

## **GENERAL SITE INFORMATION, CHARACTERISTICS, AND STATUS**

<b>Project Name</b>	<b><u>ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER - PROJECT 2 (Upper River)</u></b>	<b>ProjectID:</b> 05-25
<b>Last Updated:</b>	08/24/04	
<b>City:</b>	Kalamazoo; Parchment; Plainwell; Otsego; Allegan	
<b>County:</b>	Kalamazoo; Allegan	
<b>State:</b>	MI	
<b>Country:</b>	USA	
<b>Bodies of Water:</b>	Three-mile sector of Portage Creek, and the Kalamazoo River from Morrow Dam downstream to Allegan Dam	
<b>US EPA Region:</b>	V	
<b>Status (Active, Complete, or Monitoring Only):</b>	Active	
<b>Date On NPL:</b>	1990	
<b>ROD/ESD Date:</b>	None	
<b>Operable Unit:</b>	OU-5	
<b>Areas of Concern (length or acres):</b>	The Superfund Site originally included the three-mile sector of Portage Creek from Cork Street just above Bryant Mill Pond to its confluence with the Kalamazoo River and a 35-mile stretch of the Kalamazoo River from this confluence to Allegan City Dam in Allegan, Michigan. Because PCB contamination was found in sediment both downstream and upstream of this river sector, the Superfund investigation was expanded to include the 80 miles of Kalamazoo River from Morrow Dam in Comstock, Michigan to Lake Michigan, as well as the three-mile sector of Portage Creek. The river is being investigated in two phases, Phase 1 consisting of the Upper River from Morrow Dam to Allegan Dam in addition to the three-mile sector of Portage Creek. The Lower River will be investigated as Phase II (Project ID 05-37). The 80-mile stretch of the river from Morrow Dam to Lake Michigan is designated as a Great Lakes Area of Concern. The surface area of the Upper River is about 2,500 acres with Lake Allegan accounting for about 1,650 acres.	
<b>Other Characteristics of Water Body:</b>	<p>Average flow in the Kalamazoo River is about 900 cfs at Comstock near the Allied Paper facility, increasing to about 1,500 cfs 35 miles downstream, below the Allegan Dam. Between Morrow Dam and Lake Michigan the river is an alternating series of free-flowing sections, with three existing impoundments and three former impoundments. The river includes a variety of hydrologic regimes, including areas of braided channels, rocky rapids, wetlands, and open, impounded water. Other than wetlands, there is relatively little floodplain. Average flow in Portage Creek is about 50 cfs. For the great majority of its 80-mile length, the Kalamazoo River ranges between 175-450 feet in width (typically 200 feet for most of the river), and extends to about 1,500 feet wide at Lake Allegan. Average water depths range from 2.5-7 feet.</p> <p>Seven dams are present in the Kalamazoo River, and one dam is present in Portage Creek within the designated site boundaries. Three dams in the river are owned by the State, and have been dismantled down to the sills. Reportedly, a total of approximately 1,100,000 cy of sediment containing an estimated 33,000 lbs of PCBs was displaced from the three state-owned impoundments as a direct result of the MDNR permanently opening the dams. The Plainwell City No. 2 dam also was partially removed, but does not significantly impound sediment or water. A small dam present on Portage Creek at the upstream end of the site does not impound a significant volume of PCB-containing sediments since completion of a Removal Action in 1999 (described in Project ID 05-01).</p>	
<b>Contaminants of Concern:</b>	PCBs (1242/1254)	

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**Source of Contamination:** PCBs were historically used as a solvent for dyes used in the manufacture of carbonless copy paper. PCBs were discharged to the river in process wastewater from de-inking and/or repulping of carbonless copy paper for recycling at former paper-recycling facilities located along the river. In addition, PCBs reportedly continue to discharge through surface water runoff from five disposal areas located adjacent to the river. The disposal areas reportedly contain millions of cubic yards of PCB-contaminated paper residuals. Other industries in the watershed also used PCBs.

**Contaminated Area**  
**Physical Characteristics:** In 1983, the MDNR estimated that there were 227,910 lbs of PCBs in the sediments surrounding Bryant Mill Pond; the Plainwell, Otsego, and Trowbridge impoundments; and Lake Allegan. In the 1990 AOC, the MDEQ estimated that there were "about 200,000 pounds of PCBs in the sediments in and adjacent to Portage Creek and the Kalamazoo River at this site." In the 1991 Preliminary Health Assessment, the ATSDR stated "the total mass of PCBs in river sediments, including Lake Allegan, has been estimated at 350,000 pounds."

In 1990 and 1991, the site included 3 miles of Portage Creek and 35 miles of the River (from the confluence with Portage Creek to Allegan City Dam). In the draft RI (Reference: A-650), the PRPs' consultant estimated that 9.5 million cy of Upper River sediment contained approximately 65,000 lbs of PCBs. The Kalamazoo River Study Group has estimated the volume of exposed sediments in the three state-owned former impoundments to be 2.8 million cy over an area of 510 acres. These sediments are estimated to contain 54,000 lbs of PCBs.

There are no defined "hot spot" areas in the river. PCB concentrations have been below 10 ppm and 1 ppm in 97% and 76%, respectively, of all surface sediment samples collected. It is estimated that about 70% of the PCB-containing sediment has settled in Lake Allegan.

**Type of Regulatory Action:** Superfund. Final. USEPA-Lead

**Overall Status Summary:** The Superfund site originally comprised the Allied Paper property, a 3-mile stretch of Portage Creek to its confluence with the Kalamazoo River, and the 35-mile stretch of the Kalamazoo River from its confluence with Portage Creek to Allegan City Dam. The length of river being investigated was subsequently expanded by MDEQ to include the sector of river upstream to Morrow Dam and the sector of river downstream to Lake Michigan. After the Fox River, EPA reports that the Kalamazoo River deposits the highest annual load of PCBs into Lake Michigan. In December 1990, the state of Michigan entered into an Administrative Order by Consent (AOC) with Allied Paper, Inc. and its parent company, Millennium Holdings, Inc.; Georgia-Pacific Corporation; and Plainwell, Inc. (collectively known as the Kalamazoo River Study Group [KRSRG]). The AOC required that these companies undertake an RI/FS, a process that is ongoing. In addition, Fort James Corporation (now Georgia-Pacific) agreed to participate in the RI/FS.

To better manage the investigation and remedy selection process, the river has been divided at the Allegan Dam into the Upper and Lower River. The Upper and Lower Rivers will be addressed as Phase I and Phase II respectively, as the investigation and remedy selection processes proceed. This report addresses Phase I of the project. The Phase II project which addresses the Lower River is described in MCSS Database Project ID 05-37.

Five paper waste landfills are specifically targeted as sources of PCBs to the river. PCB-contaminated paper-making residuals which were disposed of in the landfills are considered a continuing source of PCBs to the river. Because the five landfills represent potential PCB sources to the river, they are being addressed as four separate operable units for source control purposes prior to addressing in-river sediments. The OUs are: OU-1: Allied Paper

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Property/Bryant Mill Pond Area; OU-2: Willow Boulevard/A-Site; OU-3: King Highway Landfill; and OU-4: 12th Street Landfill. In addition, the 3 miles of Portage Creek and the Kalamazoo River are being investigated as a separate operable unit, OU-5.

Seven dams are present in the Upper River (upstream to downstream): Plainwell No. 2 Dam; Plainwell Dam; Otsego City Dam; Otsego Dam; Trowbridge Dam; Allegan City Dam; and Allegan Dam. Three of the dams are state-owned, having been purchased from Consumers Power in the 1960s. The three state-owned dams, Plainwell, Otsego, and Trowbridge, do not have locks and all have been dismantled down to the sills. Both the Plainwell No. 2 Dam and Otsego City Dam were also partially removed. Consumers Energy owns the Allegan Dam and operates it as an active hydroelectric facility. A single dam exists in Portage Creek within the designated site boundaries. The Allegan City Dam no longer produces hydroelectric power, however, at the request of the City of Allegan the water level has not been significantly lowered to allow for ongoing recreational use of the impoundment.

The remaining portions of the three state-owned dams are being maintained in place due in part to the accumulation of sediments behind them. Additionally, lowering the dams down to their sills reduced the water level in the impoundments, exposing PCB-contaminated bank soils and floodplain soils that historically were under water. MDEQ continues to evaluate whether the dams should be completely removed or remain in-place in their current condition. To further evaluate the impact of dam removal on the river, MDEQ commissioned a study to model the river to evaluate river flow characteristics with and without the dams in-place.

The PRPs, with MDEQ oversight, have continued to investigate the land-based sites and the river since 1993. During that period, remediation was completed for a portion of OU-1 (Bryant Mill Pond – Project ID 05-01). MDEQ is continuing to work on the RI/FS for the remainder of OU-1. For OU-2, USEPA is awaiting approval by MDEQ of the final RI/FS; USEPA plans to issue a proposed plan once the RI/FS is approved. RODs were signed for OU-3 in 1998 and for OU-4 in 2001. Closure and capping of the King Highway landfill (OU-3) is complete; MDEQ will continue to oversee groundwater monitoring and maintenance of the remedy. USEPA is working with PRPs at OU-4 to install a protective cover and groundwater monitoring wells. One contentious issue between the MDEQ, citizen groups, and the PRPs is the disposition of 1,400 core samples collected from the river for physical characterization purposes in 1993. These have been preserved (frozen) since that time; MDEQ was to make a decision by Summer 1999 as to whether these would be analyzed for PCBs. Reportedly, MDEQ requested that further analysis be performed; the analysis has yet to be performed.

In October 2000 the PRPs submitted a draft Phase I (Upper River) RI/FS to MDEQ, which MDEQ rejected in July 2002. The RI/FS preferred remedy for the Upper River included stabilization of bank and floodplain soils that border the three state-owned former impoundments, monitored natural attenuation, and implementing institutional controls.

In July 2001, MDEQ requested of USEPA that the site be redesignated "federal-lead." USEPA took over as the lead agency in early 2002. For the land-based sites (OU-1 to -4), MDEQ retained lead agency status which will remain in effect until the completion of any existing, ongoing investigations, studies, or remedial activities. USEPA has taken over lead of OU-5 and eventually issued a draft RI/FS for the Plainwell and Otsego City Impoundments. USEPA also financed an MDEQ-commissioned study by USGS to evaluate the effects of removing the Plainwell, Otsego, and Trowbridge impoundments; the preliminary results of this study have been reviewed by USEPA and it remains unclear if or how the results of this study will be used during future analysis of the river. Release of the results of the study is pending.

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The draft RI/FS that USEPA issued for the Plainwell and Otsego City Impoundments recommended initially addressing floodplain soils and bank sediments since they were identified as ongoing sources of PCB contamination to the river. Following issuance of the RI/FS, MDEQ determined that the preferred fate of the three state-owned dams was to remove them completely in an effort to restore the river to a more free-flowing condition. The decision by MDEQ to remove the state-owned dams requires (1) that sediment, both contaminated and uncontaminated, trapped behind the dams, now be addressed as part of the remedy and prior to dam removal and (2) that additional floodplain soils and bank sediment exposed once the impoundments are removed be addressed as part of the remedy, including identifying responsible parties for these areas. Because of these issues, MDEQ has rejected the draft RI/FS for the two impoundments.

The RI/FS also failed to adequately show what the effects of PCB levels in fish would be if the recommended remedy was implemented. To better understand the contribution of floodplain soils and bank sediment on PCB levels in fish, USEPA initiated the development of a detailed hydrodynamic model of the river in June 2004. Model development is to take an estimated nine months to complete, until early Summer 2005. Remedy decisions for the river will follow completion of the modeling. Additionally, MDEQ continues implementing a long-term monitoring plan that includes sampling of sediment, water column, and biota throughout the river.

***Remedial Action Planned:*** ☐

***Risk Assessment:*** ☒

***Remedial Action Implemented:*** ☐

***Status of Dredging*** ☐

***PRPs:*** ☒

***Contacts:*** ☒

***References:*** ☒

***Modeling:*** ☒

***Fishing Advisory:*** ☒

***Key Conditions:*** extended (> 1 mile) river, Great Lakes AOC, hydrodynamic modeling

## RISK ASSESSMENT

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**RA Type:** Human Health and Ecological

**RA Status:** Complete

**RA Objectives:** Source: Human Health Risk Assessment (Reference A-785):

(1) “To assess potential current and foreseeable future risks associated with PCB exposure to people who may recreate on and near the river and along the floodplain, and who may live near the river and along the floodplain. Specifically, this HHRA: defines the sources of contamination; identifies human receptors of concern; evaluates all exposure pathways and eliminates those not deemed significant; quantitatively evaluates significant exposure pathways; determines the extent and likelihood of actual or potential impacts; describes the uncertainty associated with the risk and hazard estimates; develops risk-based fish concentrations protective of human health; and develops risk-based sediment and floodplain soil concentrations protective of human health.”

Source: Baseline Ecological Risk Assessment (Reference A-784):

(2) “To identify and describe actual or potential onsite conditions that can result in adverse effects to present or future ecological receptors.”

**Company Performing RA:** (1) and (2) Camp Dresser & McKee on behalf of MDEQ; (3) Cambridge Environmental, Inc. on behalf of the Kalamazoo River Study Group

**RA Reference Report:** (1) Final (Revised) Human Health Risk Assessment, January 2002 (Reference A-785); (2) Final (Revised) Ecological Risk Assessment, January 2002 (Reference A-784); (3) A Quantitative Health Risk Assessment for the Kalamazoo River PCB Site, June 2001 (Reference A-704)

**RA Summary and Conclusions:** As new data are gathered, the MDEQ will modify the conclusions of the HHRA and EcoRA as needed. The PRPs have submitted comments to the MDEQ on both documents.

Source: Final (Revised) HHRA (Reference A-785):

“Risks and hazards in this HHRA were estimated for five populations: (1) sport angler – central tendency assumptions; (2) sport anglers – high-end assumptions; (3) subsistence anglers; (4) residents, and (5) recreationalists. In all cases, risks and hazards were associated with exposures to polychlorinated biphenyls (PCBs) released into the Kalamazoo River system. Exposures to PCBs may result primarily from ingestion of fish or by direct contact with PCB contaminated floodplain soils, or inhalation of dust and volatile emissions from floodplain soil near three former river dams. Such exposures were assessed quantitatively. Other potential exposure, including ingestion, waterfowl, and turtles, and direct contact with contaminated surface water were found to be inadequately characterized by available data . . .”

“A survey of anglers on the Kalamazoo River was conducted by the Michigan Department of Community Health of the State of Michigan in 1994 (Kalamazoo River Angler Survey and Biological Testing Study, MDCH 2000b). Despite existing advisories, this survey reported that anglers from Kalamazoo and Allegan Counties are eating on average two meals per month of various species including bass, catfish, panfish, bullheads, and carp taken from contaminated reaches of the river. More than 10 percent of anglers are eating more than one meal per week of these various species. This survey confirmed that the Kalamazoo River is an important recreational resource and, for certain subpopulations may serve as an important source of food . . .”

“Available fish data collected in 1993 and 1997 were compiled and reviewed. Data were collected for

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several species from 11 Aquatic Biota Study Area (ABSAs), including smallmouth bass, a representative sport fish, and carp, a representative bottom feeder. Data for these species from 1993 fish fillet samples were used in the HHRA.”

“While individual Aroclors were analyzed, the HHRA was based on total PCBs, as recommended by United States Environmental Protection Agency (EPA) . . .”

“The Exposure Assessment involves developing scenarios whereby people come into contact with contaminated media (sediments, soils, fish). While exposure to many media are likely to be taking place at the site, fish ingestion and contact with contaminated floodplain soils were the only exposure pathways for which a quantitative assessment of risk and hazard was conducted. Data were deemed inadequate to evaluate two exposure pathways: inhalation of particulate and vapor phase contamination, and ingestion of waterfowl and turtles.”

“Three exposure scenarios were developed for fish ingestion: (1) the sport anglers scenario – central tendency assumptions; (2) the sport angler scenario - high-end assumptions; and (3) the subsistence angler scenario . . .”

“Two scenarios were evaluated for floodplain soil exposures, the nearby resident scenario and the recreationalist scenario . . .”

“Using both average and maximum fish concentrations, cancer risks for subsistence anglers in all study areas were outside (greater than) the EPA target cancer risk range of 1 million to 1 in 10,000 and above the MDEQ risk threshold of 1 in 100,000. Hazard quotients for subsistence anglers in all study areas were greater than the acceptable EPA and MDEQ hazard quotient threshold of 1.”

“Using both average and maximum fish concentrations, cancer risks for both central tendency and high-end sport anglers who consumed 100 percent smallmouth bass or 76 percent smallmouth bass and 24 percent carp were outside the EPA target cancer risk range and exceeded the MDEQ cancer threshold for all ABSAs with two exceptions. Cancer risks calculated using both average and maximum PCB concentrations for central tendency sport anglers consuming 100 percent smallmouth bass from ABSAs 6 and 11 were in excess of the MDEQ cancer threshold but below 1 in 10,000 (i.e., the upper limit of the USEPA range).”

“Using both average and maximum fish concentrations, hazard quotients for both central tendency and high-end sport anglers who consume either 100 percent smallmouth bass or 76 percent smallmouth bass and 24 percent carp exceeded the EPA and MDEQ hazard quotient threshold of 1 for both the immunological and reproductive endpoints with one exception. The hazard quotient (0.8) using average concentrations for the central tendency sport angler who consumes 100 percent smallmouth bass from ABSA 11 does not exceed the hazard quotient threshold for the reproductive endpoint.”

“Using average floodplain soil concentrations, cancer risks to residents in all three floodplain soil areas were within the EPA target cancer risk range of 1 in 1 million to 1 in 10,000, but above the MDEQ cancer risk threshold of 1 in 100,000. Using maximum floodplain soil concentrations, cancer risks were outside the EPA target cancer risk range and exceeded the MDEQ threshold.”

“Using both average and maximum floodplain soil concentrations, hazard indices based on immunological endpoints for residents in all three floodplain soil areas exceeded the EPA and MDEQ hazard index threshold of 1. Hazard indices (HIs) were calculated for residential and recreationalist receptors due to the summation of HQs for multiple exposure routes (i.e., ingestion, dermal contact, and inhalation of fugitive



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dust). Hazard indices for the reproductive endpoint exceeded 1 using maximum concentrations for all three areas. Hazard indices for the reproductive endpoint using average concentrations did not exceed 1."

"Using average floodplain soil concentrations, cancer risks to recreationalists in all three floodplain areas were within the EPA target risk range and below the MDEQ cancer risk threshold. Using maximum floodplain soil concentrations, cancer risks were within the EPA target risk range but above the MDEQ cancer risk threshold. The highest cancer risk using maximum concentrations was estimated for the Plainwell area where cancer risks were 4 in 100,000."

"Using average floodplain soil concentrations, hazard indices based on both the immunological and reproductive endpoints were below the EPA and MDEQ threshold of 1.0. Using maximum concentrations, hazard indices based on the immunological endpoint exceeded the EPA and MDEQ threshold for the Plainwell (2.7), Otsego (1.1) and Trowbridge (2.5) areas. Using maximum concentrations, hazard indices based on the reproductive endpoint were all below the hazard index threshold . . ."

"For central tendency sport anglers who consume up to 24 meals per year of fish, a fish concentration of 0.109 mg/kg in fillets is protective of cancer endpoints, a concentration of 0.187 mg/kg in fillets is protective of the noncancer immunological endpoint. Since the immunological endpoint is more protective than the reproductive endpoint and is always a lesser concentration, the reproductive endpoint was not calculated. For high-end sport anglers who consume up to 125 meals/year of fish, a fish concentration of 0.042 is protective of cancer endpoints, a concentration of 0.072 is protective of the noncancer immunological endpoint. For subsistence anglers who consume up to 179 meals per year, a fish concentration of 0.015 mg/kg is protective of cancer endpoints, 0.025 mg/kg is protect of the noncancer immunological."

"For comparison, the MDCH considers their PCB fish advisory concentration of less than or equal to 0.05 mg/kg in fish to be protective at an ingestion rate of 225 meals per year (0.14 kg/day) for the general population for noncancer endpoints. The MDCH does not base its advisory on cancer risk, due to political and pragmatic considerations. For subsistence anglers, RBCfish developed in this HHRA indicate that concentrations in the range of 0.015 (cancer) and 0.025 (noncancer) are needed to be protective of health . . ."

"Risk-based and hazard-based sediment concentrations . . . represent the sediment concentrations protective of fish that are consumed at the ingestion rates specified for sport and subsistence anglers. RBCsed were developed using the biota-to-sediment accumulation factor (BSAF) method presented in Region V EPA guidance. RBCsed using the MDEQ cancer threshold as the target cancer risk range from 0.51 mg/kg protective of sport anglers who consume 100 percent game fish such as bass to 0.04 mg/kg protective of subsistence anglers who consume 76 percent smallmouth bass and 24 percent bottom feeding fish such as carp. RBCsed using the MDEQ and USEPA noncancer hazard quotient threshold of 1.0 as the target HQ range from 0.88 mg/kg for sport anglers consuming 100 percent bass to 0.07 mg/kg for subsistence anglers assumed to consume 76 percent bass and 24 percent carp."

"These (risk-based floodplain soil concentrations) (RBCsoil) would be protective of residents exposed to contaminated soil via ingestion, dermal contact, and inhalation. For the cancer endpoint, the RBCsoil is 2.5 mg/kg. For noncancer endpoints, the RBCsoil is 15 mg/kg for the reproductive endpoint and 4 mg/kg for the immunological endpoint."

"These RBCsoil would be protective of recreationalists exposed to contaminated soil via ingestion, dermal contact, and inhalation. For the cancer endpoint, the RBCsoil is 23 mg/kg. For noncancer endpoints, the RBCsoil is 139 mg/kg for the reproductive endpoint and 32 mg/kg for the immunological endpoint."

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Source: Reference A-784: "Sufficient recent site-specific information indicates that this ERA should focus on the primary chemical stressors present at this site - - polychlorinated biphenyls (PCBs). This ERA compares measured or estimated PCB concentrations in different types of exposure media (e.g., surface water, sediment, fish) with predicted biological effects to estimate risks and to preliminarily identify appropriate and protective cleanup levels. . ."

"Potential ecological receptors for this study are defined as plants and animals that inhabit or use, or have potential to inhabit or use, the aquatic, riparian/wetland, and terrestrial habitats of the API/PC/KR. The large number of potential receptor species identified for the API/PC/KR obviously precludes an assessment of potential risks for every species listed. Several species or groups of organisms have, therefore, been selected to serve as representative receptors for a detailed evaluation of potential risks. These include aquatic plants, aquatic macroinvertebrates, game fish (e.g., smallmouth bass), forage fish (e.g., sucker), rough fish (e.g., carp), terrestrial invertebrates (e.g., earthworms), small burrowing omnivorous mammals (e.g., deer mouse), semi-aquatic herbivorous mammals (e.g., muskrat), small semi-aquatic carnivorous mammals (e.g., mink), and top mammalian and avian predators (e.g., red fox, great horned owl, bald eagle) . . ."

"Hazard quotients based on direct toxicity for aquatic biota and dietary dose for other species reveal that mink are at most risk compared to other representative receptors. This preliminary conclusion is supported by multiple lines of evidence described in the ERA."

"Multiple lines of evidence are used to reach the following conclusions:"

- "Most aquatic biota such as invertebrates and fish are unlikely to be adversely affected by direct contact with and ingestion of surface water because of relatively low PCB toxicity to most aquatic biota. Bioaccumulation of PCBs is not considered at this stage."
- "PCB contamination of surface water and streambed sediment is likely to adversely affect sensitive piscivorous predators, such as mink, through consumption of PCB-contaminated prey, especially fish."
- "Impaired reproduction of mink and ultimately decreases in mink populations are the most likely effects of PCB contamination in aquatic prey. There is evidence that mink populations are declining or are reduced."
- "Other piscivorous predators, such as bald eagles, are at risk based on assumptions about diet (e.g., fish are the predominant prey item consumed) and exposure (e.g., foraging takes place mostly within contaminated aquatic areas). Field investigations of bald eagles by U.S. Fish and Wildlife suggest there has been a loss of reproductive capacity and decrease in the populations of bald eagles within the site boundaries."
- "Terrestrial and semi-aquatic biota may be at risk from PCB-contaminated floodplain sediment and surface soil, depending on life history (e.g., foraging behavior, diet, mobility) and sensitivity to PCBs. Such risk is in general considered to be low to moderate, depending on species."
- "Omnivorous birds (represented by the robin) that consume a substantial amount of soil invertebrates (e.g., earthworms) would be at significant risk if foraging takes place in mostly contaminated areas."
- "Carnivorous terrestrial mammals (represented by the red fox) may be at some risk if foraging is concentrated in riparian areas with contaminated floodplain sediment and diet consists of prey that (1)



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reside in PCB-contaminated areas, and (2) have taken up substantial amounts of PCBs.”

- “Carnivorous birds (represented by great horned owl) may be at significant risk, depending on diet. Relatively high risks were calculated in association with high PCB concentrations in eggs, while risk estimates generated as a result of food web modeling were comparatively low. Uncertainties with actual diet of great horned owls in the API/PC/KR area and discrepancies between estimated risks to owls, based on the two different methods mentioned previously, cannot be resolved with available data.”

- “Omnivorous terrestrial species (represented by mice) are unlikely to be at significant risk unless they reside in the most contaminated areas. PCB uptake in mice appears to be relatively low.”

- “Semi-aquatic herbivorous mammals (represented by muskrat) may be at risk from PCB contamination because estimated dietary doses exceed recommended threshold values for rats. This conclusion is based on the assumption that laboratory rats and muskrats are equally sensitive to PCBs via ingestion. Muskrats contaminated with PCBs may also cause adverse effects to muskrat predators because some muskrats contain PCBs in excess of recommended dietary limits for PCB-sensitive predators such as mink . . .”

“This risk assessment derives and recommends single point threshold PCB concentrations (“cleanup values”) for each media type. These single point values are not necessarily intended to be applied to all locations within the API/PC/KR or within a sub-area of the AP/PC/KR . . .”

“The proposed cleanup ranges include no effect levels at the lower end and low but significant effect levels at the upper end. These protective PCB ranges for each media type for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site are presented below.”

- “Range of protective total PCB concentrations in SURFACE WATER is 0.000426 to 0.0023 ?g/L (based on mink, the most sensitive of all animals tested to date).”
- “Range of protective total PCB concentrations in INSTREAM SEDIMENT AND FLOODPLAIN SEDIMENTS associated with aquatic or semi-aquatic ecosystems is 0.13 to 0.7 mg/kg (based on mink, the most sensitive of all animals tested to date).”

**POTENTIALLY RESPONSIBLE PARTIES**

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**ProjectID:** 05-25

**PRP Name:** PRP INFORMATION NOT RELEASED

**PRPID:**

**Street Address:**

**City:**

**State:**

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## **KEY CONTACTS**

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***Project Name*** **ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
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***ProjectID:*** 05-25

***Last Name:*** KEY CONTACT INFORMATION NOT RELEASED

***Contact ID:***

***First Name:***

***Title:***

***Company:***

***Address:***

***City:***

***State:***

***Postal Code:***

***Work Phone # :***

***Other Phone #:***

***Fax # :***

***Email Address:***

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## REFERENCES

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**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
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**ProjectID:** 05-25

**Reference Type:** A

**ReferenceID:** 14

**Title:** *Revised Proposed Plan Fact Sheet  
King Highway Landfill Operable Unit 3  
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** Michigan Department of Environmental Quality (MDEQ)

**Preparer/Author  
Address:** Lansing, MI

**Prepared For:** General Public

**Date Published:** July 1997

**Key Words and  
Phrases:**

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**Reference Type:** A

**ReferenceID:** 83

**Title:** *Fact Sheet #1 - Treatability Study on Field Screening  
Technologies for Analysis of PCBs at the Allied Paper,  
Inc./Portage Creek/Kalamazoo River Superfund Site*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** Michigan Department of Natural Resources, Environmental Response  
Division - Superfund Section

**Preparer/Author  
Address:** Box 30426  
Lansing, MI 48909

**Prepared For:** General Public

**Date Published:** October 14, 1992

**Key Words and  
Phrases:**

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## REFERENCES

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**Reference Type:** A **ReferenceID:** 84  
**Title:** *Fact Sheet #2 - Air Monitoring - Allied Paper, Inc./Portage  
Creek/Kalamazoo River Superfund Site*  
**Location:** AEM  
**Category:** Site Update  
**Prepared by/Author:** Michigan Department of Natural Resources, Environmental Response  
Division - Superfund Section  
**Preparer/Author  
Address:** Box 30426  
Lansing, MI 48909  
**Prepared For:** General Public  
**Date Published:** July 1993  
**Key Words and  
Phrases:**

---

**Reference Type:** A **ReferenceID:** 85  
**Title:** *Fact Sheet #3 - Allied Paper, Inc. Operable Unit - Allied Paper,  
Inc./Portage Creek/Kalamazoo River Superfund Site*  
**Location:** AEM  
**Category:** Site Update  
**Prepared by/Author:** Michigan Department of Natural Resources, Environmental Response  
Division - Superfund Section  
**Preparer/Author  
Address:** Box 30426  
Lansing, MI 48909  
**Prepared For:** General Public  
**Date Published:** July 1993  
**Key Words and  
Phrases:**

---

## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:** A **ReferenceID:** 86  
**Title:** *Fact Sheet #4 - 12th Street Landfill Operable Unit - Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site*  
**Location:** AEM  
**Category:** Site Update  
**Prepared by/Author:** Michigan Department of Natural Resources, Environmental Response Division - Superfund Section  
**Preparer/Author Address:** Box 30426  
Lansing, MI 48909  
**Prepared For:** General Public  
**Date Published:** July 1993  
**Key Words and Phrases:**

---

**Reference Type:** A **ReferenceID:** 87  
**Title:** *Fact Sheet #5 - Willow Boulevard/A-Site Operable Unit - Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site*  
**Location:** AEM  
**Category:** Site Update  
**Prepared by/Author:** Michigan Department of Natural Resources, Environmental Response Division - Superfund Section  
**Preparer/Author Address:** Box 30426  
Lansing, MI 48909  
**Prepared For:** General Public  
**Date Published:** July 1993  
**Key Words and Phrases:**

---



## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:** A

**ReferenceID:** 88

**Title:** *Fact Sheet #6 - King Highway Landfill Operable Unit - Allied  
Paper, Inc./Portage Creek/Kalamazoo River Superfund Site*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** Michigan Department of Natural Resources, Environmental Response  
Division - Superfund Section

**Preparer/Author  
Address:** Box 30426  
Lansing, MI 48909

**Prepared For:** General Public

**Date Published:** July 1993

**Key Words and  
Phrases:**

---

**Reference Type:** A

**ReferenceID:** 89

**Title:** *Fact Sheet #7 - Kalamazoo River Remedial Investigation - Allied  
Paper, Inc./Portage Creek/Kalamazoo River Superfund Site*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** Michigan Department of Natural Resources, Environmental Response  
Division - Superfund Section

**Preparer/Author  
Address:** Box 30426  
Lansing, MI 48909

**Prepared For:** General Public

**Date Published:** July 1993

**Key Words and  
Phrases:**

---

## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:**

A

**ReferenceID:** 90

**Title:**

***Fact Sheet #9 - King Highway Landfill Operable Unit - Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Early Remedial Action Proposed for King Highway Landfill Operable Unit***

**Location:**

AEM

**Category:**

Site Update

**Prepared by/Author:**

Michigan Department of Natural Resources, Environmental Response Division - Superfund Section

**Preparer/Author Address:**

Box 30426  
Lansing, MI 48909-7926

**Prepared For:**

General Public

**Date Published:**

June 1996

**Key Words and Phrases:**

---

**Reference Type:**

A

**ReferenceID:** 91

**Title:**

***Fact Sheet #10 - Willow Boulevard/A-Site OU - Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Interim Remedial Action Proposed for Willow Boulevard/A-Site OU***

**Location:**

AEM

**Category:**

Site Update

**Prepared by/Author:**

Michigan Department of Natural Resources, Environmental Response Division - Superfund Section

**Preparer/Author Address:**

Box 30426  
Lansing, MI 48909-7926

**Prepared For:**

General Public

**Date Published:**

March 1998

**Key Words and Phrases:**

---

## REFERENCES

---

**Project Name** **ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)**

**ProjectID:** 05-25

**Reference Type:**

A

**ReferenceID:** 92

**Title:**

***Proposed Plan Fact Sheet - 12th Street Landfill OU #4 - Allied  
Paper, Inc./Portage Creek/Kalamazoo River Superfund Site***

**Location:**

AEM

**Category:**

Site Update

**Prepared by/Author:**

Michigan Department of Natural Resources, Environmental Response  
Division - Superfund Section

**Preparer/Author**

Box 30426

**Address:**

Lansing, MI 48909-7926

**Prepared For:**

General Public

**Date Published:**

July 1997

**Key Words and  
Phrases:**

---

**Reference Type:**

A

**ReferenceID:** 93

**Title:**

***Proposed Plan Fact Sheet - King Highway Landfill Operable  
Unit - Allied Paper, Inc./Portage Creek/Kalamazoo River  
Superfund Site;  
King Highway Landfill Operable Unit***

**Location:**

AEM

**Category:**

Site Update

**Prepared by/Author:**

Michigan Department of Natural Resources, Environmental Response  
Division - Superfund Section

**Preparer/Author**

Box 30426

**Address:**

Lansing, MI 48909-7926

**Prepared For:**

General Public

**Date Published:**

September 1994

**Key Words and  
Phrases:**

---

## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:** A

**ReferenceID:** 224

**Title:** *Description of the Current Situation*

**Location:** BBL

**Category:** Site Update

**Prepared by/Author:** Blasland, Bouck & Lee, Inc

**Preparer/Author  
Address:** 6723 Towpath Road  
P.O. Box 66  
Syracuse, NY 13214

**Prepared For:** Kalamazoo River Study Group (KRSG)

**Date Published:** July 1992

**Key Words and  
Phrases:**

---

**Reference Type:** A

**ReferenceID:** 225

**Title:** *Work Plan, Field Sampling Plan, Quality Assurance Project Plan,  
Health and Safety Plan, and Data Management Plan*

**Location:** BBL

**Category:** Contaminated Sediments: Investigation/Delineation

**Prepared by/Author:** Blasland, Bouck & Lee, Inc

**Preparer/Author  
Address:** 6723 Towpath Road  
P.O. Box 66  
Syracuse, NY 13214

**Prepared For:** Kalamazoo River Study Group (KRSG)

**Date Published:** July 1993

**Key Words and  
Phrases:**

---

## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:** A **ReferenceID:** 226  
**Title:** *Tech Memo 2: Results of Phase I TBSA Soil Sampling;  
Addendum to Tech Memo 2: Results of the Phase II TBSA Soil  
Sampling*  
**Location:** BBL  
**Category:** Site Update  
**Prepared by/Author:** Blasland, Bouck & Lee, Inc  
**Preparer/Author  
Address:** 6723 Towpath Road  
P.O. Box 66  
Syracuse, NY 13214  
**Prepared For:** Kalamazoo River Study Group (KRSG)  
**Date Published:** February 1994; April 2000  
**Key Words and  
Phrases:**

---

**Reference Type:** A **ReferenceID:** 227  
**Title:** *Tech Memo 3: Results of the Floodplain Soils Investigation;  
Addendum to Tech Memo 3*  
**Location:** BBL  
**Category:** Site Update  
**Prepared by/Author:** Blasland, Bouck & Lee, Inc  
**Preparer/Author  
Address:** 6723 Towpath Road  
P.O. Box 66  
Syracuse, NY 13214  
**Prepared For:** Kalamazoo River Study Group (KRSG)  
**Date Published:** February 1994; September 1996  
**Key Words and  
Phrases:**

---

## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:** A **ReferenceID:** 228  
**Title:** *Draft Tech Memo 10: Sediment Characterization/Geostatistical  
Pilot Study*  
**Location:** BBL  
**Category:** Site Update  
**Prepared by/Author:** Blasland, Bouck & Lee, Inc  
**Preparer/Author  
Address:** 6723 Towpath Road  
P.O. Box 66  
Syracuse, NY 13214  
**Prepared For:** Kalamazoo River Study Group (KRSG)  
**Date Published:** July 1994  
**Key Words and  
Phrases:**

---

**Reference Type:** A **ReferenceID:** 229  
**Title:** *Draft Tech Memo 12: Former Impoundment Sediment and  
Geochronologic Dating Investigation*  
**Location:** BBL  
**Category:** Site Update  
**Prepared by/Author:** Blasland, Bouck & Lee, Inc  
**Preparer/Author  
Address:** 6723 Towpath Road  
P.O. Box 66  
Syracuse, NY 13214  
**Prepared For:** Kalamazoo River Study Group (KRSG)  
**Date Published:** May 1994  
**Key Words and  
Phrases:**

---



## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:** A

**ReferenceID:** 230

**Title:** *Draft Tech Memo 14: Biota Investigation; Draft Addendum 1 to Tech Memo 14; Draft Addendum 2 to Tech Memo 14; Draft Addendum 3 to Tech Memo 14*

**Location:** BBL

**Category:** Site Update

**Prepared by/Author:** Blasland, Bouck & Lee, Inc

**Preparer/Author Address:** 6723 Towpath Road  
P.O. Box 66  
Syracuse, NY 13214

**Prepared For:** Kalamazoo River Study Group (KRSG)

**Date Published:** July 1994; November 1994; December 1995; June 1998

**Key Words and Phrases:**

---

**Reference Type:** A

**ReferenceID:** 231

**Title:** *Draft Tech Memo 16: Surface Water Investigation*

**Location:** BBL

**Category:** Site Update

**Prepared by/Author:** Blasland, Bouck & Lee, Inc

**Preparer/Author Address:** 6723 Towpath Road  
P.O. Box 66  
Syracuse, NY 13214

**Prepared For:** Kalamazoo River Study Group (KRSG)

**Date Published:** March 1995

**Key Words and Phrases:**

---

## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:** A

**ReferenceID:** 379

**Title:** *Problem Statement for Allied Paper, Inc./Portage  
Creek/Kalamazoo River Superfund Site*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** Michigan Department of Environmental Quality

**Preparer/Author  
Address:**

**Prepared For:** General Public

**Date Published:** 1995 circa

**Key Words and  
Phrases:**

---

**Reference Type:** A

**ReferenceID:** 380

**Title:** *Information Bulletin - Fact Sheet #2 - Test Pit Investigation of  
the 12th Street Landfill Located in Plainwell, Michigan and Part  
of the Allied Paper, Inc./Portage Creek/Kalamazoo River  
Superfund Site*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** Michigan Department of Natural Resources  
(now the Michigan Department of Environmental Quality)

**Preparer/Author  
Address:**

**Prepared For:** General Public

**Date Published:** April 14, 1993

**Key Words and  
Phrases:**

---

## REFERENCES

---

**Project Name** **ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)**

**ProjectID:** 05-25

**Reference Type:** A **ReferenceID:** 381  
**Title:** *Status Report - Allied Paper, Inc./Portage Creek/Kalamazoo  
River Superfund Site*  
**Location:** AEM  
**Category:** Site Update  
**Prepared by/Author:** Michigan Department of Environmental Quality  
**Preparer/Author  
Address:**  
**Prepared For:** General Public  
**Date Published:** June 9, 1997  
**Key Words and  
Phrases:**

---

**Reference Type:** A **ReferenceID:** 578  
**Title:** *Stage I Assessment Plan - Kalamazoo River Environmental Site*  
**Location:** AEM  
**Category:** Natural Resource Damages  
**Prepared by/Author:** Stratus Consulting, Inc.  
**Preparer/Author  
Address:** PO Box 4059  
Boulder, CO 80306-4059  
**Prepared For:** MDEQ, MDAG, USFWS, NOAA  
**Date Published:** November 2000  
**Key Words and  
Phrases:**

---

**Reference Type:** A **ReferenceID:** 583  
**Title:** *Administrative Record for Allied Paper, Kalamazoo, Michigan  
(Includes Updates #1 thru #5)*  
**Location:** AEM  
**Category:** Miscellaneous  
**Prepared by/Author:** US EPA Region V  
**Preparer/Author  
Address:**  
**Prepared For:** Distribution  
**Date Published:** May 4, 1999  
**Key Words and  
Phrases:**

---

## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:**

A

**ReferenceID:** 650

**Title:**

***Draft Phase I Remedial Investigation Report***

**Location:**

BBL

**Category:**

RI/FS

**Prepared by/Author:**

Blasland, Bouck & Lee, Inc.

**Preparer/Author**

6723 Towpath Road

**Address:**

P.O. Box 66

Syracuse, NY 13214

**Prepared For:**

Kalamazoo River Study Group

**Date Published:**

October 2000

**Key Words and  
Phrases:**

---

**Reference Type:**

A

**ReferenceID:** 651

**Title:**

***Draft Phase I Feasibility Study Report***

**Location:**

BBL

**Category:**

RI/FS

**Prepared by/Author:**

Blasland, Bouck & Lee, Inc.

**Preparer/Author**

6723 Towpath Road

**Address:**

P.O. Box 66

Syracuse, NY 13214

**Prepared For:**

Kalamazoo River Study Group

**Date Published:**

October 2000

**Key Words and  
Phrases:**

---

**Reference Type:**

A

**ReferenceID:** 652

**Title:**

***Supplement to the RI/FS***

**Location:**

BBL

**Category:**

RI/FS

**Prepared by/Author:**

Blasland, Bouck & Lee, Inc.

**Preparer/Author**

6723 Towpath Road

**Address:**

P.O. Box 66

Syracuse, NY 13214

**Prepared For:**

Kalamazoo River Study Group

**Date Published:**

October 2000

**Key Words and  
Phrases:**

---

## REFERENCES

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**Project Name** **ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)**

**ProjectID:** 05-25

**Reference Type:** A  
**Title:** *Addendum to Ecological Risk Assessment*  
**Location:** AEM  
**Category:** Risk Assessment  
**Prepared by/Author:** Camp Dresser & McKee, Inc.  
**Preparer/Author Address:** One Woodward Avenue, Suite 1500  
Detroit, MI 48226  
**Prepared For:** MDEQ - Environmental Response Division  
**Date Published:** August 15, 2000  
**Key Words and Phrases:**

---

**ReferenceID:** 654

**Reference Type:** A  
**Title:** *Long Term Monitoring Plan - TOC (full document at  
<http://deq.state.mi.us/erd/k-zoo/ltmp.htm>)*  
**Location:** AEM  
**Category:** Monitoring Plan/Report  
**Prepared by/Author:** Camp Dresser & McKee, Inc. (CDM)  
**Preparer/Author Address:** One Woodward Avenue, Suite 1500  
Detroit, MI 48226  
**Prepared For:** MDEQ  
**Date Published:** September 1999  
**Key Words and Phrases:**

---

**ReferenceID:** 656

**Reference Type:** A  
**Title:** *A Quantitative Health Risk Assessment for the Kalamazoo River  
PCB Site (Complete Document with BBL)*  
**Location:** AEM  
**Category:** Risk Assessment  
**Prepared by/Author:** Edmund Crouch, Michael Ames, Laura Green  
**Preparer/Author Address:** Cambridge Environmental, Inc.  
58 Charles Street  
Cambridge, MA 02141  
**Prepared For:** The Kalamazoo River Study Group  
**Date Published:** June 1, 2001  
**Key Words and Phrases:**

---

**ReferenceID:** 704

## REFERENCES

---

**Project Name** **ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)**

**ProjectID:** 05-25

**Reference Type:** A **ReferenceID:** 784  
**Title:** ***Final (Revised) Baseline Ecological Risk Assessment***  
**Location:** AEM  
**Category:** Risk Assessment  
**Prepared by/Author:** CDM  
**Preparer/Author Address:** One Woodward Avenue, Suite 1500  
Detroit, MI 48226  
**Prepared For:** Michigan DEQ, Environmental Response Division  
**Date Published:** January 2002  
**Key Words and Phrases:**

---

**Reference Type:** A **ReferenceID:** 785  
**Title:** ***Final (Revised) Human Health Risk Assessment***  
**Location:** AEM  
**Category:** Risk Assessment  
**Prepared by/Author:** CDM  
**Preparer/Author Address:** One Woodward Avenue, Suite 1500  
Detroit, MI 48226  
**Prepared For:** Michigan DEQ, Environmental Response Division  
**Date Published:** January 2002  
**Key Words and Phrases:**

---

**Reference Type:** A **ReferenceID:** 897  
**Title:** ***Preliminary Health Assessment for: Allied Corp Kalamazoo Plant***  
**Location:** AEM  
**Category:** Risk Assessment  
**Prepared by/Author:** Michigan Department of Public Health and U.S Department of Health and  
Human Services, Public Health Service, Agency for Toxic Substances and  
Disease Registry  
**Preparer/Author Address:**  
**Prepared For:** General Public  
**Date Published:** December 23, 1991  
**Key Words and Phrases:**

---



## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:** A

**ReferenceID:** 1040

**Title:** *Dereliction of Duty*

**Location:** AEM

**Category:** Miscellaneous

**Prepared by/Author:** (1) Detroiters Working for Environmental Justice, (2) Ecology Center, (3) Friends of the Detroit River, (4) Groundwork for a Just World, (5) Guide Law Center, NLG/Sugar Law Center, (6) Hamtramck Environmental Action Team (HEAT), (7) Lake Michigan Federation, (8) Lone Tree Council, (9) Michigan Environmental Council, (10) Michigan Environmental Justice Coalition, (11) Michigan Land Use Institute, (12) Northern Michigan Environmental Action Council, (13) Preserve the Dunes, (14) Sierra Club, Mackinac Chapter

**Preparer/Author**

**Address:**

**Prepared For:** General Public

**Date Published:** October 5, 2000

**Key Words and  
Phrases:**

---

**Reference Type:** B

**ReferenceID:** 12

**Title:** *Kalamazoo River Fishing and Recreation Guide*

**Location:** AEM

**Category:** Miscellaneous

**Prepared by/Author:** Michigan Department of Community Health  
Community Public Health Agency  
Health Risk Assessment Division

**Preparer/Author  
Address:** P.O. Box 30195  
Lansing, MI 48909-9802

**Prepared For:** General Public

**Date Published:** September 1996

**Key Words and  
Phrases:**

---

## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:** B

**ReferenceID:** 13

**Title:** *Progress Report #13 - King Highway Landfill Proposed Plan to be Unveiled at Public Meeting*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** Michigan Department of Natural Resources

**Preparer/Author Address:** Environmental Response Division - Superfund Section  
P.O. Box 30426  
Lansing, MI 48909

**Prepared For:** General Public

**Date Published:** September 7, 1994

**Key Words and Phrases:**

---

**Reference Type:** B

**ReferenceID:** 14

**Title:** *Progress Report #12 - Air Monitoring Data Complete For Allied Paper, Inc. and Willow Boulevard/A-Site OUs*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** Michigan Department of Natural Resources

**Preparer/Author Address:** Environmental Response Division - Superfund Section  
P.O. Box 30426  
Lansing, MI 48909

**Prepared For:** General Public

**Date Published:** May 18, 1994

**Key Words and Phrases:**

---

## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:** B  
**Title:** *Progress Report #1 - General Update*  
**Location:** AEM  
**Category:** Site Update  
**Prepared by/Author:** Michigan Department of Natural Resources  
**Preparer/Author Address:** Environmental Response Division - Superfund Section  
P.O. Box 30426  
Lansing, MI 48909  
**Prepared For:** General Public  
**Date Published:** October 5, 1990  
**Key Words and Phrases:**

---

**ReferenceID:** 15

**Reference Type:** B  
**Title:** *Progress Report #2 - General Update*  
**Location:** AEM  
**Category:** Site Update  
**Prepared by/Author:** Michigan Department of Natural Resources  
**Preparer/Author Address:** Environmental Response Division - Superfund Section  
P.O. Box 30426  
Lansing, MI 48909  
**Prepared For:** General Public  
**Date Published:** November 16, 1990  
**Key Words and Phrases:**

---

**ReferenceID:** 16

**Reference Type:** B  
**Title:** *Progress Report #3 - General Update*  
**Location:** AEM  
**Category:** Site Update  
**Prepared by/Author:** Michigan Department of Natural Resources  
**Preparer/Author Address:** Environmental Response Division - Superfund Section  
P.O. Box 30426  
Lansing, MI 48909  
**Prepared For:** General Public  
**Date Published:** February 20, 1991  
**Key Words and Phrases:**

---

**ReferenceID:** 17

## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:** B  
**Title:** *Progress Report #4 - General Update*  
**Location:** AEM  
**Category:** Site Update  
**Prepared by/Author:** Michigan Department of Natural Resources  
**Preparer/Author Address:** Environmental Response Division - Superfund Section  
P.O. Box 30426  
Lansing, MI 48909  
**Prepared For:** General Public  
**Date Published:** January 2, 1992  
**Key Words and Phrases:**

---

**ReferenceID:** 18

**Reference Type:** B  
**Title:** *Progress Report #5 - General Update*  
**Location:** AEM  
**Category:** Site Update  
**Prepared by/Author:** Michigan Department of Natural Resources  
**Preparer/Author Address:** Environmental Response Division - Superfund Section  
P.O. Box 30426  
Lansing, MI 48909  
**Prepared For:** General Public  
**Date Published:** August 28, 1992  
**Key Words and Phrases:**

---

**ReferenceID:** 19

**Reference Type:** B  
**Title:** *Progress Report #6 - General Update*  
**Location:** AEM  
**Category:** Site Update  
**Prepared by/Author:** Michigan Department of Natural Resources  
**Preparer/Author Address:** Environmental Response Division - Superfund Section  
P.O. Box 30426  
Lansing, MI 48909  
**Prepared For:** General Public  
**Date Published:** February 4, 1993  
**Key Words and Phrases:**

---

**ReferenceID:** 20

## REFERENCES

---

**Project Name** **ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)**

**ProjectID:** 05-25

**Reference Type:** B  
**Title:** **Progress Report #7 - General Update**  
**Location:** AEM  
**Category:** Site Update  
**Prepared by/Author:** Michigan Department of Natural Resources  
**Preparer/Author Address:** Environmental Response Division - Superfund Section  
P.O. Box 30426  
Lansing, MI 48909  
**Prepared For:** General Public  
**Date Published:** February 4, 1993  
**Key Words and Phrases:**

---

**ReferenceID:** 21

**Reference Type:** B  
**Title:** **Progress Report #8 - Remedial Investigation Underway; Site Testing Begins**  
**Location:** AEM  
**Category:** Site Update  
**Prepared by/Author:** Michigan Department of Natural Resources  
**Preparer/Author Address:** Environmental Response Division - Superfund Section  
P.O. Box 30426  
Lansing, MI 48909  
**Prepared For:** General Public  
**Date Published:** August 2, 1993  
**Key Words and Phrases:**

---

**ReferenceID:** 22

**Reference Type:** B  
**Title:** **Progress Report #9 - General Update**  
**Location:** AEM  
**Category:** Site Update  
**Prepared by/Author:** Michigan Department of Natural Resources  
**Preparer/Author Address:** Environmental Response Division - Superfund Section  
P.O. Box 30426  
Lansing, MI 48909  
**Prepared For:** General Public  
**Date Published:** May 25, 1993  
**Key Words and Phrases:**

---

**ReferenceID:** 23

## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:** B

**ReferenceID:** 24

**Title:** *Progress Report #10 - Initial Phase of OU Remedial Investigation  
Completed Ahead of Schedule*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** Michigan Department of Natural Resources

**Preparer/Author  
Address:** Environmental Response Division - Superfund Section  
P.O. Box 30426  
Lansing, MI 48909

**Prepared For:** General Public

**Date Published:** October 29, 1993

**Key Words and  
Phrases:**

---

**Reference Type:** B

**ReferenceID:** 25

**Title:** *Progress Report #11 - Remedial Investigation Now Into Technical  
Memoranda Result Reporting Stage*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** Michigan Department of Natural Resources

**Preparer/Author  
Address:** Environmental Response Division - Superfund Section  
P.O. Box 30426  
Lansing, MI 48909

**Prepared For:** General Public

**Date Published:** April 8, 1994

**Key Words and  
Phrases:**

---



## REFERENCES

---

**Project Name** **ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)**

**ProjectID:** 05-25

**Reference Type:**

B

**ReferenceID:** 122

**Title:**

**EPA National Priorities List: Allied Paper, Inc. / Portage Creek /  
Kalamazoo River**

**Location:**

AEM

**Category:**

Site Update

**Prepared by/Author:**

US EPA HQ

**Preparer/Author  
Address:**

Internet Website

**Prepared For:**

General Public

**Date Published:**

March 1996

**Key Words and  
Phrases:**

---

**Reference Type:**

B

**ReferenceID:** 356

**Title:**

**The Kalamazoo River Update (Newsletter)**

**Location:**

AEM

**Category:**

Site Update

**Prepared by/Author:**

Kalamazoo River Protection Association

**Preparer/Author  
Address:**

**Prepared For:**

General Public

**Date Published:**

1998 Spring / Summer

**Key Words and  
Phrases:**

---

**Reference Type:**

B

**ReferenceID:** 363

**Title:**

**Information Repository Table of Contents**

**Location:**

AEM

**Category:**

Miscellaneous

**Prepared by/Author:**

**Preparer/Author  
Address:**

**Prepared For:**

General Public

**Date Published:**

August 1997

**Key Words and  
Phrases:**

---

## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:** B

**ReferenceID:** 364

**Title:** *Table 3-1: Summary of Observed Field Measurements by River Segments*

**Location:** AEM

**Category:** RI/FS

**Prepared by/Author:** Blasland, Bouck & Lee, Inc.

**Preparer/Author Address:** 6723 Towpath Road  
P.O. Box 66  
Syracuse, NY 13214

**Prepared For:** General Public

**Date Published:** April 8, 1994

**Key Words and Phrases:**

---

**Reference Type:** B

**ReferenceID:** 460

**Title:** *Meeting Handouts: Superfund Process Overview; List of Information Repositories; Target Compound List / Target Analyte List: Progress Reports #1 thru #13*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** Michigan Department of Environmental Quality

**Preparer/Author Address:**

**Prepared For:** General Public

**Date Published:** 1995-96 circa

**Key Words and Phrases:**

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## REFERENCES

---

**Project Name** **ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)**

**ProjectID:** 05-25

**Reference Type:** B **ReferenceID:** 468  
**Title:** *Itemized Cost Summary - Allied Paper, MI Superfund Site #9B*  
**Location:** AEM  
**Category:** Cost Summary Reports  
**Prepared by/Author:** US EPA Region V  
**Preparer/Author Address:**  
**Prepared For:** Distribution  
**Date Published:** November 19, 1996  
**Key Words and Phrases:**

---

**Reference Type:** B **ReferenceID:** 489  
**Title:** *Spotlight On: Allied Paper, Inc./Portage Creek/Kalamazoo River Site*  
**Location:** AEM  
**Category:** Site Update  
**Prepared by/Author:** Susan Pastor  
**Preparer/Author Address:** US EPA Region V  
**Prepared For:** Fox River Current  
**Date Published:** January/February 2001  
**Key Words and Phrases:**

---

**Reference Type:** B **ReferenceID:** 495  
**Title:** *e-mail re: EPA Picks Cleanup Plan for Rockwell International Site*  
**Location:** AEM  
**Category:** Site Update  
**Prepared by/Author:** Dave Novak  
**Preparer/Author Address:** US EPA Region V  
**Prepared For:** General Public  
**Date Published:** October 9, 2002  
**Key Words and Phrases:**

---

## REFERENCES

---

**Project Name** **ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)**

**ProjectID:** 05-25

**Reference Type:** B

**ReferenceID:** 524

**Title:** **Michigan 2001 Fish Advisory**

**Location:** AEM

**Category:** Fish/Biota

**Prepared by/Author:** Michigan Department of Community Health

**Preparer/Author  
Address:** <http://www.mdch.state.mi.us/pha/fish/fishadvisory.pdf>

**Prepared For:** General Public

**Date Published:** March 2001

**Key Words and  
Phrases:**

---

**Reference Type:** B

**ReferenceID:** 525

**Title:** **Allied Paper, Inc./Portage Creek/Kalamazoo River Fact Sheet**

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** US EPA Region V

**Preparer/Author  
Address:** 77 West Jackson Blvd.  
Chicago, IL 60604

**Prepared For:** General Public

**Date Published:** November 2000

**Key Words and  
Phrases:**

---

**Reference Type:** B

**ReferenceID:** 579

**Title:** **EPA Addresses Questions on Kalamazoo River**

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** Eric Kerney

**Preparer/Author  
Address:**

**Prepared For:** River Rap 2001

**Date Published:** 2001 Winter

**Key Words and  
Phrases:**

---

## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:** B

**ReferenceID:** 724

**Title:** *EPA Update: Allied Paper/Portage Creek/Kalamazoo River  
Superfund Site*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** US EPA Region V

**Preparer/Author  
Address:**

**Prepared For:** General Public

**Date Published:** August 2002

**Key Words and  
Phrases:**

---

**Reference Type:** B

**ReferenceID:** 745

**Title:** *Agents hash over schedule for Kalamazoo River Cleanup, future  
of dams*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:**

**Preparer/Author  
Address:**

**Prepared For:** River Rap

**Date Published:** Autumn 2002

**Key Words and  
Phrases:**

---

## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:** B

**ReferenceID:** 785

**Title:** *Realizing Remediation I - Great Lakes Contaminated Sediments  
Kalamazoo River - Allied Paper  
(see Reference A-905)*

**Location:** AEM

**Category:** Dredging: Remedial (Contaminated Sediments)

**Prepared by/Author:** US EPA Great Lakes National Program Office (GLNPO)

**Preparer/Author  
Address:** 77 West Jackson Boulevard (G-17J)  
Chicago, IL 60604

**Prepared For:** General Public

**Date Published:** August 1, 2002

**Key Words and  
Phrases:**

---

**Reference Type:** B

**ReferenceID:** 816

**Title:** *Realizing Remediation II - Updated Summary:  
Kalamazoo River - Allied Paper (Project 2)  
(see Reference A-907)*

**Location:** AEM

**Category:** Dredging: Remedial (Contaminated Sediments)

**Prepared by/Author:** US EPA Great Lakes National Program Office (GLNPO)

**Preparer/Author  
Address:** 77 West Jackson Boulevard (G-17J)  
Chicago, IL 60604

**Prepared For:** General Public

**Date Published:** July 2000

**Key Words and  
Phrases:**

---

## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:** B

**ReferenceID:** 877

**Title:** *Memo re: CSTAG Recommendations on the Allied Paper,  
Inc./Portage Creek/Kalamazoo River Superfund Site  
(see also Reference B-879)*

**Location:** AEM

**Category:** Contaminated Sediments: Management Issues

**Prepared by/Author:** Stephen J. Ells and Judith McCulley

**Preparer/Author** US EPA

**Address:** Contaminated Sediments Technical Advisory Group (CSTAG)  
Washington, DC 20460

**Prepared For:** Shari Kolak, RPM, US EPA Region V

**Date Published:** June 26, 2002

**Key Words and  
Phrases:**

---

**Reference Type:** B

**ReferenceID:** 879

**Title:** *Memo re: CSTAG Recommendations on the Allied Paper,  
Inc./Portage Creek/Kalamazoo River Superfund Site  
(see also Reference B-877)*

**Location:** AEM

**Category:** Contaminated Sediments: Management Issues

**Prepared by/Author:** Shari Kolak

**Preparer/Author** Remedial Project Manager

**Address:** US EPA Region V  
77 West Jackson Boulevard  
Chicago, IL 60604-3590

**Prepared For:** Stephen J. Ells and Judith McCulley  
US EPA  
Contaminated Sediments Technical Advisory Group (CSTAG)  
Washington, DC 20460

**Date Published:** November 20, 2002

**Key Words and  
Phrases:**

---

## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:** B

**ReferenceID:** 1015

**Title:** *EPA Explains Delay in River Cleanup*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:**

**Preparer/Author  
Address:**

**Prepared For:** River Rap

**Date Published:** Winter/Spring 2003

**Key Words and  
Phrases:**

---

**Reference Type:** B

**ReferenceID:** 1016

**Title:** *Statewide Council on Great Lakes Areas of Concern*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:**

**Preparer/Author  
Address:**

**Prepared For:** River Rap

**Date Published:** Winter/Spring 2003

**Key Words and  
Phrases:**

---

**Reference Type:** B

**ReferenceID:** 1017

**Title:** *TAG! You're It!*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:**

**Preparer/Author  
Address:**

**Prepared For:** River Rap

**Date Published:** Winter/Spring 2003

**Key Words and  
Phrases:**

---



## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:**

B

**ReferenceID:** 1018

**Title:**

*The Kalamazoo River Dams: Questions and Answers*

**Location:**

AEM

**Category:**

Site Update

**Prepared by/Author:**

US EPA Region V

**Preparer/Author**

**Address:**

**Prepared For:**

General Public

**Date Published:**

September 2003

**Key Words and  
Phrases:**

---

**Reference Type:**

B

**ReferenceID:** 1019

**Title:**

*EPA Will Study Effects of Dam Removals on Cleanup*

**Location:**

AEM

**Category:**

Site Update

**Prepared by/Author:**

US EPA Region V

**Preparer/Author**

**Address:**

**Prepared For:**

General Public

**Date Published:**

November 2003

**Key Words and  
Phrases:**

---

**Reference Type:**

B

**ReferenceID:** 1058

**Title:**

*Kalamazoo River Cleanup Decisions on Hold*

**Location:**

AEM

**Category:**

Site Update

**Prepared by/Author:**

US EPA Region V

**Preparer/Author**

**Address:**

**Prepared For:**

General Public

**Date Published:**

June 2004

**Key Words and  
Phrases:**

---

## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:** B

**ReferenceID:** 1126

**Title:** *Letter re: MDEQ Disapproval of Draft RI/FS*

**Location:** AEM

**Category:** Response Comments

**Prepared by/Author:** Brian von Gunten, Michigan DEQ

**Preparer/Author  
Address:**

**Prepared For:** Shari Kolak, US EPA Region V

**Date Published:** July 11, 2002

**Key Words and  
Phrases:**

---

**Reference Type:** B

**ReferenceID:** 1127

**Title:** *Allied Paper, Inc / Portage Creek / Kalamazoo River Superfund  
Site*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** Michigan DEQ

**Preparer/Author  
Address:**

**Prepared For:** General Public

**Date Published:** 2004 circa

**Key Words and  
Phrases:**

---

**Reference Type:** C

**ReferenceID:** 1

**Title:** *Allied anticipates several caps*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:**

**Preparer/Author  
Address:**

**Prepared For:** Superfund Week

**Date Published:** January 2, 1998

**Key Words and  
Phrases:**

---

## REFERENCES

---

**Project Name** **ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)**

**ProjectID:** 05-25

**Reference Type:** C

**ReferenceID:** 21

**Title:** *Allied Paper gets another plan*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:**

**Preparer/Author  
Address:**

**Prepared For:** Superfund Week

**Date Published:** August 8, 1998

**Key Words and  
Phrases:**

---

**Reference Type:** C

**ReferenceID:** 39

**Title:** *Mich. proposes to expand Allied Paper cleanup*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:**

**Preparer/Author  
Address:**

**Prepared For:** Superfund Week

**Date Published:** July 18, 1997

**Key Words and  
Phrases:**

---

**Reference Type:** C

**ReferenceID:** 40

**Title:** *PRPs will build remedies for Allied Paper*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:**

**Preparer/Author  
Address:**

**Prepared For:** Superfund Week

**Date Published:** March 20, 1998

**Key Words and  
Phrases:**

---

## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:** C

**ReferenceID:** 44

**Title:** *PRPs launch RI/FS along 80 miles of river*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:**

**Preparer/Author  
Address:**

**Prepared For:** Superfund Week

**Date Published:** March 26, 1993

**Key Words and  
Phrases:**

---

**Reference Type:** C

**ReferenceID:** 45

**Title:** *Not many drums found at 12th St.*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:**

**Preparer/Author  
Address:**

**Prepared For:** Superfund Week

**Date Published:** August 13, 1993

**Key Words and  
Phrases:**

---

**Reference Type:** C

**ReferenceID:** 46

**Title:** *Vinyl chloride found in dump*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:**

**Preparer/Author  
Address:**

**Prepared For:** Superfund Week

**Date Published:** April 29, 1994

**Key Words and  
Phrases:**

---

## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:** C

**ReferenceID:** 139

**Title:** *PRPs build steel wall for Kalamazoo site*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:**

**Preparer/Author  
Address:**

**Prepared For:** Superfund Week

**Date Published:** April 17, 1998

**Key Words and  
Phrases:**

---

**Reference Type:** C

**ReferenceID:** 651

**Title:** *EPA Scans Remedial Documents for Allied Paper/Portage Creek*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:**

**Preparer/Author  
Address:**

**Prepared For:** Hazardous Waste/Superfund Week

**Date Published:** February 19, 2001

**Key Words and  
Phrases:**

---

**Reference Type:** C

**ReferenceID:** 736

**Title:** *Michigan to Give Up Lead of Kalamazoo River Cleanup*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:**

**Preparer/Author  
Address:**

**Prepared For:** Hazardous Waste/Superfund Week

**Date Published:** July 30, 2001

**Key Words and  
Phrases:**

---

## REFERENCES

---

**Project Name** ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)

**ProjectID:** 05-25

**Reference Type:** H

**ReferenceID:** 30

**Title:** *Kalamazoo River Superfund Site, Michigan*

**Location:** AEM

**Category:** Miscellaneous

**Prepared by/Author:**

**Preparer/Author  
Address:**

**Prepared For:**

**Date Published:** Undated

**Key Words and  
Phrases:**

---

**Reference Type:** L

**ReferenceID:** 53

**Title:** *Letter re: Kalamazoo River Public Meeting and Visit to Other  
River Sites in Michigan (Pine, Saginaw, and Shiawassee Rivers)*

**Location:** AEM

**Category:** Site Update

**Prepared by/Author:** AEM, Inc.

**Preparer/Author  
Address:** Malvern, PA 19355

**Prepared For:** Distribution

**Date Published:** December 30, 1998

**Key Words and  
Phrases:**

---

**Reference Type:** M

**ReferenceID:** 50

**Title:** *Letter re: removal techniques*

**Location:** AEM

**Category:** Dredging: Remedial (Contaminated Sediments)

**Prepared by/Author:** Ray Bergeron

**Preparer/Author  
Address:** Cable Arm, Inc.

**Prepared For:** Barry Shukla (CDM)

**Date Published:** July 5, 1999

**Key Words and  
Phrases:**

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## MODELING

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**Project Name:** **ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER - PROJECT 2 (Upper River)** **ProjectID:** 05-25

**Last Updated:** 08/27/02

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**Modeling Performed:** A suite of models was developed to support evaluation of remedial alternatives for a 40-mile section of the Kalamazoo River from Morrow Lake Dam to Lake Allegan. KALSIM, a PCB mass balance model based on a modified version of the USEPA's WASP model, was the principal modeling tool. KALSIM was applied to simulate long-term PCB trends in the sediment bed and water column for a 40-year period, forecasting PCB exposure trends under natural attenuation and remediation scenarios. The KALSIM application was supported by application of the USACE HEC6 model to simulate resuspension shear stresses. The USACE Automated Coastal Engineering System (ACES) windwave model was developed to calculate bottom shear stresses under high wind conditions to evaluate the potential for scour and resuspension of sediment in Lake Allegan in response to an extreme wind event.

**Modeling Objectives:** The principal modeling objectives were to forecast the long-term response of PCB exposure levels in the Kalamazoo River under natural attenuation and active remedial scenarios including source control, dredging, and capping. The KALSIM PCB fate and transport model results were used to quantitatively assess the expected performance of different remedial alternatives.

**Modeling Description:** The KALSIM model is a modification of the WASP model, which is a time-variable mass balance water quality model capable of simulating fate and transport processes affecting PCBs in the sediment bed and the water column. KALSIM includes a shear stress-dependent resuspension equation. HEC6 is a one-dimensional river hydraulics and sediment transport model. HEC6 model results were used to develop a relationship between average shear stress in KALSIM segments and river flow to compute resuspension. A separate modeling analysis of resuspension potential due to wind waves was conducted for Lake Allegan using the USACE Automated Coastal Engineering System wind wave model. A site-specific bank erosion model was developed to simulate erosion of PCB-containing bank material from exposed former sediments.

**Company Performing Modeling:** Limno Tech, Inc.

**Modeling Status:** A draft modeling report was submitted to the MDEQ as Supplemental Information to a draft RI/FS report prepared by BBL. The MDEQ provided comments on the RI/FS including the modeling report. The Kalamazoo River Study Group is currently reviewing comments on the modeling and preparing responses to comments.

**Modeling Summary:** The KALSIM model developed for the draft RI/FS, although based on limited data and an empirical sediment resuspension model, was useful in evaluating effectiveness of remedial alternatives. Additional data collection and model development activities may be incorporated in future assessments of remedial alternatives. Conclusions drawn from the modeling analysis of remedial alternatives conducted for the draft RI/FS report indicate source control through stabilization of eroding sediment banks in the three former impoundments combined with natural attenuation processes would achieve significant reductions in ecological and human health risks due to exposure reductions. Natural attenuation, observed to be occurring at rates of approximately 6 to 10 percent per year in most reaches of the river, would be enhanced by source control. Due to the dispersed nature of PCBs throughout the site and the lack of manageable "hot spots", predictions of removal alternatives did not identify a basis for targeted removal and instead simulated site-wide remediation. Site-wide remediation was estimated to take years and dredging scenario predictions suggested little relative benefit over source control as a means to reduce site-wide risks.

## ***FISH ADVISORIES***

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***Project Name*** **ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)**

***ProjectID:*** 05-25

<b><i>Advisory:</i></b>	Kalamazoo River	<b><i>AdvisoryID:</i></b> 549
<b><i>Extent:</i></b>	Morrow Pond Dam to Allegan Dam	
<b><i>Pollutant:</i></b>	PCBs (total)	
<b><i>Species:</i></b>	all fish except banned species	
<b><i>Population:</i></b>	RGP	
<b><i>Population Definition:</i></b>	Restricted Consumption-General Population: Advises the general population to restrict the size of the organisms and/or the frequency of meals consumed.	
<b><i>Advisory Type:</i></b>	River	<b><i>Advisory Number:</i></b> 239
<b><i>Status (Active or Rescinded):</i></b>	Active	<b><i>Date Rescinded:</i></b>
<b><i>Contact Name:</i></b>	David R. Wade	<b><i>Contact Number:</i></b> 517-335-8834
<b><i>Advisory:</i></b>	Kalamazoo River	<b><i>AdvisoryID:</i></b> 550
<b><i>Extent:</i></b>	Morrow Pond Dam to Allegan Dam	
<b><i>Pollutant:</i></b>	PCBs (total)	
<b><i>Species:</i></b>	bass-largemouth	
<b><i>Population:</i></b>	NCGP	
<b><i>Population Definition:</i></b>	No Consumption-General Population: Advise against consumption by the general population.	
<b><i>Advisory Type:</i></b>	River	<b><i>Advisory Number:</i></b> 239
<b><i>Status (Active or Rescinded):</i></b>	Active	<b><i>Date Rescinded:</i></b>
<b><i>Contact Name:</i></b>	David R. Wade	<b><i>Contact Number:</i></b> 517-335-8834
<b><i>Advisory:</i></b>	Kalamazoo River	<b><i>AdvisoryID:</i></b> 551
<b><i>Extent:</i></b>	Morrow Pond Dam to Allegan Dam	
<b><i>Pollutant:</i></b>	PCBs (total)	
<b><i>Species:</i></b>	bass-smallmouth	
<b><i>Population:</i></b>	NCGP	
<b><i>Population Definition:</i></b>	No Consumption-General Population: Advise against consumption by the general population.	
<b><i>Advisory Type:</i></b>	River	<b><i>Advisory Number:</i></b> 239
<b><i>Status (Active or Rescinded):</i></b>	Active	<b><i>Date Rescinded:</i></b>
<b><i>Contact Name:</i></b>	David R. Wade	<b><i>Contact Number:</i></b> 517-335-8834



## ***FISH ADVISORIES***

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***Project Name*** **ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)**

***ProjectID:*** 05-25

***Advisory:*** Kalamazoo River ***AdvisoryID:*** 552

***Extent:*** Morrow Pond Dam to Allegan Dam

***Pollutant:*** PCBs (total)

***Species:*** carp-common

***Population:*** NCGP

***Population Definition:*** No Consumption-General Population: Advise against consumption by the general population.

***Advisory Type:*** River ***Advisory Number:*** 239

***Status (Active or Rescinded):*** Active ***Date Rescinded:***

***Contact Name:*** David R. Wade ***Contact Number:*** 517-335-8834

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***Advisory:*** Kalamazoo River ***AdvisoryID:*** 553

***Extent:*** Morrow Pond Dam to Allegan Dam

***Pollutant:*** PCBs (total)

***Species:*** catfish

***Population:*** NCGP

***Population Definition:*** No Consumption-General Population: Advise against consumption by the general population.

***Advisory Type:*** River ***Advisory Number:*** 239

***Status (Active or Rescinded):*** Active ***Date Rescinded:***

***Contact Name:*** David R. Wade ***Contact Number:*** 517-335-8834

---

***Advisory:*** Kalamazoo River ***AdvisoryID:*** 554

***Extent:*** Morrow Pond Dam to Allegan Dam

***Pollutant:*** PCBs (total)

***Species:*** all fish

***Population:*** NCSP

***Population Definition:*** No Consumption-Subpopulation(s): Advises against consumption for populations that are potentially at greater risk, e.g., pregnant or nursing women, and small children.

***Advisory Type:*** River ***Advisory Number:*** 239

***Status (Active or Rescinded):*** Active ***Date Rescinded:***

***Contact Name:*** David R. Wade ***Contact Number:*** 517-335-8834

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## ***FISH ADVISORIES***

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***Project Name*** **ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER -  
PROJECT 2 (Upper River)**

***ProjectID:*** 05-25

***Advisory:*** Kalamazoo River

***AdvisoryID:*** 555

***Extent:*** Morrow Pond Dam to Allegan Dam

***Pollutant:*** PCBs (total)

***Species:*** sucker

***Population:*** NCGP

***Population Definition:*** No Consumption-General Population: Advise against consumption by the general population.

***Advisory Type:*** River

***Advisory Number:*** 239

***Status (Active or  
Rescinded):*** Active

***Date Rescinded:***

***Contact Name:*** David R. Wade

***Contact Number:*** 517-335-8834

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