in these kinds of projects and programs, that I would suggest that that needs to be addressed more sufficiently.

Response:
EPA will work with the potentially responsible parties, MDEQ, and MDNR to increase awareness of the restrictions on fish consumption as well as signage within the Kalamazoo River area. MDCH has recently developed www.michigan.gov/eatsafefish to better explain the fish consumption restrictions and associated risks. The cleanup will reduce PCB levels in fish and protect fish consumers.

2. Comment from Dayle Harrison:
I am Dayle Harrison, D-a-y-l-e, H-a-r-r-i-s-o-n. I am the president of a group called the Kalamazoo River Protection Association. We have been on the site -- and I know many of you have heard the story before. We have been on the site since 1976, '77. We're still really saddened deeply by the failure of GP and the Koch Brothers--Koch Industries to take a commanding lead in this cleanup. It's our belief that Koch Industries, when they acquired GP, factored in the billion dollar cleanup costs as a liability to reduce the purchase price for that amount. So, they need to man up and step up with the deal they already got. So, having said that, I think, as a preliminary review, I think what EPA proposes here is adequate. We've got some more research to do and some more reading to do, but I think the two alternatives will help us with the downstream and, hopefully, bring about more cleanup in that area. We will be submitting written comments probably within the next three or four days, but I would request an extension in the next ten days to give us more time to review what is a pretty cumbersome document. Thank you.

It's pretty perplexing that -- and this is probably a side line, but we've cleaned up -- excavated 300,000 cubic yards out of a $4 million dollar cleanup excavation process that's needed. So, if we do that in 20 years, you can figure out -- you can do the math yourself -- how long it's going to take, at this rate, to get the river restored for the fisheries, the human health risk reduced, and ecological safety for wildlife. It's really puzzling why -- I think even the community is having difficulty understanding why -- it's taking so long, given the resources that these companies have, to clean up the river, and why EPA has not been more aggressive. At the present rate, we're talking about a 300-year cleanup at the present rate we're doing the work now. That's really frightening and just unbelievable.

Response:
EPA has taken action to eliminate the release of PCB contamination from former mills and disposal areas into the Kalamazoo River from 1998-2015. EPA has also taken several emergency removal actions which have addressed the most significant sources of PCB contamination from the 20-mile section of the River from Morrow Dam to the former

Plainwell Dam. This ROD will address the remaining significant sources of PCBs in this first Area of the River. Area 1 is the most upstream segment of the site and includes the 22-mile reach of the Kalamazoo River from Morrow Dam to the former Plainwell Dam as well as the 3-mile stretch of Portage Creek from Alcott Street to its confluence with the Kalamazoo River. EPA continues to work simultaneously in several areas of the Kalamazoo River, and is currently working as far downstream as the Trowbridge impoundment.

EPA understands your concerns related to timing, but disagrees with your conclusion that it will take 300 years to clean up the Site. EPA currently anticipates that construction of cleanup work on the entire Kalamazoo River will be complete in 2030. Assuming a conservative estimate of 40 years additional time for the remedy to reach RAOs after natural recovery processes, the entire River would be cleaned up in 2070.

3. Comment from Bruce Noble:
The Proposed Plan for Kalamazoo River Superfund Site, Operable Unit 5, Area 1, and Sediment Alternative S-3A and Flood Plain Soil Alternative FPS-4A, is not acceptable because it does not protect the human health and the environment at this Superfund site for the following reasons. *(EPA's Responses are provided below each numbered comment.)*

1. The main deficiency is the basic fact that the total PCB mass remains at the site. A fact that EPA omitted in their public notice and proposed plan. The proposed plan only removes 858 lbs of PCBs from site sediments from a Superfund site that had over 113,000 lbs of PCBs in River sediments. This limited PCB removal action (S-3A) represents less than 1% of the total of PCBs at this site. Therefore potentially over 100,000 pounds of PCBs will remain at the site. Does the EPA really think this is acceptable to the residents that live in the Kalamazoo watershed?

Response:
The Selected Remedy will remove approximately 390 kg (858 pounds) of PCBs within Area 1. EPA has initiated numerous response actions at the Site that have reduced the amount of PCBs in Area 1. As discussed above, Area 1 addresses the upstream 20 miles within the first of seven areas to be remediated, and is currently estimated to contain less than 3 percent of the total mass of PCBs at the Site. After the remedy is implemented, sediment concentrations will be reduced throughout Area 1.

Comment, continued
2. In addition, the Institutional Controls at the site for the next 32 years rely on only 9 signs in 22 miles of River in Area 1 that say don't eat the fish. That is an average of one sign warning for every 2.4 miles of River. This IC shifts the burden from the Potential Responsible Party to the community to be protective of human health. This seems bizarre that even the Interstate Highway system has mileage markers every mile, but a Superfund site with contaminated fish has less warning signs. The M-89 bridge that crosses the Kalamazoo River in Plainwell has no warning signs.

Response:
During the remedial design phase of the Selected Remedy an institutional control plan addressing fish consumption advisories and warning signs will be developed by the party implementing the remedy. Fish consumption advisories and warning signs help to minimize the potential for human exposure to contamination and are designed to work by providing information that helps modify or guide human behavior at the Site, which is consistent with EPA's institutional control guidance. (See for example, OSWER 9355.0-89, EPA 540-R-09-001, November 2010.) EPA will work with the potentially responsible parties, MDEQ, and MDNR to increase awareness of the restrictions on fish consumption as well as signage within the Kalamazoo River area.

Comment, continued
3. Also the Surface Weighted Average Concentrations for remedy goals does not address individual hot spots. EPA did not address this issue. For example, single PCB sample could have a high reading and would not be removed and would remain in place. For example a flood plain soil sample could have a result of 100 mg/kg for PCB and a single family could use this area for recreation activities such as fires or boat launching and the likelihood of exposures to high levels PCBs remains.

Response:
The SWAC is used for in-stream sediment to estimate fish uptake of a contaminant across a given area. The SWAC was not used for establishing cleanup levels in the floodplain soil, where families may recreate. The Selected Remedy's cleanup number for floodplain soils in recreational areas is 11 mg/kg. This cleanup number was derived from the baseline ecological risk assessment for the Site and is a lower, or more stringent, number than the cleanup level of 23 mg/kg for floodplain soil in recreational areas set forth in the human health risk assessment for the Site.

Comment, continued
4. The clean up levels for S-3A and FPS-4A are much higher than other and similar Superfund sites on NPL or other Superfund sites with PCBs in aquatic environments. For example, the Fox River, Hudson River and Yosemite Slough all have much more stringent cleanup levels, often to less than 1 mg/kg.

Response:
The sediment cleanup level in the Selected Remedy for the Kalamazoo River is a SWAC of 0.33 mg/kg and is consistent with the cleanup levels at the sites mentioned above.

Comment, continued
5. The clean up levels for S-3A and FPS-4A are considerably higher than previous cleanup goals conducted at the Kalamazoo River Superfund Site. The PCB clean up goals have slowly increased for each separate removal action since 2009. Starting as low as 1 mg/kg for Portage Creek to a current high of 20 mg/kg for FPS-4A.

Response:
This comment compares a sediment goal (1 mg/kg for Portage Creek) to a floodplain soil excavation level of 20 mg/kg. For the Selected Remedy, the sediment cleanup level is a SWAC of (0.33 mg/kg), and the floodplain soil cleanup level for non-residential areas is 11 mg/kg and 2.5 mg/kg for residential areas.

Comment, continued
6. The risk based clean up levels are suspect for a site that is 77 miles long. Risk based clean up levels for Human Health and Ecological rely on specific input parameters. The science for even more controlled Superfund sites that are considerably smaller is difficult. Controlled and specific parameters for a large and complex Superfund site such as the Kalamazoo River are difficult to predict and to accurately model. For example, waterfowl consumption couldn't be completed because of data limitations.

Response:
EPA, MDEQ, MDNR, and the responsible parties have completed extensive work and research both on the human health and ecological risk assessments. The human health risk assessment was produced by MDEQ's contractor CDM and reviewed and approved by EPA. The baseline ecological risk assessment was also produced by MDEQ's contractor CDM and reviewed and approved by EPA. The terrestrial baseline risk assessment was developed by Georgia-Pacific and reviewed and approved by EPA. The ecological risk assessment, studies, and assumptions were subject to a peer review panel of technical experts outside of EPA. The approved ecological risk assessment reflects the input of those from the expert panel. The cleanup levels derived from both the human health and ecological risk assessments accurately reflect sound science and balance risk and uncertainty.

Comment, continued
7. The proposed plan provided very limited information about the requirements for the engineering controls and monitored natural recovery. What are these requirements and how can EPA ask for community input on the proposed plan when these parameters aren't specifically listed? The parameters are extremely important and should be specifically listed.

Response:
A long-term monitoring plan is essential for success of any alternative remedy set forth in the FS for this Site. As discussed in this ROD, a long-term monitoring plan will be implemented that includes fish monitoring, surface water monitoring, and sediment monitoring. The ROD provides some specifications regarding the requirements of the long-term monitoring plan. A remedial design plan will be completed before implementation of the Selected Remedy to ensure that any engineering controls will remain in place and to adequately monitor recovery.

Comment, continued
8. The LTM plan seems to be limited to annual requirements for 5 years and every 5 years after. This isn't adequate for extreme weather patterns that seem to happening on a more frequent basis due to global warming. The increased likelihood of 100 year floods are to increase and more erosion is likely. The LTM should include yearly inspections over the 32 year LTM period and inspections after major flood events.

Response:
The LTM requires fish sampling each year for the first five years and annual inspections of banks and floodplains. Further details and the inspection frequency will be part of the long-term monitoring plan that will be submitted during remedial design and approved by EPA.

Comment, continued
9. It only took the PRPs 20 years to dump over 113,000 pounds of PCBs into the Kalamazoo River. It already has been 25 years and another 32 years or 57 years to reach the FRGs for smallmouth bass. Doesn't that seem strange to EPA? Is 57 years an acceptable time frame for EPA to reach remediation goals?

Response:
The nature of the cleanup is both technically complex and involves potentially responsible parties as well as numerous stakeholders throughout the community. EPA has taken action to eliminate the release of PCB contamination from landfills and former paper mills into the Kalamazoo River from 1998-2015. EPA has also taken several emergency removal actions which have addressed the most significant sources of PCB contamination from the 20-mile section of the River from Morrow Dam to the former Plainwell Dam. Fish tissue levels are currently in a slow decline. The remedies described in this ROD will further reduce fish tissue levels over time. There are background sources of PCBs that may continue to contribute to fish tissue concentration and can impact the ability of fish tissue levels to recover. Therefore, it is not unusual for lengthy time periods to reach remediation goals with sediment remedies in large river systems over time.

Comment, continued
10. It should be noted that Koch Industries owns Georgia Pacific who is the only remaining viable PRP at the site. Koch Industries made billions in 2014 and can easily afford a more costly cleanup that protects the Kalamazoo River community. Historically, Koch Industries has a dismal environmental record (see Wikipedia) and has incurred some of the largest environment fines for non-compliance. Why should the community trust Koch Industries and Georgia-Pacific under any AOC to actually carry out requirements of any LTM requirements? Who is actually paying for the remedies in Area 1, Koch Industries and Georgia Pacific or US EPA? Why wasn't this information provided in the proposed plan or public notice? Does EPA have to negotiate another AOC for Area 1?

Response:
EPA and Georgia-Pacific, LLC (GP) entered into a settlement agreement whereby GP agreed to complete a SRI and FS for all Areas of OU5. EPA anticipates that it will negotiate another agreement to have the PRPs, including GP, implement the Selected Remedy set forth in this ROD, which includes LTM requirements. EPA's model consent decree for implementation of remedial actions contains provisions that allow EPA to take over the work should a PRP fail to fulfill the requirements set forth in the agreement. The current model consent decree is available at: http://www2.epa.gov/enforcement/guidance-2014-cercla-rdra-cd-and-sow.

Comment, continued
11. It should be noted that the 57 page Proposed Plan, May 2015, Kalamazoo River Superfund Site, Operable Unit 5, Area 1, had no Table of Contents which made the document difficult to review. The public notice dated May 2015 didn't show the location of the Crown Vantage Side Channel. Does EPA agree that it is hard for the community to comment on a proposed plan when the remediation locations aren't shown to community?

Response:
The location of the Crown Vantage Side Channel was indicated in Figure 3 of the Proposed Plan. In addition, information related to the Crown Vantage Side Channel is set forth in the Remedial Investigation and FS reports, which are part of the Administrative Record compiled and made available for review along with the Proposed Plan.

Comment, continued
12. EPA failed to explain in the proposed plan why S-5 Area 1 Removal would require 45 years to reach FRGs for smallmouth bass.

Response:
EPA based its 45-year estimate to reach FRGs for smallmouth bass, in part, on the fact that the remedial action described in that alternative would take more than 10 years to complete, and there would be significant disruptions and suspension of materials during that 10-year remedial action period that could continue to impact fish. EPA used the same smallmouth bass recovery rate for all alternatives analyzed in the Proposed Plan.

Comment, continued
13. This commenter states that EPA should select remedies S-5 Area 1 Wide Removal and FPS-4B Removal because these remedies actually protect the human health and the environment.

Response:
EPA finds that the Selected Remedy (alternatives S-3A and FPS-4A) protects human health and the environment. Section 121 of CERCLA sets forth five principal requirements for the selection of remedies. Remedies must: 1) protect human health and the environment; 2) comply with applicable or relevant and appropriate requirements (ARARs) unless a waiver is justified; 3) be cost-effective; 4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum

extent practicable; and 5) satisfy a preference for treatment as a principal element, or provide an explanation in the ROD as to why this preference was not met. EPA established the remedial investigation/FS process in order to gather the information necessary to select a remedy that is appropriate for the site and fulfills these statutory mandates.

EPA also established a two-step remedy selection process, in which a preferred remedial action is presented to the public for comment in a Proposed Plan, which states preliminary conclusions supporting the option that appears most favorable based on the information available and considered during the FS. Following receipt and evaluation of public comments on the Proposed Plan (which may include new information), EPA makes a final decision and documents the Selected Remedy in a ROD. The above comment is not supported by any new information nor does it set forth any rationale supporting your assertion that alternatives S-5 and FPS-4B are more protective of human health and the environment when compared to the Selected Remedy. EPA finds that the Selected Remedy protects human health and the environment. This ROD details EPA's rationale for selecting alternatives S-3A and FPS-4A.

Although alternatives S-5 would eventually meet cleanup objectives (e.g., 45 years for fish tissue levels to reach cleanup goals), S-5 has short-term effectiveness and implementability issues (e.g., cross-contamination through re-suspension in one work area and migration into another work area).

Comment, continued
14. Finally and please when EPA reviews my comments and most importantly explain to me and to the public how many pounds of PCBs will remain in place in Area 1 if EPA selects their preferred alternatives S-3A and FPS-4A.

Response:
EPA does not have an accurate estimate of the total pounds of PCBs that exist in Area 1. As discussed above in response to your first comment, at present, Area 1 represents less than 3 percent of the mass of PCBs at the entire site. The estimate of mass of PCB material to be removed from alternative S-3A is 390 kg (858 pounds). The amount of PCB material remaining will not significantly impact fish tissue concentration or present an unacceptable risk to human health and the environment. PCB mass is not a predictor of ecological or human health risks. Rather, the exposure concentration is used to determine whether risks exist.

4. Comment from Cary Mannaber:
I am very happy that this section of the Kalamazoo River is being cleaned. I live in Plainwell and I am a very active canoeist and kayaker. I also like to fish. One thing I would like to see is the old railroad bridge in Parchment needs to be removed. This is dangerous and is difficult and hazardous to canoeists. The bridge can be seen by going behind the Save-A-Lot store. It is fenced off, but not secured. The GPS coordinates for the bridge are 42 19 13.57 N, 85 34 25.10 W. Look on Google Earth for many pictures showing debris trapped against the bridge.

Response:
EPA appreciates your comment. Although removal of the bridge is not part of the Selected Remedy, EPA will bring your comment to the attention of potentially responsible parties, city representatives, and natural resources trustees for potential future action.

5. Comment from Richard Klade:
Agree that the two alternatives proposed by EPA are the best choices.

In all sediment alternatives it seems likely the time to reach cleanup in fish could be greatly reduced through cooperation with the Michigan DNR. This would be accomplished by DNR action to declare the river a "no limit" fishery with a publicity program encouraging anglers to catch and remove all the fish they wanted. Of course, publicity would point out the dangers in eating the fish, and suggest burial in areas unlikely to be disturbed by human activity.

The goal should be to get as many contaminated fish as possible out of the river, not simply to wait many years for nature to accomplish the fishing cleanup.

Response:
EPA agrees it is important to reduce sediment contamination, thereby reducing PCB levels in fish. EPA will continue to work with MDNR, MDEQ, and the natural resources trustees to raise awareness of fish consumption restrictions. EPA defers to MDNR regarding how to best manage the fisheries in the Kalamazoo River, as they are responsible for managing the State's fisheries.

6. Comment from Mary Beth Montague:
When did the EPA decide that money is more important than human life? The EPA is supposed to PROTECT human life not sell us out.

There is no other option but total cleanup for this generation and all to come. Hot spot removal is not acceptable now or in the future. S-5 Area-Wide removal, MNR, ICs and ECs or FPS-4B removal, ICs and ECs are the only two options acceptable.

City water wells are in this area and will be effected at some point without total cleanup. The City of Kalamazoo does not have the funds to correct this when it happens.

Response:
None of the data collected to date indicate that there is any risk from the PCBs located in the Kalamazoo River impacting groundwater or the City of Kalamazoo well field. Groundwater data collected as part of the Area 1 remedial investigation did not detect any PCBs in groundwater.

Although alternatives S-5 and FPS-4B would eventually meet cleanup objectives, they would cause considerable environmental harm (e.g., potential for sediment resuspension and migration during long construction periods, disturbance and/or destruction of

sensitive riparian habitat, frequency and prolonged truck traffic along local haul routes, location of approved offsite landfill, etc.) and still require 45 years for fish tissue levels to reach cleanup goals. The uncertainty associated with the environmental improvement that might occur with these remedies is difficult to justify a cost seven to ten times greater than other remedies which will accomplish similar environmental results.

7. Comment from Dayle Harrison

Please include these comments on behalf of the Kalamazoo River Protection Association (KRPA) in the official record of the EPA's proposed final remedy. The KRPA with over 100 dues paying members and a mailing list of over 300 appreciates this opportunity to comment.

I have reviewed the Area 1 Feasibility Study, OU-5 Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund as well as previous RI/FS technical documents relating to Area 1. We are of the opinion that Preferred Alternative S-3A relating to sediments and Preferred Alternative FPS-4A as it relates to floodplain contamination are adequate to protect human health and the environment. These remediation alternatives should provide long term protection and appear to be cost effective. Cleanup standards and objectives should adequately protect human health and the environment.

Although not technically related to the Allied Paper Landfill, Operable Unit 1, US EPA preferred Alternatives selected at Area 5 and other sites are of serious concern. EPA needs to exercise extreme caution relating to overall funding needs for downstream remediation including Area 5 and areas downstream of the former MDNR Plainwell Impoundment. We are deeply concerned that funds dedicated to the river cleanup may be diverted to the Allied Paper Landfill, Operable Unit 1. I am referring here to a proposed Cleanup Alternative introduced by the City of Kalamazoo and local organizations and likely to be added as another proposed Alternative for Operable Unit 1. The information presented by US EPA at the April 2015 meeting regarding that proposed alternative clearly indicates that no further Protection of Human Health and the Environment will take place. KRPA is strongly opposed to that alternative. That plan seems more like a redevelopment/restoration plan. The additional cost, approximately 20 million dollars for the additional cap and access points needs to be reserved for cleanup efforts downstream where riverbank and in-stream erosion are causing alarming risks to human health and the environment. Today, 99 percent of the PCB's in river sediments that need remediation are located in Allegan County downstream of the former Plainwell impoundment.

Thank you for this opportunity to comment. Contact me with any questions or concerns at your convenience.

Response:

A remedy has not yet been selected for the Allied Landfill (OU1). Once a proposed plan is issued for OU1, the KRPA should review that document and provide public comment on the proposed remedy for OU1. Once a remedy for OU1 is selected, EPA will first approach potentially responsible parties to implement or fund that remedy. EPA is aware

of the required funding necessary for cleanup in the downstream areas of the Kalamazoo River and is making every attempt to preserve available bankruptcy funds to support those activities.

8. Comment from F. Claus Globig:
Please enter this letter as well as the two attached items, representing the evidence for my conclusion, as my comments to the EPA's proposed cleanup plan for Area 1 of the Kalamazoo River.

The plan is based on EPA's premise, or assumption, that PCBs are "probable human carcinogens," a classification that was established a long time ago. Based on the results of my 19 years of studying the PCB issue, this premise is incorrect: PCBs are not causing cancer or any other serious illness in humans at the levels in our environment, either by occupational exposure or by eating fish containing PCBs. There is no medical evidence for this classification.

Therefore, no cleanup action is justified at all. With the basic premise being wrong, all the resulting actions are invalid. Alternatives S-1 and S-2 apply.

Response:
Your attachments have been placed in the AR. It is EPA's position that PCBs are probable human carcinogens and that PCB contamination in Area 1 of OU5 does, in fact, present an unacceptable risk to human health and the environment. Alternative S-1 does not allow for any monitoring to determine if remediation goals are being obtained. Alternative S-2 allows for monitoring, but based upon EPA's evaluation, the time to reach remediation goals would be approximately 87 years. Given the uncertain nature and extended time for Alternatives S-1 and S-2 to reach sediment cleanup levels, these alternatives were not selected. The ROD details EPA's rationale for selecting alternatives S-3A and FPS-4A.

9. Comment from Chase Fortenberry, Georgia Pacific:
May 2015 Proposed Plan, page 45, item 6, 2nd sentence
Text reads as follows: "Areas exceeding the FRG would be remediated as described above."

Comment: Residential areas exceeding the FRG for residential exposure (2.5 mg/kg) would be remediated. Remedial actions and/or land use restrictions may be placed on areas that exceed an exposure concentration of 2.5 mg/kg and are not currently residential but may become residential in the future.

Response:
The ROD indicates that residential areas (including parcels that may become residential in the future) exceeding the FRG of 2.5 mg/kg will either be excavated or capped. The determination to excavate or cap will be made in the future based on data results. EPA believes this is the appropriate remedial action for residential and reasonable potential residential properties.

10. Comment from Chase Fortenberry, Georgia Pacific:
May 2015 Fact Sheet
Page 4, S-5, Area 1 Wide Removal, MNR, ICs, and ECs, Description - second column Table reads as follows: "Total excavation of all highly contaminated sediment throughout the river in Area 1."

Comment: This alternative calls for removal of both highly contaminated sediment such as that detected in hot spots and the excavation of areas with relatively low PCB concentrations (near 1 mg/kg). The majority of the excavated areas have relatively low PCB concentrations. The description should state that this alternative includes excavation of sediment with PCB concentrations greater than 1 mg/kg.

Response:
Language describing Alternative S-5 reflecting the excavation of sediment greater than 1 mg/kg can be found on section 2.9 in the ROD.

11. Comments from the Kalamazoo River Watershed Council Board of Directors:
The Kalamazoo River Watershed Council notes the dependence on the institutional control, Michigan Department of Community Health Fish Consumption Advisory, for protection of human health during the remediation project period, lasting variously from 32 to 192 years. There are two major concerns with this dependency: lack of confidence in the effectiveness of the current advisory and its implementation, and the calculation of exposure risk.

The Fish Consumption Advisory and its limitations are described in the Proposed Plan:

Fish Advisory
MDCH has issued a fish advisory for parts of Portage Creek and the Kalamazoo River, extending from Morrow Lake Dam to Lake Michigan. For the river area from Morrow Lake Dam to the Allegan Dam (which is located in Area 6), and on Portage Creek downstream of Monarch Mill Pond (which is located just upstream of OU1), the advisory currently recommends that the general population not consume carp, catfish, suckers, smallmouth bass, or largemouth bass from these areas. Between Allegan Dam and Lake Michigan, the advisory recommends that the general public not consume carp, catfish, or northern pike. Healthy adult males are advised to eat no more than one meal per week of all other species. For women of childbearing age and children under 15 years of age, no consumption of any species is recommended for fish caught above Allegan Dam (including Area 1).

MDCH's fish consumption advisory is only a recommendation, is not legally binding, and has limited effectiveness in protecting human anglers from Kalamazoo and Allegan Counties. A survey from 1994 showed that anglers ate on average two meals per month

of various species taken from contaminated reaches of the river, including bass, catfish, panfish, bullheads, and carp. More than 10 percent of anglers ate more than one meal per week of these various species. This survey confirmed that the Kalamazoo River is an important recreational resource and may serve as an important source of food for certain human subpopulations.

We concur wholeheartedly with the statement concerning the limitations of the advisories in 7. SUMMARY OF REMEDIAL ALTERNATIVES, Common Elements:

"Site-specific fish consumption advisories established and publicized by the State will continue to manage risks posed to anglers and their families from consumption of PCB-containing fish. These advisories are already in place for Area 1, and the advisory for each fish type will remain in effect until fish tissue PCB concentrations achieve RAOs for the fish specified. The advisories will be reviewed and verified annually as a component of the site ICs. The fish consumption advisories issued by MDCH are only a recommendation, are not legally binding, and have limited effectiveness in protecting human health. Fish advisories, alone, would not be an appropriate remedial alternative."

We feel it is appropriate to include in the proposed plan a proposal to provide technical and financial support to a State interdepartmental program currently in the planning stage which would add substance to the advisories. An outline of the planning stage discussions is attached (Attachment 1.)

Support of the Eat Safe Fish program is aligned with the objectives promulgated in the EPA directive "Enforcement First" to Ensure Effective Institutional Controls at Superfund Sites, OSWER Directive No. 9208.2, March 17, 2006, which addresses "any actions needed to ensure the implementation and effectiveness of institutional controls." A copy of the Directive is attached. (Attachment 2.)

Our concern with the risk calculations is that the risk profile is limited to a class of anglers who consume limited amounts of only the least contaminated fish. We believe that consumption risk profiles should address the population with the highest risk: subsistence fishermen who consume a wide range of fish including the most contaminated carp and similar species.

"Risk characterization for anglers was performed for three potential populations: central tendency sports anglers, high-end sports anglers, and subsistence anglers. Two exposure scenarios for the three angler populations were included in the BHHRA: the first assumed a diet of 100 percent pelagic (non-bottom feeding) fish species and the second assumed a mixed species diet (76 percent pelagic species and 24 percent bottom-feeding species).

The BHHRA showed that potential excess cancer risks and non-cancer hazards exceeded acceptable levels for the fish ingestion pathway for all three angler populations. Cancer risks and non-cancer hazards were highest for the subsistence angler (2 x 10-3 and an HI of 123, respectively). Cancer risks and non-cancer hazards were lowest for the central tendency sport angler (3 x 10-4 and an HI of 17, respectively). Adverse health effects

associated with PCB exposure include increased risk of liver cancers and reproductive and immunological impairment. The highest risks and hazards are associated with a mixed species diet, and were highest in the vicinity of the recent Area 1 TCRAs described earlier in this document; the BHHRA did not take into account recent reductions of PCB concentrations in sediment and soil due to the TCRAs."

Justification for the choice of central tendency sport anglers is discussed:

"The selection of a fish tissue FRG was a multi-step process that considered the RBC fish values generated for each receptor, the likely exposure scenario to be frequently encountered, and the background levels of PCBs in fish tissue. Although a subsistence angler scenario was included in the calculation of RBCfish, this pathway represents a worst-case scenario that is not expected to be frequently encountered compared to sport anglers. The RBCfish would likely reflect a diet that is weighted toward the 100 percent smallmouth bass consumption scenario (over a mixed carp and bass species scenario) because the smallmouth bass is a popular sport fish on the Kalamazoo River."

We believe that the risk profile for the subsistence angler would change the number of years, 32 to 192, to a much longer period over which an enhanced fish consumption advisory would be necessary for protection of all human health. At a minimum the proposed plan should state the worst-case period over which institutional control must be maintained.

Response:
EPA will work with the potentially responsible parties, MDEQ, and MDNR to increase awareness of the restrictions on fish consumption as well as signage within the Kalamazoo River area.

EPA did consider the subsistence angler population, as indicated in your comment, and provided calculations and information in the proposed plan concerning risk to subsistence anglers. The PCB concentrations necessary for fish in the Kalamazoo River to support subsistence anglers would need to be below existing fish tissue background levels upstream of Morrow Dam. EPA's selection of the sport angler is consistent with approaches at other Superfund sites and appropriate for the Kalamazoo River.

12. Comment from Janet Germain:
Money spent now may save future costs to health and clean up later. The Allied site, Plainwell site, Kalamazoo River and wetlands and creeks need to be cleaned up of PCB, toxic materials from Morrow Pond all the way to Lake Michigan with the funds from the trusts and any other dollars available without creating a debt environmentally protecting the people and wildlife.

Fourteen members of my family (immediate and in-laws) have toxic poisoning. So this proves it is <u>not</u> a hereditary problem, but from the environmental toxics in soil, water and air. No research has been done on the combination of exposure to multiple toxins increasing the effects on their body and even changes to their DNA. "We have a moral

duty to protect all people present and future." America's largest fresh water and Kalamazoo groundwater and aquifer.

As I have addressed in many meetings over the years that even toxic land sites need to be safe from dam breaks on the Kalamazoo River. The Huron River in Belleville, Michigan has earthquake faults and nuclear power plants close to these. Also the two rivers cover many miles in Michigan.

Also the Detroit salt mines extend for many miles underneath many underground streams.

Response:
It is EPA's mission to protect human health and the environment. EPA's evaluation of OU 5 Area 1 determined unacceptable risks exist, and that there is a need for action at this site. The remedy for OU 5 Area 1 is protective as it removes PCB-contaminated materials from the Kalamazoo River, will implement a long-term monitoring program, and will meet cleanup goals over time.

FIGURES

Figure 1: Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

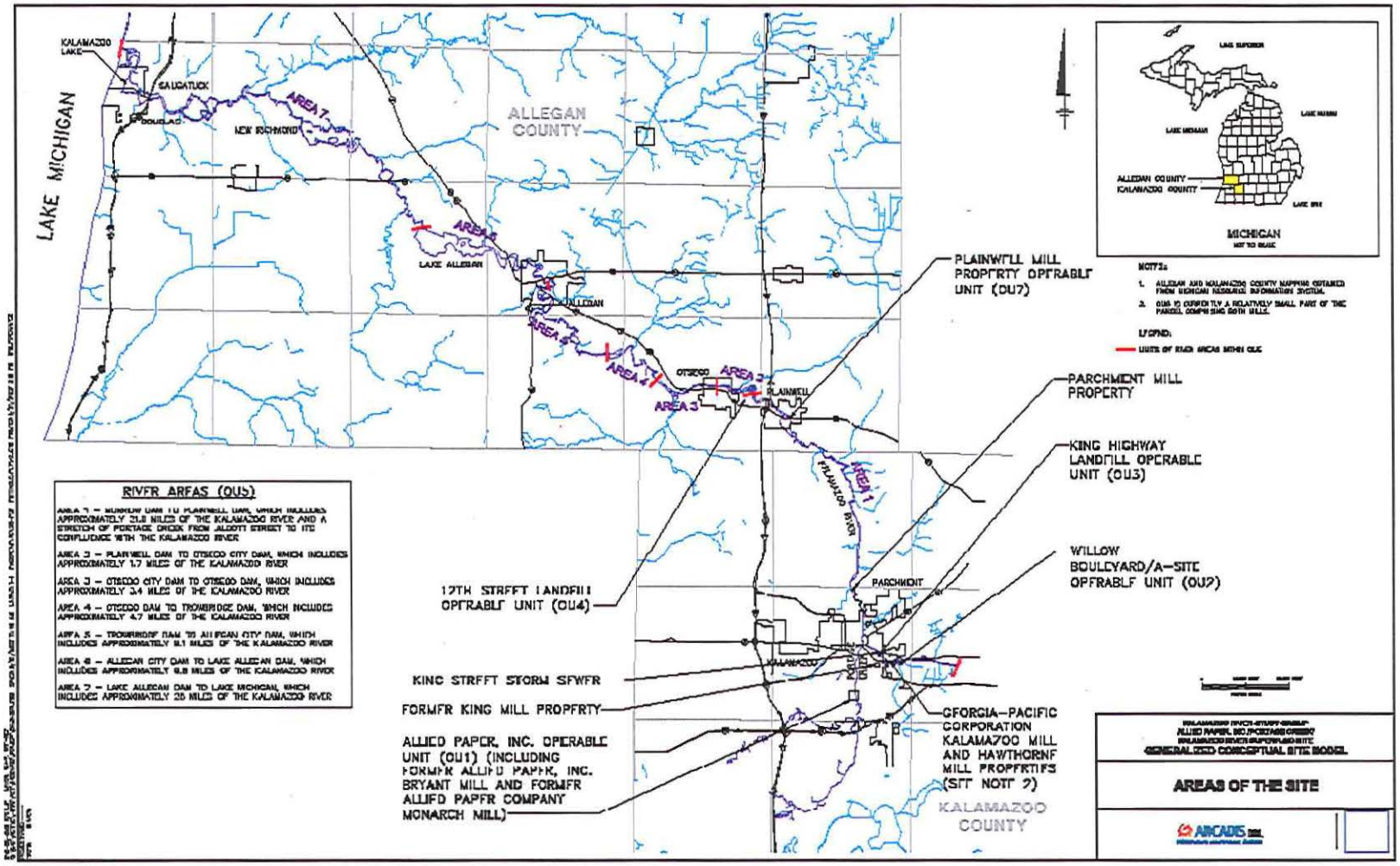


Figure 2: Operable Unit 5

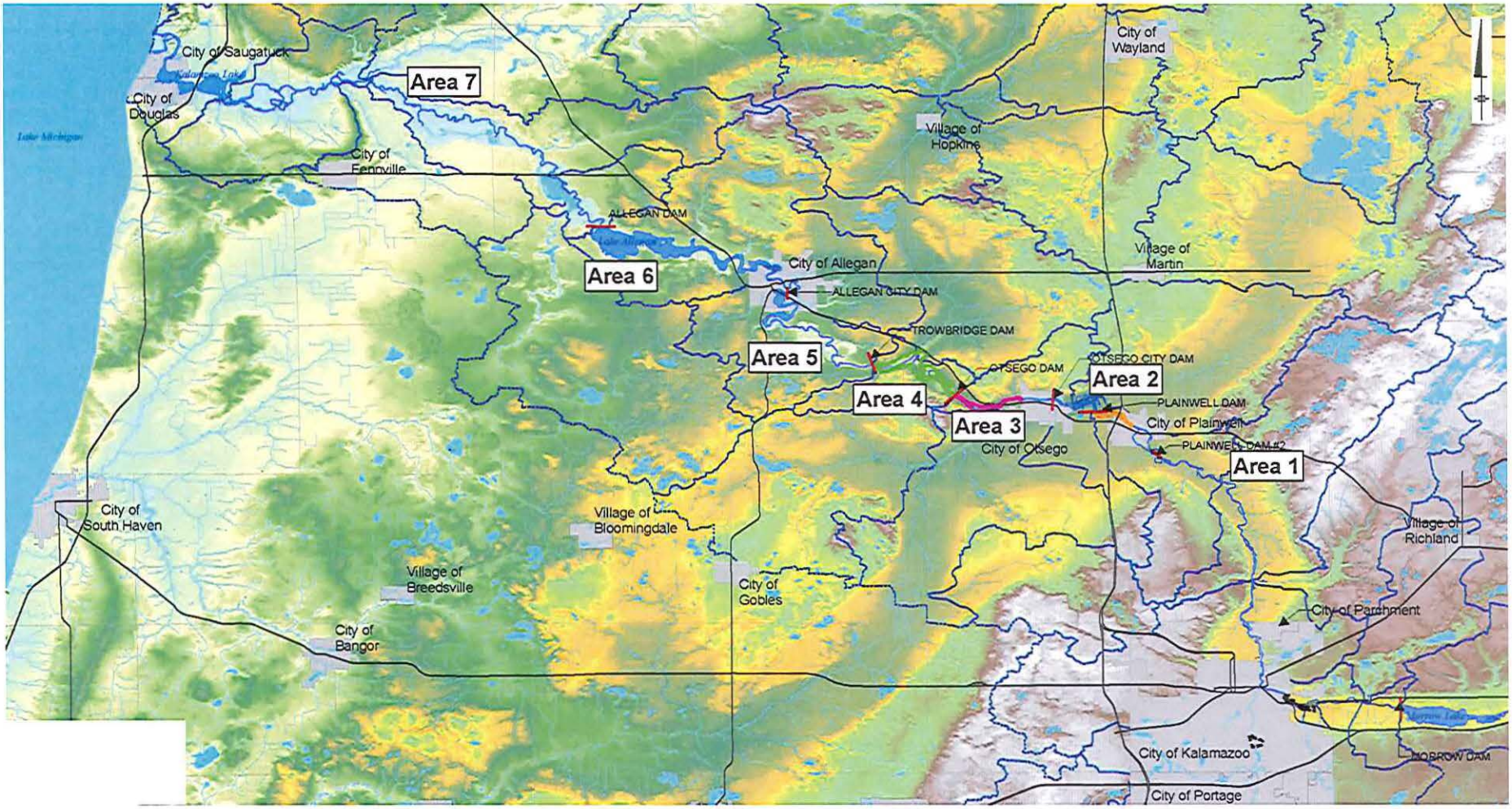


Figure 3: Area 1

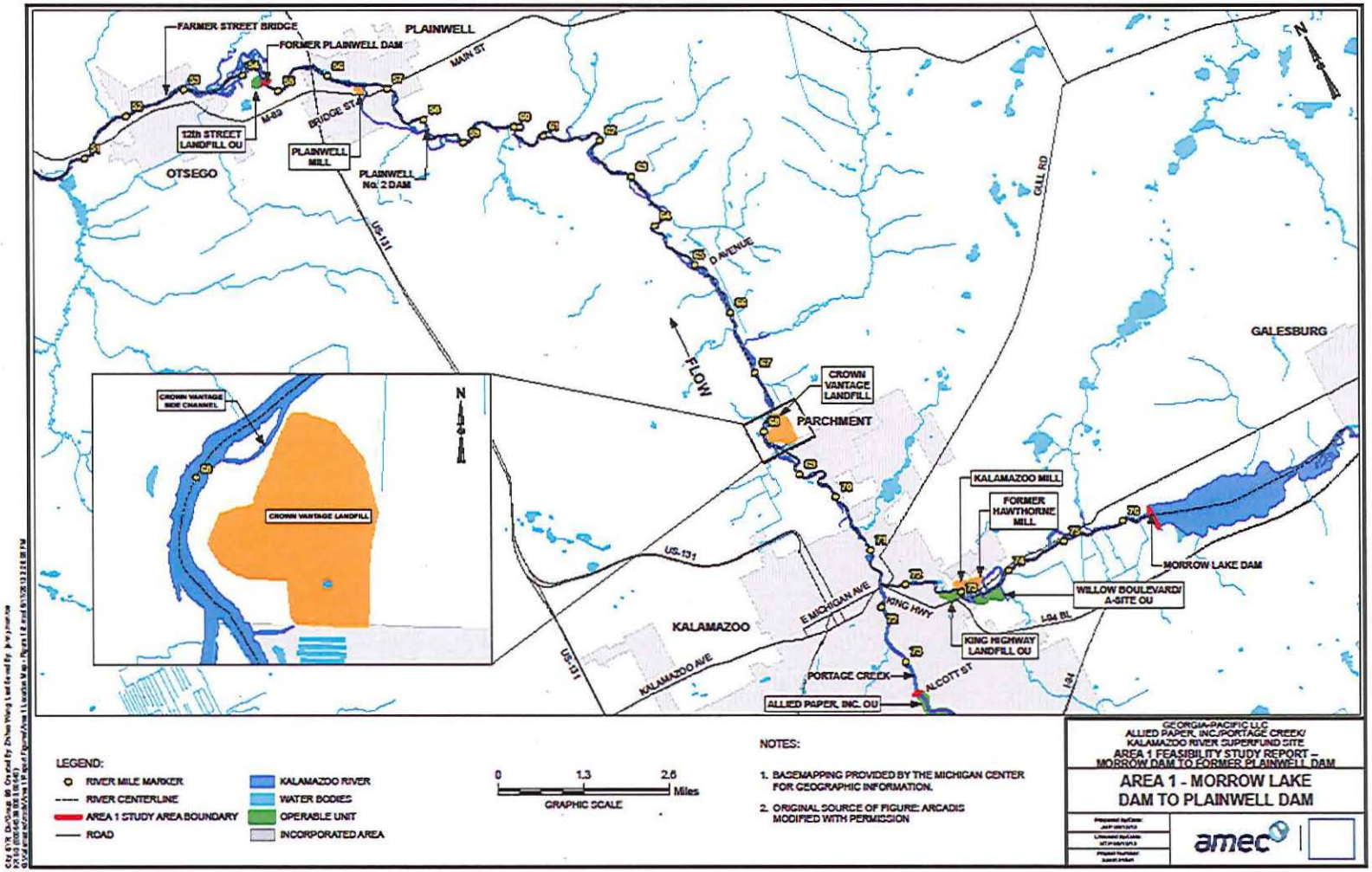


Figure 4: Eight Sections of Area 1

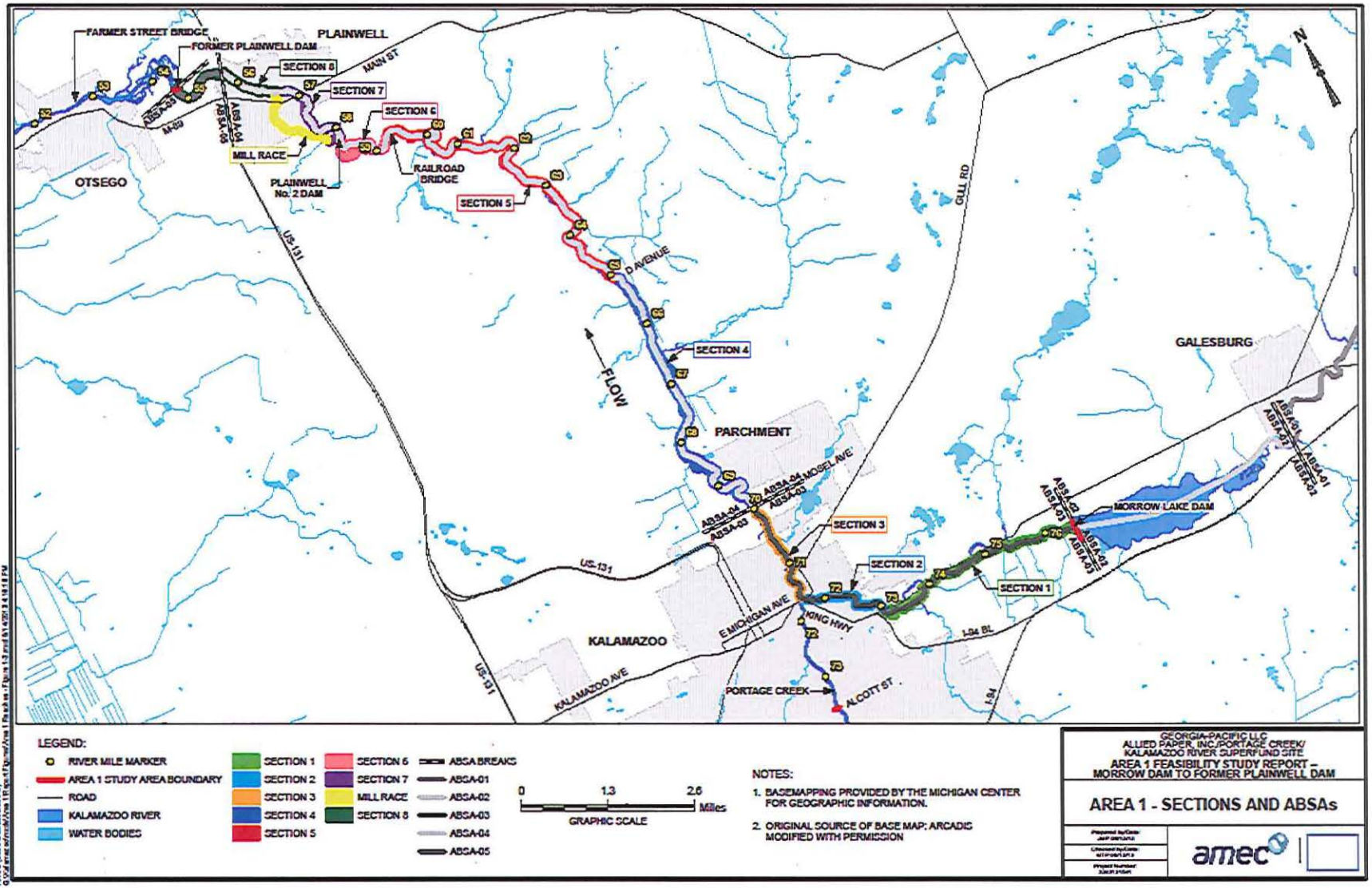


Figure 5: Remedial Reach

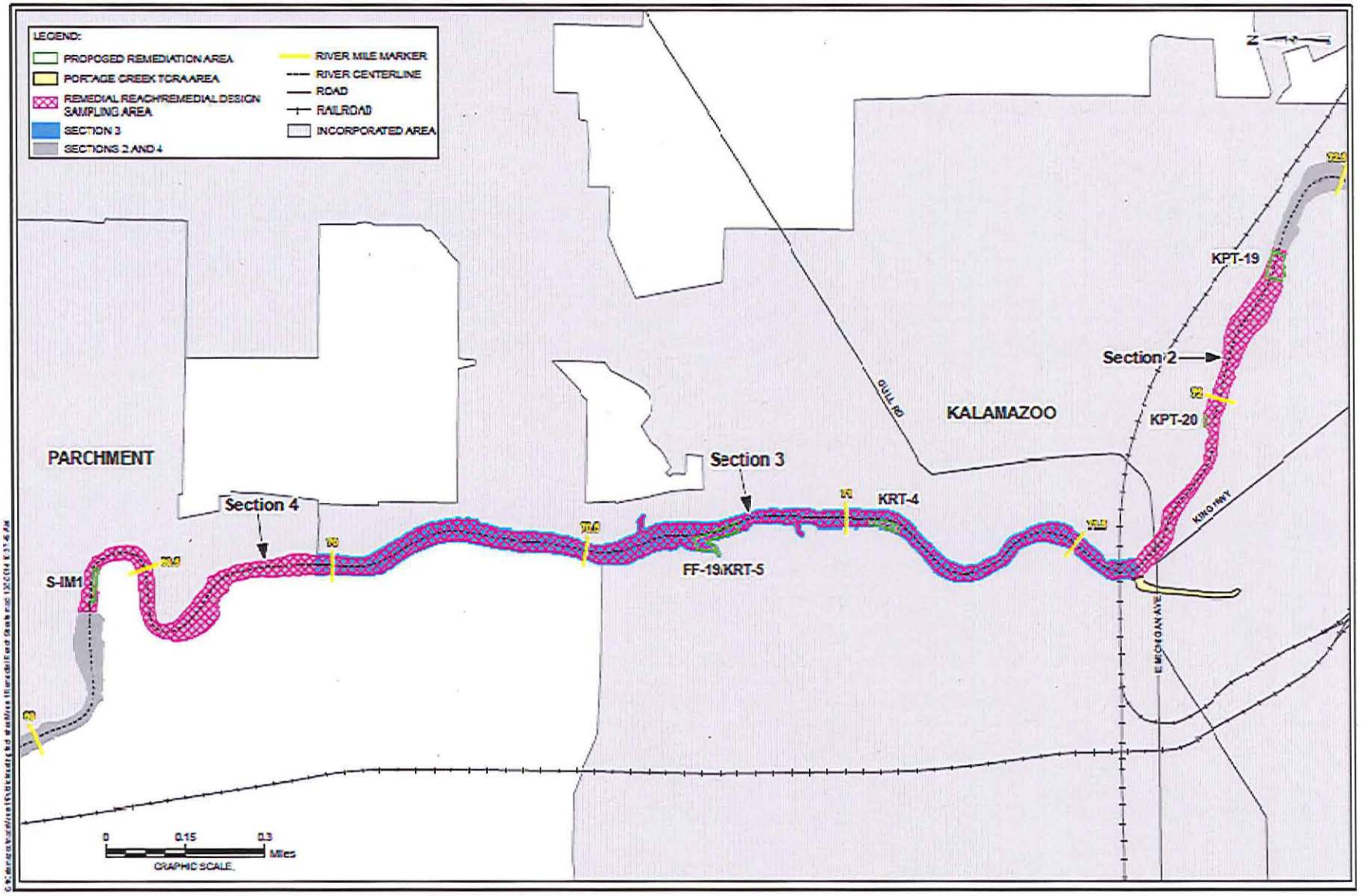
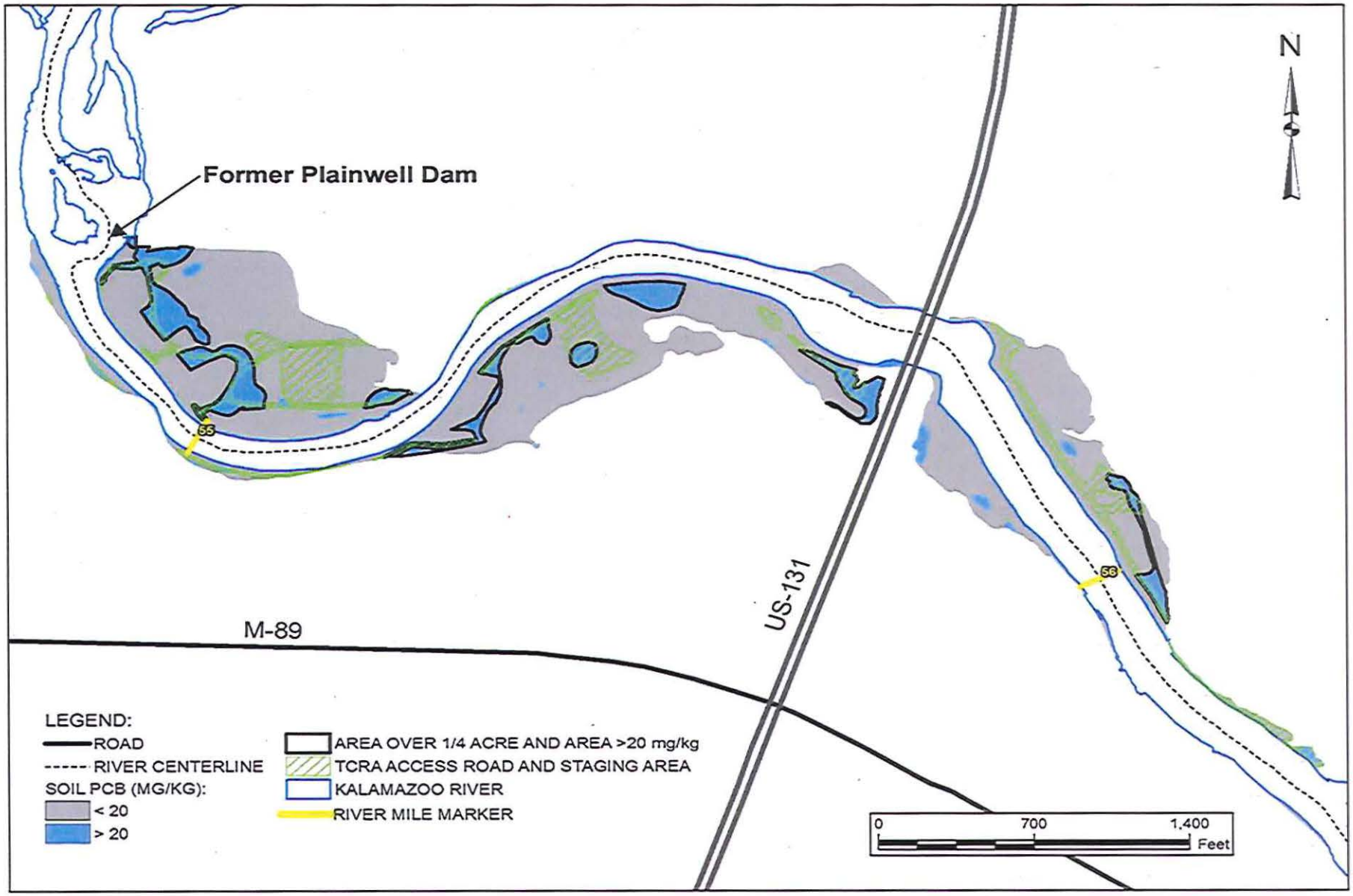


Figure 6: Plainwell Impoundment Floodplain Soil Excavation Areas



TABLES

Table 1: SWACs by Section for Area 1

SWAC Calculations By Section and Bounds on Confidence Limits
Area 1, OU-5 Kalamazoo River

Section	Interval	SWAC	Number of Data Points	Chebyshev Area-weighted (5% LCL, 95% UCL) CI Bounds **	
Section 1	0-6"	0.11	90	<DL	0.28
Section 2	0-6"	0.23	42	0.14	0.33
Section 3	0-6"	2.19	33	<DL	5.59
Section 4	0-6"	0.42	92	<DL	1.16
Section 5	0-6"	0.24	64	0.07	0.42
Section 6	0-6"	0.72	43	<DL	1.91
Section 7	0-6"	0.72	13	<DL	1.76
Mill Race	0-6"	0.33	17	<DL	0.91
Section 8	0-6"	1.77	29	<DL	5.74
Section 1	6-12"	0.06	87	0.01	0.12
Section 2	6-12"	0.22	40	0.10	0.34
Section 3	6-12"	4.25	32	<DL	10.11
Section 4	6-12"	0.24	83	<DL	0.48
Section 5	6-12"	0.11	58	<DL	0.23
Section 6	6-12"	0.31	34	0.04	0.58
Section 7	6-12"	0.66	11	<DL	2.40
Mill Race	6-12"	0.21	12	<DL	0.56
Section 8	6-12"	1.79	22	<DL	5.28
Section 1	12-24"	0.12	66	<DL	0.35
Section 2	12-24"	1.05	26	<DL	5.16
Section 3	12-24"	18.13	26	<DL	42.67
Section 4	12-24"	0.26	49	<DL	0.78
Section 5	12-24"	0.09	29	<DL	0.27
Section 6	12-24"	0.39	26	<DL	0.98
Section 7	12-24"	0.76	8	<DL	2.29
Mill Race	12-24"	0.07	11	<DL	0.17
Section 8	12-24"	2.97	14	<DL	9.09

Notes: <DL means less than detection limit.
Depths greater than six inches actually represent depth, area-weighted average concentrations.

Table 2: Post-TCRA PCB Concentrations by Floodplain Soil Area

Soil Areas	Mean PCB Concentration (mg/kg)		Maximum PCB Concentration (mg/kg)	
	Surface	Subsurface	Surface	Subsurface
Soil Area 1	0.76	0.30	5.8	5.9
Soil Area 2	2.1	0.48	15	14
Soil Area 3	1.6	2.0	8.4	18
Soil Area 4	8.5	1.9	49	79

Table 3: Sediment Alternatives

Alternative	Capping Area (acres) / Removal Volume (cy)	Years to Reach PRGs for Smallmouth Bass	Overall Protection of Human Health and the Environment	Compliance with ARARs	Short-term Effectiveness	Long-term Effectiveness	Reduction of Toxicity, Mobility, and Volume Through Treatment	Implementability	Total Cost
S-1	None	87	Undocumented	Undocumented	Not Effective	Effective	No treatment, No reduction	Nothing to implement	$0
S-2	None	87	Protective, lengthy timeframe	Complies	Not Effective	Effective	No treatment, No reduction	Readily implementable	$2,700,000
S-3A	0 / 19,500	32	Protective, reasonable timeframe	Complies	Effective	Effective	No treatment, Reduced volume	Readily implementable	$13,100,000 to $16,600,000
S-3B	1.2 / 15,600	32	Protective, reasonable timeframe	Complies	Effective	Effective	No treatment, Reduced mobility and volume	Readily implementable	$12,200,000 to $15,700,000
S-4A	0 / 63,900	25	Protective, reasonable timeframe	Complies	Effective	Effective	No treatment, Reduced volume	Readily implementable	$33,700,000 to $37,200,000
S-4B	1.2 / 59,900	25	Protective, reasonable timeframe	Complies	Effective	Effective	No treatment, Reduced mobility and volume	Readily implementable	$32,300,000 to $35,800,000
S-5	0 / 300,000 to 490,000	45	Protective, longer timeframe, extensive habitat destruction	Compliance delayed	Not Effective	Effective	No treatment, Reduced volume	Requires extensive effort	$202,000,000 to $337,000,000

Table 4: Floodplain Soil Alternatives

Alternative	Capping or Excavation Footprint	Remediation Time	Overall Protection of Human Health and the Environment	Compliance with ARARs	Short-term Effectiveness	Long-term Effectiveness	Reduction of Toxicity, Mobility, and Volume Through Treatment	Implementability	Total Cost
FPS-1	None	Lengthy	Undocumented	Unable to predict	Not Effective	Unknown, indeterminable	No treatment, No reduction	Nothing to implement	$0
FPS-2	None	Lengthy	Protective, lengthy timeframe	Unable to predict	Not Effective	Unknown, determinable	No treatment, No reduction	Readily Implementable	$1,300,000
FPS-3	7 Acres	1 year	Protective	Complies	Effective	Effective	No treatment, Reduced mobility	Readily Implementable	$3,800,000
FPS-4A	7 Acres	1 year	Protective	Complies	Effective	Effective	No treatment, Reduced mobility & volume	Readily Implementable	$6,800,000
FPS-4B	850 Acres	10 years	Protective	Complies	Effective	Effective	No treatment, Reduced volume	Difficult with access limitations and extensive habitat destruction	$486,000,000

APPENDICES

APPENDIX 1

STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

RICK SNYDER
GOVERNOR

DAN WYANT
DIRECTOR

September 25, 2015

Mr. Richard C. Karl, Director
Superfund Division
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard (S-6J)
Chicago, Illinois 60604-3507

Dear Mr. Karl:

SUBJECT: Allied Paper/Portage Creek/Kalamazoo River Superfund Site, Area 1 - Operable Unit 5, Kalamazoo and Allegan Counties, Michigan
State of Michigan Concurrence with the Record of Decision

Staff of the Michigan Department of Environmental Quality (MDEQ) has reviewed the draft Record of Decision (ROD) for the Allied Paper/Portage Creek/Kalamazoo River Superfund Site (site), Area 1 of Operable Unit 5 (OU5), in Kalamazoo and Allegan Counties, Michigan, Comprehensive Environmental Response, Compensation and Liability Act Site Identification Number MID006007306, that was submitted in July 2015. The Allied Paper/Portage Creek/Kalamazoo River Superfund site remedy is financed by the Responsible Parties that have been identified for the site. The lead agency for the Remedial Investigation/Feasibility Study was the United States Environmental Protection Agency (USEPA). The USEPA also continues as the lead agency for the Remedial Design/Remedial Action (RD/RA) for the site.

The ROD has been developed for Area 1 of OU5 and with remedial options developed for instream and floodplain areas of the site. The USEPA has selected Sediment Alternative S-3A and Floodplain Soil Alternative FPS-4A as the Selected Remedy for Area 1 of OU5 to address these risks.

The MDEQ concurs with the selection of Sediment Alternative S-3A and Floodplain Soil Alternative FPS-4A as the remedy in the September 2015 ROD. The ROD provides the basis for the USEPA to begin the RD/RA. If you have any questions, please contact Mr. Paul Bucholtz, Remediation and Redevelopment Division, at 517-284-5072; bucholtzp@michigan.gov; or MDEQ, P.O. Box 30426, Lansing, Michigan 48909-7926; or you may contact me.

Sincerely,

Dan Wyant
Director
517-284-6700

cc: Mr. Donald Bruce, USEPA
Ms. Rebecca Frey, USEPA
Mr. James Saric, USEPA
Mr. Jim Sygo, Chief Deputy Director, MDEQ
Mr. Robert Wagner, MDEQ
Ms. Susan Leeming, MDEQ
Mr. David Kline, MDEQ
Ms. Daria W. Devantier, MDEQ
Mr. Paul Bucholtz, MDEQ
Allied Paper/Portage Creek/Kalamazoo River Superfund Site Files (J1)

APPENDIX 2

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR
ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER SITE
OPERABLE UNIT 5
AREA 1
KALAMAZOO, KALAMAZOO COUNTY, MICHIGAN

ORIGINAL
APRIL 9, 2012
(SDMS ID: 424256)

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	00/00/00	U.S. EPA	File	Statement of Work for Supplemental Remedial Investigations and Feasibility Studies for the Allied Paper/Portage Creek/Kalamazoo River Site **(SDMS ID: 424178)**	36
2	00/00/00	U.S. EPA	File	Map: Allied Paper/Portage Creek/Kalamazoo River Superfund Site **(SDMS ID: 424179))**	1
3	2007-2009	U.S. EPA	Public	U.S. EPA Administrative Record for Removal Action for Operable Unit #5, Plainwell Impoundment, at the Allied Paper/Portage Creek/Kalamazoo River Site (Original-Update #1 **(DOCUMENTS CONTAINED ON THE INDEX ARE INCORPORATED BY REFERENCE INTO THE REMEDIAL AR FOR OPERABLE UNIT #5) (SDMS ID: 237699,370732)**	3
4	02/00/07	Arcadis BBL	Kalamazoo River Study Group	Supplemental Remedial Investigation/Feasibility Study Work Plan for Morrow Dam to Plainwell **(SDMS ID: 424180)**	
5	02/21/07	U.S. EPA	Respondents	Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study for the Allied Paper/Portage Creek/Kalamazoo River Site **(SDMS ID: 424175)**	37
6	04/09/07	Erickson, M., Arcadis BBL	Kolak, S. & S. Borries, U.S. EPA	Letter re: Multi-Area Health and Safety Plan for the Allied Paper/Portage Creek/Kalamazoo River Site **(SDMS ID: 424171)**	333

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
7	08/30/07	Erickson, M., Arcadis BBL	Saric, J., U.S. EPA	Letter re: Request for Data Usability Determination for Existing Kalamazoo River Data **(SDMS ID: 424136)**	36
8	01/05/08	Erickson, M., Arcadis	Saric, J., U.S. EPA	Letter re: Multi-Area Feasibility Study Technical Memorandum for the Allied Paper/Portage Creek/Kalamazoo River Site **(SDMS ID: 424152)**	39
9	04/11/08	Erickson, M., Arcadis	Saric, J., U.S. EPA & P. Bucholtz, MDEQ	Letter re: Kalamazoo River Area 1 SRI Phase 1 Data Report **(SDMS ID: 424165)**	173
10	04/17/08	Erickson, M., Arcadis	Saric, J., U.S. EPA	Letter re: Proposed Plainwell No. 2 Dam Area Investigation Plan **(SDMS ID: 424167)**	12
11	05/07/08	Saric, J., U.S. EPA	Erickson, M., Arcadis	Letter re: Plainwell No. 2 Dam Area Investigation Plan **(SDMS ID: 424146)**	3
12	05/21/08	Saric, J., U.S. EPA	Erickson, M., Arcadis	Letter re: Ecological Risk Assessment Peer Review Scope of Work for the Allied Paper/Portage Creek/Kalamazoo River Site **(SDMS ID: 424139)**	2
13	06/00/08	Arcadis	Kalamazoo River Study Group	Multi-Area Data Management Plan for the Allied Paper/Portage Creek/Kalamazoo River Site **(SDMS ID: 424132)**	81
14	06/04/08	Saric, J., U.S. EPA	Erickson, M., Arcadis	Letter re: Revised Multi-Area Data Management Plan for the Allied Paper/Portage Creek/Kalamazoo River Site **(SDMS ID: 424156)**	2
15	06/13/08	Erickson, M., Arcadis	Saric, J., U.S. EPA	Multi-Area Data Management Plan for the Allied Paper/Portage Creek/Kalamazoo River Site **(SDMS ID: 424140)**	2

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
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U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR THE
ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER SITE
OPERABLE UNIT 5, AREA 1
KALAMAZOO, KALAMAZOO COUNTY, MICHIGAN

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114	406931	9/9/08	Ribordy, M., U.S. EPA	Distribution List	Pollution Report (POLREP) #7 - Ongoing Time-Critical Removal Activities	11
115	918503	9/13/08	Strause, K., et al.	File	Journal Article re: Risk Assessment of Great Horned Owls (*Bubo virginianus*) Exposed to Polychlorinated Biphenyls and DDT along the Kalamazoo River, Michigan, USA	17
116	407015	9/15/08	Arcadis	U.S. EPA	Monthly Progress Report #18 - Former Plainwell Impoundment Time-Critical Removal Action	71
117	918208	9/15/08	Arcadis	U.S. EPA	Monthly Progress Report #18 - SRI/FS - Area 1: Morrow Dam to Plainwell Dam	58
118	406847	9/29/08	Arcadis	U.S. EPA	Weekly Construction Update #65 - Former Plainwell Impoundment Time-Critical Removal Action	9
119	918489	10/1/08	Saric, J., U.S. EPA	File	Presentation re: Plainwell No. 2 Dam Area Examination of Sediment Data - Results from Arcadis Summer 2008 Sampling Event	40

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121	406843	10/13/08	Arcadis	U.S. EPA	Weekly Construction Update #67 - Former Plainwell Impoundment Time-Critical Removal Action	9
122	407036	10/15/08	Arcadis	U.S. EPA	Monthly Progress Report #19 - Former Plainwell Impoundment Time-Critical Removal Action	64
123	406842	10/20/08	Arcadis	U.S. EPA	Weekly Construction Update #68 - Former Plainwell Impoundment Time-Critical Removal Action	9
124	918479	10/20/08	Erickson, M., Arcadis	Hanshue, S., MDNR	Letter re: Ownership of Plainwell No. 2 Dam	5
125	406841	10/27/08	Arcadis	U.S. EPA	Weekly Construction Update #69 - Former Plainwell Impoundment Time-Critical Removal Action	9
126	918486	10/28/08	Arcadis	U.S. EPA	Maps re: Plainwell No. 2 Dam Area Property Ownership	3
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128	406840	11/3/08	Arcadis	U.S. EPA	Weekly Construction Update #70 - Former Plainwell Impoundment Time-Critical Removal Action	9
129	406839	11/10/08	Arcadis	U.S. EPA	Weekly Construction Update #71 - Former Plainwell Impoundment Time-Critical Removal Action	9
130	406838	11/17/08	Arcadis	U.S. EPA	Weekly Construction Update #72 - Former Plainwell Impoundment Time-Critical Removal Action	9
131	407013	11/17/08	Arcadis	U.S. EPA	Monthly Progress Report #20 - Former Plainwell Impoundment Time-Critical Removal Action	19
132	918211	11/17/08	Arcadis	U.S. EPA	Monthly Progress Report #20 - SRI/FS - Area 1: Morrow Dam to Plainwell Dam	40
133	918487	11/20/08	Arcadis	U.S. EPA	Presentation re: Plainwell No. 2 Dam Area Reconnaissance Photos	60

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136	406837	11/24/08	Arcadis	U.S. EPA	Weekly Construction Update #73 - Former Plainwell Impoundment Time-Critical Removal Action	9
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138	406836	12/8/08	Arcadis	U.S. EPA	Weekly Construction Update #74 - Former Plainwell Impoundment Time-Critical Removal Action	10
139	407035	12/15/08	Arcadis	U.S. EPA	Monthly Progress Report #21 - Former Plainwell Impoundment Time-Critical Removal Action	14
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141	317557	12/19/08	Ribordy, M., U.S. EPA	Distribution List	Pollution Report (POLREP) #9 - Ongoing Time-Critical Removal Activities	8
142	918456	12/22/08	Arcadis	U.S. EPA	Weekly Construction Update #76 - Former Plainwell Impoundment Time-Critical Removal Action	9
143	918481	1/8/09	Northeast Analytical	U.S. EPA	Data Summary Package - SDG #08120163	221
144	918482	1/8/09	Northeast Analytical	U.S. EPA	Data Summary Package - SDG #08120164	226
145	918483	1/8/09	Northeast Analytical	U.S. EPA	Data Summary Package - SDG #08120165	226
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149	918468	1/15/09	Arcadis	U.S. EPA	Monthly Progress Report #6 - Plainwell No. 2 Dam Area Time-Critical Removal Action	8
150	406834	1/19/09	Arcadis	U.S. EPA	Weekly Construction Update #78 - Former Plainwell Impoundment Time-Critical Removal Action	9
151	406833	1/26/09	Arcadis	U.S. EPA	Weekly Construction Update #79 - Former Plainwell Impoundment Time-Critical Removal Action	8
152	918457	2/2/09	Arcadis	U.S. EPA	Weekly Construction Update #80 - Former Plainwell Impoundment Time-Critical Removal Action	8
153	406982	2/16/09	Arcadis	U.S. EPA	Semi-Annual Progress Report #4 - Supplemental RI/FS	8
154	407010	2/16/09	Arcadis	U.S. EPA	Monthly Progress Report #23 - Former Plainwell Impoundment Time-Critical Removal Action	9
155	407034	2/16/09	Arcadis	U.S. EPA	Monthly Progress Report #23 - Former Plainwell Impoundment Time-Critical Removal Action	21
156	918485	3/1/09	Fields Group	U.S. EPA	Maps re: Plainwell No. 2 Dam Area Removal	11
157	407009	3/16/09	Arcadis	U.S. EPA	Monthly Progress Report #24 - Former Plainwell Impoundment Time-Critical Removal Action	5
158	918201	3/16/09	Arcadis	U.S. EPA	Monthly Progress Report #24 - SRI/FS - Area 1: Morrow Dam to Plainwell Dam	18
159	918490	4/1/09	Saric, J., U.S. EPA	File	Presentation re: Plainwell No. 2 Dam Area Examination of Arcadis Proposed Oxbow Removal	7
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163	918462	4/30/09	CH2M Hill	U.S. EPA	Technical Memorandum - Kalamazoo River Field Oversight Report - April 13-17, 2009 - Groundwater Sampling for Area 1 SRI	6
164	407008	5/15/09	Arcadis	U.S. EPA	Monthly Progress Report #26 - Former Plainwell Impoundment Time-Critical Removal Action	11
165	918203	5/15/09	Arcadis	U.S. EPA	Monthly Progress Report #26 - SRI/FS - Area 1: Morrow Dam to Plainwell Dam	41
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167	407032	6/15/09	Arcadis	U.S. EPA	Monthly Progress Report #27 - Former Plainwell Impoundment Time-Critical Removal Action	21
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169	407007	7/15/09	Arcadis	U.S. EPA	Monthly Progress Report #28 - Former Plainwell Impoundment Time-Critical Removal Action	4
170	918205	7/15/09	Arcadis	U.S. EPA	Monthly Progress Report #28 - SRI/FS - Area 1: Morrow Dam to Plainwell Dam	18
171	406955	7/24/09	Ribordy, M., U.S. EPA	Garbaciak, S., Arcadis	Letter re: Approval of Final Design Report	1
172	407006	8/14/09	Arcadis	U.S. EPA	Monthly Progress Report #29 - Former Plainwell Impoundment Time-Critical Removal Action	4

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175	918419	8/17/09	Arcadis	U.S. EPA	Weekly Construction Update #1 - Plainwell No. 2 Dam Area Time-Critical Removal Action	7
176	338254	8/19/09	Ribordy, M., U.S. EPA	Distribution List	Pollution Report (POLREP) #1 - Plainwell No. 2 Dam	4
177	918420	8/24/09	Arcadis	U.S. EPA	Weekly Construction Update #2 - Plainwell No. 2 Dam Area Time-Critical Removal Action	7
178	918421	9/14/09	Arcadis	U.S. EPA	Weekly Construction Update #5 - Plainwell No. 2 Dam Area Time-Critical Removal Action	7
179	406938	9/15/09	Garbaciak, S., Barnes, C., and A. Esposito, Arcadis	Ribordy, M., U.S. EPA	Memo re: Bank Maintenance/Repair and Approach for Erosion at Removal Areas 8 and 9B	13
180	918207	9/15/09	Arcadis	U.S. EPA	Monthly Progress Report #30 - SRI/FS - Area 1: Morrow Dam to Plainwell Dam	12
181	918464	9/15/09	Arcadis	U.S. EPA	Monthly Progress Report #2 - Plainwell No. 2 Dam Area Time-Critical Removal Action	10
182	918422	9/21/09	Arcadis	U.S. EPA	Weekly Construction Update #6 - Plainwell No. 2 Dam Area Time-Critical Removal Action	8
183	918476	9/23/09	Ribordy, M., U.S. EPA	Garbaciak, S., Arcadis	Letter re: Completion of Work Associated with Mobilization - Plainwell No. 2 Dam Area Time-Critical Removal Action	1
184	918423	9/28/09	Arcadis	U.S. EPA	Weekly Construction Update #7 - Plainwell No. 2 Dam Area Time-Critical Removal Action	8
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187	918425	10/12/09	Arcadis	U.S. EPA	Weekly Construction Update #9 - Plainwell No. 2 Dam Area Time-Critical Removal Action	8
188	918209	10/15/09	Arcadis	U.S. EPA	Monthly Progress Report #31 - SRI/FS - Area 1: Morrow Dam to Plainwell Dam	22
189	918465	10/15/09	Arcadis	U.S. EPA	Monthly Progress Report #3 - Plainwell No. 2 Dam Area Time-Critical Removal Action	11
190	918467	10/15/09	Arcadis	U.S. EPA	Monthly Progress Report #5 - Plainwell No. 2 Dam Area Time-Critical Removal Action	12
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196	918210	11/13/09	Arcadis	U.S. EPA	Monthly Progress Report #32 - SRI/FS - Area 1: Morrow Dam to Plainwell Dam	28
197	918466	11/13/09	Arcadis	U.S. EPA	Monthly Progress Report #4 - Plainwell No. 2 Dam Area Time-Critical Removal Action	14
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201	918432	12/7/09	Arcadis	U.S. EPA	Weekly Construction Update #16 - Plainwell No. 2 Dam Area Time-Critical Removal Action	7
202	918212	12/15/09	Arcadis	U.S. EPA	Monthly Progress Report #33 - SRI/FS - Area 1: Morrow Dam to Plainwell Dam	74
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204	406991	1/14/10	Arcadis	U.S. EPA	Response to Comments on Final Construction Completion Report	11
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208	918469	2/15/10	Arcadis	U.S. EPA	Monthly Progress Report #7 - Plainwell No. 2 Dam Area Time-Critical Removal Action	7
209	476485	3/1/10	Arcadis	U.S. EPA	Former Plainwell Impoundment Time-Critical Removal Action Final Construction Completion Report	8041
210	360605	3/5/10	Arcadis		Final Construction Completion Report	18671
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214	918460	4/15/10	Arcadis	U.S. EPA	Monthly Progress Report #9 - Plainwell No. 2 Dam Area Time-Critical Removal Action	6
215	407067	5/1/10	CDM	MDNRE	Geomorphic Feature Delineation and PCB Correlations Final Report	12807
216	918218	5/14/10	Arcadis	U.S. EPA	Monthly Progress Report #38 - SRI/FS - Area 1: Morrow Dam to Plainwell Dam	29
217	918408	5/17/10	Arcadis	U.S. EPA	Weekly Construction Update #17 - Plainwell No. 2 Dam Area Time-Critical Removal Action	7
218	918409	5/24/10	Arcadis	U.S. EPA	Weekly Construction Update #18 - Plainwell No. 2 Dam Area Time-Critical Removal Action	7
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220	918448	6/1/10	U.S. EPA	File	Portage Creek PCB Results Maps	5
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227	918414	6/28/10	Arcadis	U.S. EPA	Weekly Construction Update #23 - Plainwell No. 2 Dam Area Time-Critical Removal Action	7
228	918435	7/5/10	Arcadis	U.S. EPA	Weekly Construction Update #24 - Plainwell No. 2 Dam Area Time-Critical Removal Action	7
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234	918416	7/19/10	Arcadis	U.S. EPA	Weekly Construction Update #26 - Plainwell No. 2 Dam Area Time-Critical Removal Action	7
235	370734	7/20/10	Borries, S., U.S. EPA	Distribution List	Pollution Report (POLREP) #5 - Plainwell No. 2 Dam	8
236	918417	7/26/10	Arcadis	U.S. EPA	Weekly Construction Update #27 - Plainwell No. 2 Dam Area Time-Critical Removal Action	7
237	918418	8/9/10	Arcadis	U.S. EPA	Weekly Construction Update #28 - Plainwell No. 2 Dam Area Time-Critical Removal Action	7
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241	918436	9/7/10	Arcadis	U.S. EPA	Weekly Construction Update #32 - Plainwell No. 2 Dam Area Time-Critical Removal Action	7
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243	918222	9/15/10	Arcadis	U.S. EPA	Monthly Progress Report #42 - SRI/FS - Areas 1 and 2	4
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247	918440	10/4/10	Arcadis	U.S. EPA	Weekly Construction Update #36 - Plainwell No. 2 Dam Area Time-Critical Removal Action	7
248	918441	10/11/10	Arcadis	U.S. EPA	Weekly Construction Update #37 - Plainwell No. 2 Dam Area Time-Critical Removal Action	7
249	918223	10/15/10	Arcadis	U.S. EPA	Monthly Progress Report #43 - SRI/FS - Areas 1 and 2	4
250	918474	10/15/10	Arcadis	U.S. EPA	Monthly Progress Report #15 - Plainwell No. 2 Dam Area Time-Critical Removal Action	16
251	918224	11/15/10	Arcadis	U.S. EPA	Monthly Progress Report #44 - SRI/FS - Areas 1 and 2	4
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255	381972	12/29/10	MDNRE	File	Analytical Laboratory Data	32
256	918447	2/2/11	CDM	U.S. EPA	Portage Creek Sampling Maps	2
257	918491	2/3/11	Arcadis	U.S. EPA	Presentation re: Preliminary Summary of Kalamazoo Area 1 BERA Results	32
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259	474088	2/14/11	EPA Fields Group	File	Portage Creek Remediation Scenario (More than 10 PPM)	4
260	918477	3/1/11	Borries, S., U.S. EPA	Garbaciak, S., Arcadis	Letter re: Notice of Completion of Work Pursuant to Section XXIX of Order No. V-W-09-C-925	4
261	918226	3/15/11	Arcadis	U.S. EPA	Monthly Progress Report #48 - SRI/FS - Areas 1 and 2	4
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265	912762	7/5/11	Karl, R., U.S. EPA	Stanislaus, M., U.S. EPA	Action Memo re: Request for Approval of a Time-Critical Removal Action and Emergency Exemption at the Portage Creek Area	22
266	910557	7/14/11	Saric, J., U.S. EPA	Erickson, M., Arcadis	Letter re: Area 1 Draft Supplemental Remedial Investigation Report Disapproval	33
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269	918227	9/15/11	Arcadis	U.S. EPA	Monthly Progress Report #54 - SRI/FS - Areas 1 and 2	6
270	412942	10/7/11	Borries, S., U.S. EPA	Distribution List	Pollution Report (POLREP) #1 - Portage Creek Area	5
271	918228	10/14/11	Arcadis	U.S. EPA	Monthly Progress Report #55 - SRI/FS - Areas 1, 2, and 3	6
272	413789	10/28/11	Borries, S., U.S. EPA	Distribution List	Pollution Report (POLREP) #2 - Portage Creek Area	9
273	418231	11/17/11	Borries, S., U.S. EPA	Distribution List	Pollution Report (POLREP) #3 - Portage Creek Area	6
274	918229	12/15/11	Arcadis	U.S. EPA	Monthly Progress Report #57 - SRI/FS - Areas 1, 2, and 3	51
275	918442	12/19/11	City of Kalamazoo	U.S. EPA	Consent for Access to Property	3
276	910555	12/20/11	Saric, J., U.S. EPA	Erickson, M., Arcadis	Letter re: Area 1 Revised Supplemental Remedial Investigation Report Disapproval	18
277	918230	1/13/12	Arcadis	U.S. EPA	Monthly Progress Report #58 - SRI/FS - Areas 1, 2, and 3	29
278	910554	2/23/12	Saric, J., U.S. EPA	Erickson, M., Arcadis	Letter re: Area 1 Draft Alternative Screening Technical Memorandum Submittal Date	2
279	428704	2/24/12	Borries, S., U.S. EPA	Distribution List	Pollution Report (POLREP) #5 - Portage Creek Area	7
280	918443	2/27/12	Fields Group	U.S. EPA	PCB Mass, Volume, and Surface-Weighted Average Concentration Estimates	13
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282	918407	3/23/12	Arcadis	U.S. EPA	Semi-Annual Progress Report #6 - SRI/FS	9
283	431702	4/13/12	Thomas, C., U.S. EPA	Distribution List	Pollution Report (POLREP) #7 - Portage Creek Area	8

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284	431906	4/27/12	Thomas, C., U.S. EPA	Distribution List	Pollution Report (POLREP) #8 - Portage Creek Area	8
285	918232	5/11/12	Arcadis	U.S. EPA	Monthly Progress Report #62 - SRI/FS - Areas 1, 2, and 3	22
286	918233	6/12/12	Arcadis	U.S. EPA	Monthly Progress Report #63 - SRI/FS - Areas 1, 2, and 3	7
287	435599	6/22/12	Thomas, C., U.S. EPA	Distribution List	Pollution Report (POLREP) #12 - Portage Creek Area	9
288	910562	6/27/12	Saric, J., U.S. EPA	Erickson, M., Arcadis	Letter re: Area 1 Supplemental Remedial Investigation Report Approval	9
289	910563	6/27/12	Erickson, M., Arcadis	Saric, J., U.S. EPA	Area 1 Supplemental Remedial Investigation Report	4740
290	435608	6/29/12	Thomas, C., U.S. EPA	Distribution List	Pollution Report (POLREP) #13 - Portage Creek Area	9
291	918234	7/13/12	Arcadis	U.S. EPA	Monthly Progress Report #64 - SRI/FS - Areas 1, 2, and 3	33
292	435624	7/20/12	Thomas, C., U.S. EPA	Distribution List	Pollution Report (POLREP) #14 - Portage Creek Area	8
293	910558	7/31/12	Saric, J., U.S. EPA	Erickson, M., Arcadis	Letter re: Area 1 Alternatives Screening Technical Memorandum Final Comments	15
294	918185	8/1/12	Arcadis	U.S. EPA	Supplemental Remedial Investigation Report for Operable Unit 5, Area 1	4740
295	435643	8/17/12	Thomas, C., U.S. EPA	Distribution List	Pollution Report (POLREP) #16 - Portage Creek Area	9
296	918235	9/11/12	Arcadis	U.S. EPA	Monthly Progress Report #66 - SRI/FS - Areas 1, 2, and 3	25
297	918236	10/12/12	Arcadis	U.S. EPA	Monthly Progress Report #67 - SRI/FS - Areas 1, 2, and 3	18
298	911964	10/15/12	Arcadis	U.S. EPA	Technical Memorandum - Fall 2012 Bank Repair - Former Plainwell Impoundment and Plainwell No.2 Dam Area	14

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299	911970	10/15/12	Mendoza, R., U.S. EPA	Erickson, M., Arcadis	Letter re: Draft Spring 2012 Bank Conditions Monitoring Report - Former Plainwell Impoundment and Plainwell No. 2 Dam	6
300	911973	10/25/12	MDEQ/CDM	File	Field Report - Plainwell Time-Critical Removal Action	5
301	911962	10/26/12	Bucholtz, P. and S. Hanshue, MDEQ	Erickson, M., Arcadis	Letter re: Review and Comments of Multiple Reports	7
302	918237	11/13/12	Arcadis	U.S. EPA	Monthly Progress Report #68 - SRI/FS - Areas 1, 2, and 3	63
303	911991	11/14/12	Synk, P., Michigan Assistant Attorney General	Mendoza, R., U.S. EPA	Letter re: Completion of Work under AOC and Post-Removal Site Control	4
304	918238	1/11/13	Arcadis	U.S. EPA	Monthly Progress Report #70 - SRI/FS - Areas 1, 2, and 3	44
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306	918239	3/13/13	Arcadis	U.S. EPA	Monthly Progress Report #72 - SRI/FS - Areas 1, 2, 3, and 4	22
307	910561	4/2/13	Saric, J., U.S. EPA	Fortenberry, C., Georgia-Pacific LLC	Letter re: Area 1 Draft Feasibility Study Report Extension	1
308	910560	5/23/13	Saric, J., U.S. EPA	Fortenberry, C., Georgia-Pacific LLC	Letter re: Area 1 Revised Feasibility Study Report Second Extension	1
309	918240	7/15/13	Geogia-Pacific	U.S. EPA	Monthly Progress Report #76 - SRI/FS	4
310	456907	7/19/13	Thomas, C., U.S. EPA	Distribution List	Pollution Report (POLREP) #31 - Portage Creek Area	8
311	918241	9/15/13	Geogia-Pacific	U.S. EPA	Monthly Progress Report #78 - SRI/FS	4
312	456986	10/11/13	Thomas, C., U.S. EPA	Distribution List	Pollution Report (POLREP) #37 - Portage Creek Area	7
313	918242	10/15/13	Geogia-Pacific	U.S. EPA	Monthly Progress Report #79 - SRI/FS	4

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315	918243	11/15/13	Geogia-Pacific	U.S. EPA	Monthly Progress Report #80 - SRI/FS	4
316	918449	12/3/13	U.S. EPA	File	Photo: Portage Creek Confluence	1
317	918244	12/15/13	Geogia-Pacific	U.S. EPA	Monthly Progress Report #81 - SRI/FS	4
318	916471	3/13/14	Saric, J., U.S. EPA	Fortenberry, C., Georgia-Pacific LLC	Letter re: Revised Draft Area 1 Feasibility Study Report (with Comments Attached)	25
319	918245	3/15/14	Geogia-Pacific	U.S. EPA	Monthly Progress Report #84 - SRI/FS	4
320	916469	4/28/14	Saric, J., U.S. EPA	Fortenberry, C., Georgia-Pacific LLC	Letter re: Schedule Extension for Final Area 1 Feasibility Study and Dispute Resolution Informal Negotiation Period	2
321	916470	6/3/14	Fortenberry, C., Georgia-Pacific LLC	Saric, J., U.S. EPA	Letter re: Revised Draft Area 1 Feasibility Study Report	10
322	918246	6/15/14	Geogia-Pacific	U.S. EPA	Monthly Progress Report #87 - SRI/FS	4
323	918478	9/9/14	Mendoza, R., U.S. EPA	Fortenberry, C., Georgia-Pacific LLC	Letter re: Plainwell No. 2 Dam June 5, 2014 Site Inspection; Administrative Settlement Docket No. V-W-09-C-925	2
324	916468	11/4/14	Saric, J., U.S. EPA	Fortenberry, C., Georgia-Pacific LLC	Letter re: Final Approval of Area 1 Feasibility Study Report	5
325	916480	11/14/14	Saric, J., U.S. EPA	Fortenberry, C., Georgia-Pacific LLC	Letter re: Draft Area-Wide Non-PCB Constituent Screening Evaluation	7
326	918247	11/15/14	Geogia-Pacific	U.S. EPA	Monthly Progress Report #92 - SRI/FS	4
327	916479	11/18/14	Ells, S., Contaminated Sediments Technical Advisory Group	Saric, J., U.S. EPA	Memo re: CSTAG Recommendations on Operable Unit 5	5
328	918183	12/19/14	AMEC	U.S. EPA	Final Area 1 Feasbility Study	783

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331	918195	12/19/14	AMEC	MDEQ	Response to MDEQ Comments on Area 1 Feasibility Study Report	3
332	918248	1/15/15	Geogia-Pacific	U.S. EPA	Monthly Progress Report #94 - SRI/FS	4
333	918190	1/27/15	Saric, J., U.S. EPA	Fortenberry, C., Georgia-Pacific LLC	Letter re: Multi-Area Quality Assurance Project Plan Revision 1, Addendum 1 Approval	2
334	918187	1/28/15	Saric, J., U.S. EPA	Ells, S., Contaminated Sediments Technical Advisory Group	Letter re: Response to Contaminated Sediments Technical Advisory Group Recommendations for the Operable Unit 5, Area 1	7
335	918193	2/4/15	Saric, J., U.S. EPA	Fortenberry, C., Georgia-Pacific LLC	Letter re: Comments on Quality Assurance Project Plan Revision 1, Addendum 1	3
336	918191	3/4/15	Saric, J., U.S. EPA	Fortenberry, C., Georgia-Pacific LLC	Letter re: Draft Area-Wide Non-PCB Constituent Screening Evaluation Approval	3
337	918192	4/3/15	AMEC	U.S. EPA	Area-Wide Non-PCB Constituent Screening Evaluation - Operable Unit 5	1310
338	918196	4/3/15	AMEC	MDEQ	Response to MDEQ March 6, 2015 Comments on Revised Draft Area-Wide Non-PCB Constituent Screening Evaluation	6
339	918197	4/3/15	AMEC	MDEQ	Response to MDEQ November 25, 2014 Comments on Revised Draft Area-Wide Non-PCB Constituent Screening Evaluation	8
340	918198	4/3/15	AMEC	U.S. EPA	Response to U.S. EPA March 4, 2015 Comments on Revised Draft Area-Wide Non-PCB Constituent Screening Evaluation	2
341	918249	4/15/15	Geogia-Pacific	U.S. EPA	Monthly Progress Report #97 - SRI/FS	4

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343	918188	5/1/15	U.S. EPA	Public	Fact Sheet: EPA Proposes Cleanup Plan for Area 1 of the Kalamazoo River	6

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMEDIAL ACTION

ADMINISTRATIVE RECORD
FOR THE
ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER SITE
OPERABLE UNIT 5, AREA 1
KALAMAZOO, KALAMAZOO COUNTY, MICHIGAN

UPDATE 2
SEPTEMBER 18, 2015

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3	921050	Undated	U.S. EPA	Pubilc	Presentation Slides - Update on Site Progress	12
4	381968	8/30/90	Federal Register	Pubilc	NPL Site Narrative	2
5	237456	5/3/02	Robb, K., Hunton & Williams	Von Gunten, B., U.S. EPA	Plainwell Response to 104(e) Information Request w/Attachments	448
6	202441	6/11/03	Barnet, B., Drinker, Biddle & Reath	Furey, E., U.S. EPA	Millennium Holdings Response to U.S. EPA 104(e) Request for Information	495
7	203895-203898, 203900-203905	11/13/03	Starr Garber, M., Drinker, Biddle & Reath	Furey, E., U.S. EPA	Millennium Holdings Supplemental Response to U.S. EPA 104(E) Request for Information	11085
8	249492	7/25/06	ATSDR	Dyer, D., Eder Associates Consulting Engineers	Response to Comments on ATSDR Health Consultation	18
9	920039	12/1/06	CH2M Hill	U.S. EPA	Community Involvement Plan	29
10	407062	4/13/07	Mick, H., U.S. EPA	Pubilc	News Release - River Cleanup Delayed; Additional Community Input Planned	2

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11	406972	4/17/07	Gade, M., U.S. EPA	Upton, F., U.S. House of Representatives	Letter re: Response to March 26 Letter of the Honorable Fred Upton	6
12	407063	4/25/07	Mick, H., U.S. EPA	Pubilc	New Release - New Plan for 2007 Dredge Disposal Announced	4
13	421951	5/14/07	Hale, J., Weyerhaeuser	Berkhoff, M., U.S. EPA	Letter re: Emergency Response Plan Documentation Report	2
14	407066	6/3/07	Kalamazoo Gazette	Pubilc	Article re: Two-Year Cleanup Project	1
15	407061	6/5/07	Mick, H., U.S. EPA	Pubilc	News Release - Plainwell Dredging Begins this Week	2
16	407060	6/26/07	Wager, G., Kalamazoo River Cleanup Coalition	Pubilc	News Release - Kalamazoo River Cleanup Coalition Formed to Address PCB Removal and Disposal Effort - Group Seeks Regional Solution to Regional Problem of PCBs	2
17	277429	7/6/2007	Borries, S., U.S. EPA	Distribution List	Pollution Report (POLREP) #1 - OU5: Plainwell Impoundment	4
18	407055	8/1/07	U.S. EPA	Pubilc	Fact Sheet - Plainwell PCB Cleanup Proceeding on Schedule	4
19	279555	8/10/2007	Borries, S., U.S. EPA	Distribution List	Pollution Report (POLREP) #2 - OU5: Plainwell Impoundment	5
20	407054	9/12/07	MDEQ	U.S. EPA	Draft Quality Assurance Project Plan and Sampling and Analysis Plan for MDEQ Sampling at the Plainwell Time-Critical Removal Action	1077
21	280819	9/18/2007	Borries, S., U.S. EPA	Distribution List	Pollution Report (POLREP) #3 - OU5: Plainwell Impoundment	5
22	407057	10/1/07	U.S. EPA	Pubilc	Fact Sheet - Plainwell PCB Cleanup Progress and Updates	4
23	279609	11/27/2007	Borries, S., U.S. EPA	Distribution List	Pollution Report (POLREP) #4 - OU5: Plainwell Impoundment	5
24	279988	2/21/2008	Ribordy, M., U.S. EPA	Distribution List	Pollution Report (POLREP) #5 - OU5: Plainwell Impoundment	6

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26	919315	3/1/08	CH2M Hill	U.S. EPA	Community Involvement Plan	29
27	407052	3/3/08	Garbaciak, S., Arcadis	Borries, S., U.S. EPA	Letter re: Post-Removal Surface Sediment PCB Sampling Results for Removal Areas Completed in 2007	28
28	920049	4/2/08	U.S. EPA	Pubilc	Presentation Slides - Former Plainwell Impoundment Time-Critical Removal Action - U.S. EPA Public Meeting - April 2, 2008, Plainwell, Michigan	48
29	421851	7/1/08	RMT, Inc.	U.S. EPA	Emergency Response Plan Documentation Report	122
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31	920042	9/1/08	U.S. EPA	Pubilc	Fact Sheet - Plainwell PCB Cleanup Progress, Updates, And Public Meeting	4
32	407059	2/1/09	U.S. EPA	Pubilc	Fact Sheet - Plainwell PCB Cleanup Progress, Updates & Public Meeting	4
33	920059	2/26/09	U.S. EPA	Pubilc	Presentation Slides - Update on Site Progress	5
34	323596	3/16/2009	Ribordy, M., U.S. EPA	Distribution List	Pollution Report (POLREP) #10 - OU5: Plainwell Impoundment	8
35	446517	5/1/09	The Corradino Group	City of Kalamazoo	Portage Creek Corridor Resue Plan	97
36	494691	7/1/09	U.S. EPA	File	Allied Paper Operable Unit Frequently Asked Questions on the Remedial Investigation Report (Working Draft)	4
37	920052	7/1/09	U.S. EPA	Pubilc	Presentation Slides - Plainwell No. 2 Dam; Update on Site Progress	9
38	920053	8/1/09	U.S. EPA	Pubilc	Presentation Slides - Allied Paper Landfill (OU1) Summer 2009 Update	23

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40	407056	11/7/09	U.S. EPA	Pubilc	Fact Sheet - Cleanup Plan on Track for #2 Dam	2
41	920064	12/3/09	U.S. EPA	Pubilc	Presentation Slides - Allied Paper/Portage Creek/Kalamazoo River Superfund Site, December 3, 2009 Update	16
42	494663	5/20/15	Globig, C., Private Citizen	Russell, D., U.S. EPA	Letter to EPA Concerning Cleanup of Kalamazoo River (with Attachments) (***Portions of this document have been redacted***)	49
43	920804	7/9/15	Fortenberry, C., Georgia-Pacific	Saric, J., U.S. EPA	Area Wide Non-PCB Constituent Screening Evaluation for Operable Unit 5	1311
44	920805	7/9/15	Amec Foster Wheeler	U.S. EPA	Response to Comments on Area-Wide Non-PCB Constituent Screening Evaluation for Operable Unit 5	2