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Annotated Bibliography of Selected References on PCB and the Kalamazoo River Superfund Site, Michigan, 1982-2002

Open-File Report 03-338

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Cover photo: Health advisory sign warning of the dangers of eating fish contaminated by PCBs at the Plainwell dam foundation, Kalamazoo, Mich. Photo by S.J. Rheaume, U.S. Geological Survey, Lansing, Mich.

Annotated Bibliography of Selected References on PCB and the Kalamazoo River Superfund Site, Michigan, 1982-2002

By **Andreanne Simard**

Open-File Report 03-338

Lansing, Michigan
2003

U.S. DEPARTMENT OF THE INTERIOR
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U.S. GEOLOGICAL SURVEY
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CONVERSION FACTORS AND ABBREVIATIONS

	Multiply	By	To obtain
Mass	milligram (mg)	0.00003527	ounce
	kilogram (kg)	2.205	pound

Abbreviated water-quality units used in this report: Chemical concentrations for bed sediment are given in milligrams per kilogram (mg/kg), a unit expressing the concentration of chemical constituents in bed sediment (dry weight) for synthetic organic compounds and trace elements. Numerical values expressed as milligrams per kilogram are the same as concentrations in parts per million (ppm).

MISCELLANEOUS ABBREVIATIONS

CDM	Camp Dresser and McKee
CRQL	Contract Required Quantitation Limit
ERA	Ecological Risk Assessment
LTI	Limno-Tech Inc.
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
MIOSHA	Michigan Occupational Safety and Health Administration
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PCB	Polychlorinated Biphenyls
PCDD	Polychlorinated Dibenzo-dioxin
PCDF	Polychlorinated Dibenzo-furan
PRP	Potential Responsible Party
RI	Remedial Investigation
TBSA	Terrestrial Biota Sampling Area
TMDL	Total Maximum Daily Load
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey

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ABSTRACT

Fifty six publications pertaining to the Kalamazoo River Superfund Site Publications stored in the Michigan Department of Environmental Quality Environmental Response Division site files are summarized. Publications are presented chronologically within four categories: PCB releases, PCB remediation, PCB safety, and PCB testing and cleanup. The text consists of bibliographical information and brief summaries of various published documents pertaining to PCB contamination of the Kalamazoo River. Numerous investigators such as the Michigan Department of Natural Resources, Georgia Pacific, and various contractors have demonstrated that multiple and at times continuous releases and re-releases of PCBs have occurred as a result of operations at papermill facilities owned and operated by the "Potential Responsible Parties".

INTRODUCTION

The Kalamazoo River was placed on the Superfund or National Priorities List (NPL) in August 1990 because of PCB contamination (Camp Dresser and McKee, 1999). The NPL study area, which is defined in the Michigan Environmental Response Act 307, includes 3 miles of Portage Creek, from Cork Street to its confluence with the Kalamazoo River at Kalamazoo, Mich. (fig. 1) and 80 miles of the Kalamazoo River, from Morrow Lake Dam near Comstock downstream to Lake Michigan. Five paper residual disposal areas and five papermill properties are in this study area (Blasland, Bouck & Lee, Inc., 1993). The Michigan Department of Community Health has issued a species-specific no-consumption fish advisory annually since 1977 for the Kalamazoo River area of this site because of PCB contamination. The Kalamazoo River and Portage Creek have also been designated a site of environmental contamination under Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended (NREPA), because of PCB contamination. Both have been identified as an area of concern by the International Joint Commission on the Great Lakes because of the detrimental effects that the release of PCBs has on Lake Michigan. Fifty-six references containing information on PCBs and the Kalamazoo River Superfund Site are annotated in this report (table 1). The compilation is intended to summarize the extensive information stored in the Michigan Department of Environmental Quality, Environmental Response Division site files regarding the Kalamazoo River Superfund Site.

Purpose and scope

The purpose of this report is to summarize selected publications relating to PCB releases, PCB remediation, PCB safety, and PCB testing and cleanup. Fifty-six references containing information on PCBs and the Kalamazoo River Superfund Site are annotated in this report (table 1). A complete alphabetical list containing the entire citations of these publications can be found at the end of the report.

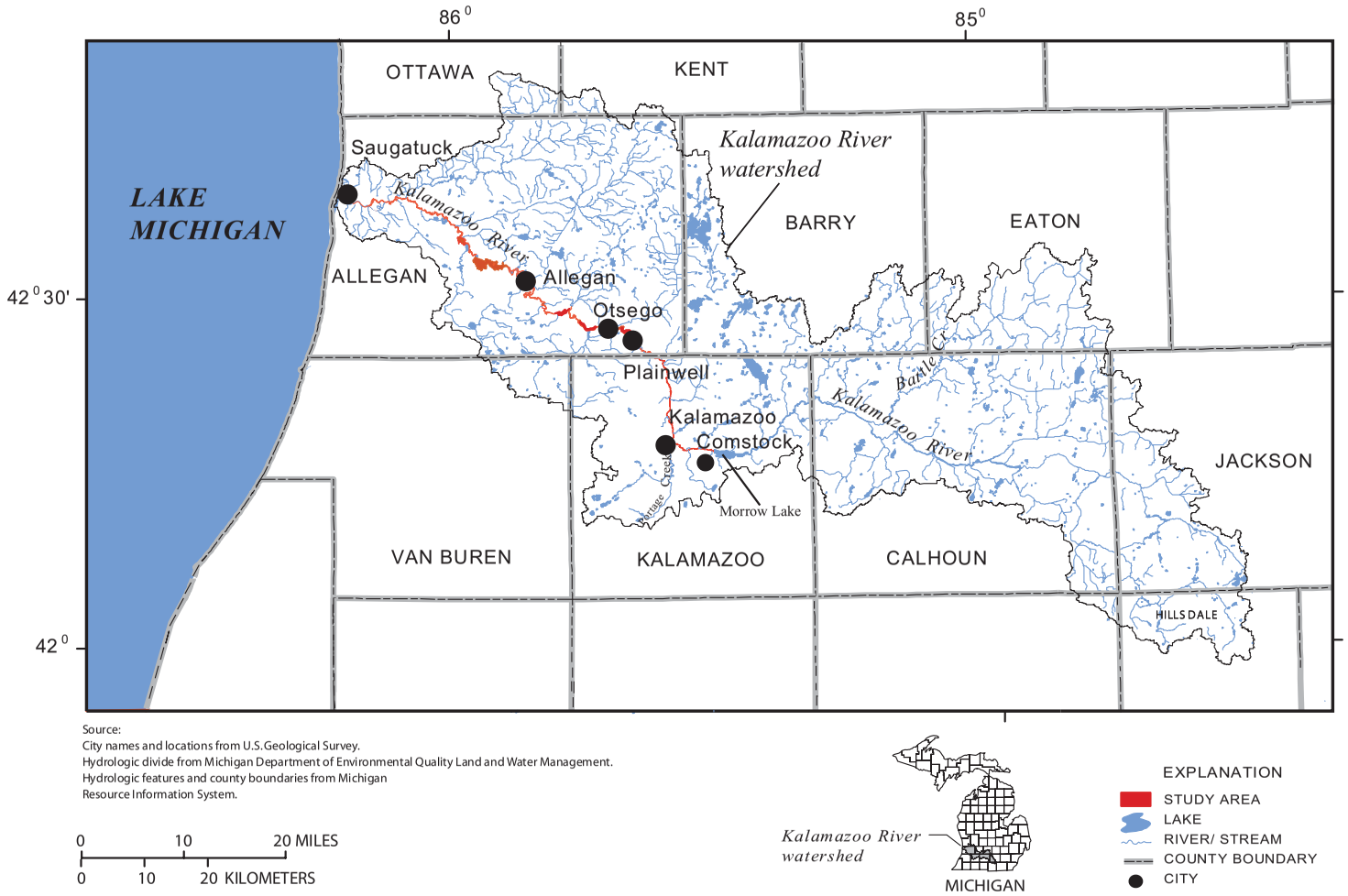

Figure 1. Location of the Kalamazoo River watershed and study area in Michigan.

Table 1. Chronological list of selected references and primary topics for the Kalamazoo River Superfund Site

Ref. Number and page	Reference	PCB releases	PCB remediation	PCB safety	PCB testing and cleanup
1 (p. 11)	Wilkins and Wheaton Testing Laboratory, Inc., 1982, Hydrologic investigation for the Allied Paper, Inc. sanitary landfill.	**X**			
2 (p. 26)	Wilkins & Wheaton Testing Laboratory, Inc., 1985, Short term waste characterization study for Allied Paper, Inc., Kalamazoo Michigan.				**X**
3 (p. 17)	Varnum, Riddering, Schmidt & Howlett; Attorneys at Law, 1986, Proposal for implementation of immediate remedial action plan for assessment of future remedial action plan.		**X**		
4 (p. 25)	Wilkins & Wheaton, 1986, Program for effective residuals management for the allied paper, Inc. solid waste disposal facility for residuals disposal.			**X**	
5 (p. 26)	Yeasted, Joseph G., Ph.D, P.E., 1986, Feasibility study of alternatives, v. 1 and 2—Kalamazoo River PCB Project, Kalamazoo and Allegan Counties, Michigan.				**X**
6 (p. 26)	Yeasted, Joseph G., ph.D, P.E., 1986, Feasibility study of alternatives, addendum—Kalamazoo River PCB Project, Kalamazoo and Allegan Counties, Michigan.				**X**
7 (p. 27)	O'Brien & Gere Engineers, Inc., 1989, Description of containment work details assumed for purposes of preparing preliminary cost estimates.				**X**
8 (p. 28)	Peerless-Midwest, Inc., 1989, Aquifer performance analysis—Wells TW1 and TW2.				**X**
9 (p. 11)	Limno-Tech, Inc. and United Environmental Technologies, Inc., 1990, Report on the H.M. Holdings/Allied Paper investigations of the historical residuals dewatering lagoons and "seeps 1 and 2".	**X**			
10 (p. 28)	GZA-Donohue, 1990, Evaluating sediment burial rates and PCB partition coefficients.				**X**

Table 1. Chronological list of selected references and primary topics for the Kalamazoo River Superfund Site--*Continued*

Ref. Number and page	Reference	PCB releases	PCB remediation	PCB safety	PCB testing and cleanup
11 (p. 29)	Eco Logic International, Inc., 1991, Congener specific analysis of polychlorinated biphenyls.				**X**
12 (p. 17)	Blasland, Bouck & Lee, Inc., 1992, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site description of the current situation—v. 1, 2, and 6.		**X**		
13 (p. 29)	Simpson Plainwell Paper Company, 1993, Test pit investigation work plan—Allied Paper, Inc./ Portage Creek/Kalamazoo River Superfund Site, 12th Street Landfill Operable Unit.				**X**
14 (p. 12)	HydroQual, Inc., 1993, Attachment 2—Assessment of PCBs discharge to the Kalamazoo River from sources upstream of Morrow Lake Dam.	**X**			
15 (p. 30)	Brenton, Robert, 1993, Sediment sampling.				**X**
16 (p. 25)	Blasland, Bouck & Lee, Inc., 1993, Remedial investigation/feasibility study health and safety plan, Kalamazoo River study group.			**X**	
17 (p. 31)	Blasland, Bouck & Lee, Inc., 1993, Allied Paper, Inc. Operable Unit remedial investigation/focused feasibility study workplan.				**X**
18 (p. 31)	Camp Dresser & McKee, 1993, Biota sampling plan for the Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site.				**X**
19 (p. 18)	Envirogen, Inc., 1993, Statement of proposal to Blasland and Bouck Engineers, P.C. for PCB biodegradation treatability studies.		**X**		
20 (p. 13)	Blasland, Bouck & Lee, Inc., 1994, Mill investigation/proposed storm water sediment sampling locations: technical memorandum 1.	**X**			
21 (p. 32)	Blasland, Bouck & Lee, Inc., 1994, Results of Phase I TBSA soil sampling: technical memorandum 2.				**X**

Table 1. Chronological list of selected references and primary topics for the Kalamazoo River Superfund Site--*Continued*

Ref. Number and page	Reference	PCB releases	PCB remediation	PCB safety	PCB testing and cleanup
22 (p. 33)	Blasland, Bouck & Lee, Inc., 1994, Results of the floodplain soil investigation: technical memorandum 3, v. 1.				**X**
23 (p. 33)	Blasland, Bouck & Lee, Inc., 1994, King Highway Landfill operable unit: technical memorandum 6, v. 1.				**X**
24 (p. 13)	Blasland, Bouck & Lee, Inc., 1994, PRP case study—Menasha Corporation, Otsego, Michigan.	**X**			
25 (p. 14)	Blasland, Bouck & Lee, Inc., 1994, PRP case study—Benteler Industries, Inc., Galesburg, Michigan.	**X**			
26 (p. 14)	Blasland, Bouck & Lee, Inc., 1994, PRP case study—Rock-Tenn Company, Otsego, Michigan.	**X**			
27 (p. 34)	Blasland, Bouck & Lee, Inc., 1994, Allied Paper, Inc. operable unit results of the air investigation: technical memorandum 4, v. 1.				**X**
28 (p. 35)	Blasland, Bouck & Lee, Inc., 1994, Willow Boulevard/A-Site operable unit results of the air investigation: technical memorandum 5, v. 2.				**X**
29 (p. 36)	Blasland, Bouck & Lee, Inc., 1994, PRP case study, Kalamazoo Metal Recyclers, Kalamazoo, Michigan.				**X**
30 (p. 35)	Geraghty & Miller, Inc., 1994, 12th Street Landfill Operable Unit; Plainwell, Michigan: technical memorandum 8, v. 1.				**X**

Table 1. Chronological list of selected references and primary topics for the Kalamazoo River Superfund Site--*Continued*

Ref. Number and page	Reference	PCB releases	PCB remediation	PCB safety	PCB testing and cleanup
31 (p. 36)	Lockheed Environmental Systems & Technologies Company, 1994, PCB data validation for samples analyzed by Michigan Department of Natural Resources for the Allied Paper, Inc./ Portage Creek/Kalamazoo River Superfund Site PCB Field-screening technology demonstration and evaluation.				**X**
32 (p. 37)	Weston, Roy F., 1994, Kalamazoo River mammal study—analytical report.				**X**
33 (p. 37)	Blasland, Bouck & Lee, Inc., 1995, Willow Boulevard/A-Site operable unit: technical memorandum 9, v. 1, 3, and 4.				**X**
34 (p. 19)	Blasland, Bouck & Lee, Inc., 1995, water well-inventory: technical memorandum 13.		**X**		
35 (p. 14)	Bonham, John, Otsego Paperboard Division, 1995, Kalamazoo River Site investigation: MDNR letter, Subject: Response to request from Michigan Department of Natural Resources for information pursuant to the Michigan Environmental Response Act.	**X**			
36 (p. 19)	Envirogen, Inc., 1995, Evaluation of bioremediation treatment of river and pond samples for PCB reduction at a site in Kalamazoo Michigan—Final report.		**X**		
37 (p. 38)	Geraghty & Miller, Inc., 1996, Remedial investigation addendum 1—12th Street Landfill Operable Unit, Plainwell, Michigan.				**X**
38 (p. 39)	Simpson Plainwell Paper Company, 1996, Remedial investigation report—12th Street Landfill Operable Unit, Plainwell, Michigan.				**X**

Table 1. Chronological list of selected references and primary topics for the Kalamazoo River Superfund Site--*Continued*

Ref. Number and page	Reference	PCB releases	PCB remediation	PCB safety	PCB testing and cleanup
39 (p. 15)	Blasland, Bouck & Lee, Inc., 1996, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site remedial investigation/feasibility study: Mill investigations: technical memorandum 15, v. 1.	X			
40 (p. 20)	Simpson Plainwell Paper Company, 1997, Focused feasibility study—12th Street Landfill operable unit, Plainwell, Michigan.		X		
41 (p. 39)	Blasland, Bouck & Lee, Inc., 1997, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site remedial investigation/feasibility study: technical memorandum 7, v. 1.				X
42 (p. 40)	Camp Dresser & McKee, 1997, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site—Final technical memorandum Mink/Muskrat biota sampling.				X
43 (p. 20)	Blasland, Bouck & Lee, Inc., 1998, King Highway Landfill Operable Unit closure—Landfill gas monitoring plan.		X		
44 (p. 15)	U.S. Army Corps of Engineers, 1998, Work plan rapid response interim removal action at Bryant Mill Pond.	X			
45 (p. 41)	Blasland, Bouck & Lee, Inc., 1998, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site remedial investigation/feasibility study—King Highway Landfill Operable Unit closure, Groundwater monitoring plan.				X
46 (p. 21)	Camp Dresser & McKee, 1999, Evaluation report of Plainwell Dam.		X		
47 (p. 21)	Camp Dresser & McKee, 1999, Evaluation report of Trowbridge Dam.		X		
48 (p. 19)	Camp Dresser & McKee, 1999, Baseline ecological risk assessment.		X		

Table 1. Chronological list of selected references and primary topics for the Kalamazoo River Superfund Site--*Continued*

Ref. Number and page	Reference	PCB releases	PCB remediation	PCB safety	PCB testing and cleanup
49 (p. 21)	Golder Associates, Inc., 1999, Data summary report on May 1999 sampling event, West Kalamazoo Avenue landfill site.		X		
50 (p. 41)	Blasland, Bouck & Lee, Inc., 1999, Addendum to technical memorandum 7: v. 1.				X
51 (p. 22)	Camp Dresser & McKee, 2000, Otsego Dam—Evaluation and phase 2 investigation report.		X		
52 (p. 42)	Blasland, Bouck & Lee, Inc., 2000, Biota and surface water investigations and wetlands assessment: technical memorandum 11, v. 1.				X
53 (p. 23)	Stratus Consulting, Inc., 2000, Kalamazoo River environment site, Michigan—preassessment screen.		X		
54 (p. 23)	Stratus Consulting, Inc., 2000, Kalamazoo River environment site—Stage 1 assessment plan.		X		
55 (p. 24)	Quantitative Environmental Analysis, LLC., 2001, Review of Kalamazoo River PCB fate model developed by Limno-Tech, Inc.		X		
56 (p. 42)	Rheaume and others, 2002, Sediment characteristics and configuration within three dam impoundments on the Kalamazoo River, Michigan, 2000.				X

Acknowledgments

The author thanks Dennis Eagle and Paul Bucholtz of the Michigan Department of Environmental Quality, Lansing, Mich., for making their site files available and staff members of the Michigan Department of Environmental Quality-Environmental Response Division, for the numerous photo copies of text provided to our office. Technical reviewers were Brian E. Mailot (USGS, Columbus, Ohio), Stephen J. Rheaume (USGS, Lansing, Mich.), and Paul Bucholtz, (Michigan Department of Environmental Quality, Lansing, Mich.). Editorial and graphic support were provided by Michael Eberle and Leah Hout (USGS, Columbus, Ohio) and Sharon B. Baltusis (USGS, Lansing, Mich.).

REFERENCES DESCRIBING PCB RELEASES

(1) Wilkins and Wheaton Testing Laboratory, Inc., 1982, Hydrologic investigation for the Allied Paper, Inc. sanitary landfill.

This investigation provides information needed for the renewal of the Solid Waste Disposal Area License. The license is for Allied Paper, Inc., located at 2030 Portage Street in Kalamazoo, Mich., which produces paper products and maintains a small solid-waste sanitary landfill for their non-processing industrial wastes. The landfill is situated on the north side of Cork Street between Burdick Street and Portage Street. Its location is commonly referred to as the Bryant Mill Pond/Portage Creek landfill. The conclusion of this investigation is that the license should be renewed.

(9) Limno-Tech, Inc., and United Environmental Technologies, Inc., January 1990, Report on the H.M. Holdings/Allied Paper investigations of the historical residuals dewatering lagoons and "seeps 1 and 2."

This report investigates H.M. Holdings, Inc./Allied Paper, Inc., located at 2030 Portage Street in Kalamazoo, Mich., who previously operated dewatering and disposal facilities for solids generated during the treatment of their process wastewater. During 1985, polychlorinated biphenyls (PCBs) investigations were done in Portage Creek and in two rivulets (later identified as Seep 1 and Seep 2), which were found to contain PCBs. After the discovery of PCBs, several investigations were done to find the source of the problem. This report summarizes these investigations but focuses mainly on the 1989 investigation results. Allied Paper did the 1989 investigation under a work plan approved by the Michigan Department of Natural Resources (MDNR). The main objectives of the 1989 investigation were to identify the vertical and areal distribution of PCBs, to collect information with respect to possible releases of contaminants, and to investigate the potential contaminant release from Seeps 1 and 2.

(14) HydroQual, Inc., April 1993, Attachment 2: Assessment of PCBs discharge to the Kalamazoo River from sources upstream of Morrow Lake Dam.

Because the Eaton facilities (located in Marshall and Battle Creek, Michigan) used PCB-containing insulating fluids in the past, the identified potentially responsible parties of the Remedial Investigation of PCBs in the Kalamazoo River requested that Eaton Corporation participate in the Kalamazoo River Study Group in performing site studies. This report describes the steps taken to evaluate whether PCBs were released from the Eaton facilities and, where applicable, the amount of the release. To conduct this analysis, PCB measurements in the water, sediments, and biota were reviewed and a mathematical model of the transport of PCBs from the upper

Kalamazoo to the Remedial Investigation study area was developed. Another model also was developed for the downstream transport and fate of the PCBs passing over the Morrow Lake Dam. The existing data and mathematical models show that the Eaton Battle Creek and Marshall facilities have not contributed detectable levels of PCBs.

(20) Blasland, Bouck & Lee, Inc., February 1994, Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site remedial investigation/feasibility study—Mill investigation/proposed storm water sediment sampling locations: technical memorandum 1.

This publication presents the proposed stormwater-sediment sampling locations for the Georgia-Pacific Corporation Kalamazoo mill property, the Portage Paper Company mill property, and the Simpson Plainwell Paper Company mill property, pursuant to the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site remedial investigation/feasibility study. This report describes the three mills, the purpose of the sampling efforts, the evaluation process to select the sampling locations, and the proposed sampling locations. The main objective of this program was to detect the contribution of PCB, polychlorinated dibenzo-dioxin (PCDD), and polychlorinated dibenzo-furan (PCDF) from each facility's stormwater runoff to the Kalamazoo River or Portage Creek.

(24) Blasland, Bouck & Lee, Inc, May 1994, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site—PRP case study, Menasha Corporation, Otsego, Michigan.

The Menasha Corporation in Otsego, Mich., situated along the Kalamazoo River at the Otsego City Dam, is described in this report. The reason for this investigation is that PCBs were detected in their effluent and they were a documented user of PCBs.

(25) Blasland, Bouck & Lee, Inc., May 1994, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site—PRP case study, Benteler Industries, Inc., Galesburg, Michigan.

The Benteler Industries, which were formerly Hydreco, documented PCB contamination at their facility in Galesburg, Mich. This report describes the detected levels of PCBs found in one of the facility's ditches, which was previously a wastewater conveyance from the facility to Morrow Lake. The main issue of concern is that of in the event of a large storm, PCBs could be carried to the Kalamazoo River from the drainage ditch.

(26) Blasland, Bouck & Lee, Inc., May 1994, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site—PRP case study, Rock-Tenn Company, Otsego, Michigan.

The Rock-Tenn Company is on the banks of the Kalamazoo River at 431 Helen Street in Otsego, Mich., and produces paperboard using recycled stock. PCBs were found in the company's treated wastewater and noncontact cooling water. According to this report, the outfall monitoring data document discharges of PCBs to the Kalamazoo River.

(35) Bonham, John, Otsego Paperboard Division, August 3, 1995, Kalamazoo River Site Investigation: MDNR letter, Subject: Response to request from Michigan Department of Natural Resources for information pursuant to the Michigan Environmental Response Act.

This is a letter stating that Menasha is not a responsible party for the contamination of the Kalamazoo River. Menasha is the corporation, which includes the Otsego Mill.

(39) Blasland, Bouck & Lee, Inc., August 1996, Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site remedial

investigation/feasibility study—Mill investigations: technical memorandum 15, v.1.

The main purpose of this investigation is to determine whether any of the existing or former papermill properties may be a source of PCB contamination to the Kalamazoo River or Portage Creek. The sampling activities focused mainly on mill residuals and solid residue that may come in contact with the surface runoff. These sampling activities were chosen because of the high PCB levels found in the water samples obtained by the MDNR.

(44) U.S. Army Corps of Engineers, April 1998, Kalamazoo River Superfund Site Allied Paper, Inc. operable unit—Work plan rapid response interim removal action at Bryant Mill Pond.

Included in this work plan is a summary of the historical data of the contaminants on the Kalamazoo River Superfund Site, Allied Paper, Inc. Operable Unit (OU). On the northern end of the site, a dam known as the Alcott Street Dam was formerly used to impound process waste discharge into Portage Creek from Bryant Mill. This waste discharge contained PCBs, resulting in the PCB deposition in the Bryant Mill Pond. The purpose of this plan is to outline work needed to remove the PCB-contaminated deposits within this contaminated pond.

REFERENCES DESCRIBING PCB REMEDIATION

(3) Varnum, Riddering, Schmidt & Howlett; Attorneys at Law, 1986, Proposal for implementation of immediate remedial action plan for assessment of future remedial action plan.

This report presents background information on PCBs in Portage Creek and the Kalamazoo River. It states that PCBs had been present since 1971, but that levels decreased over the years. Applicable regulatory documents are reviewed and show that although generic criteria and guidelines do exist, no specific regulatory standards or methods are available for site-specific evaluations of PCB impact or for selection of remedial action goals. Allied Paper cooperated with the MDNR in the investigation of PCBs in Portage Creek to ultimately determine whether remedial action was necessary and if so, the level of action that was appropriate. This document presents Allied Paper's specific proposal for a remedial action plan, which includes a position statement, a general review of remedial methods, and a recommended remedial action plan.

(12) Blasland, Bouck & Lee, Inc., July 1992, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site description of the current situation, v. 1, 2, and 6.

Volume 1: The purpose of this report is to aid in identifying specific areas to be included in the Remedial Investigation (RI) and the nature of the activities involved for those areas. The major concern is the presence of PCBs. The report includes estimates of the annual transport of PCBs from the Kalamazoo River to Lake Michigan. This report also focuses on the major issues involved in this Superfund Site.

Volume 2: This volume contains tables relating to the testing for PCBs on the Kalamazoo River Superfund Site.

Volume 6: This volume contains the Appendices, which includes boring and well logs kept during in 1988 through 1990.

(19) Envirogen, Inc., November 1993, Statement of proposal to Blasland and Bouck Engineers, P.C. for PCB biodegradation treatability studies.

In this report, Blasland and Bouck Engineers are interested in determining whether

biological treatment methods would be possible to bioremediate PCB-containing sediments in a small pond. They have supplied Envirogen, Inc., with information on the contaminated site. According to the research Envirogen has performed, bioremediation is considered as a first treatment option. This proposal discusses the laboratory biodegradation treatability testing, PCB analysis, and the results.

(34) Blasland, Bouck & Lee, Inc., April 1995, Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site remedial investigation/feasibility study—Water well inventory: technical memorandum 13.

The purpose of the water-well inventory is to provide information on water-well distribution and use along Portage Creek and the Kalamazoo River. The water-well inventory for the Allied Paper Inc./Portage Creek/ Kalamazoo River Superfund Site was compiled from county and state records for the calendar years 1937-1993. This inventory includes water-well information along the Kalamazoo River from Morrow Lake to the river's mouth at Lake Michigan and also Portage Creek from Cork Street to the confluence with the Kalamazoo River. This technical memorandum includes an overview of the development of the inventory database the acquisition of water-well logs entered into the database the quality-assurance and quality-control checks performed on the data; the process of identifying well locations, and a statistical summary of water wells along the Kalamazoo River and Portage Creek. This inventory can further be used to access well information more efficiently and quickly for future studies.

(36) Envirogen, Inc., April 3, 1995, Evaluation of bioremediation treatment of river and pond samples for PCB reduction at a site in Kalamazoo Michigan—final report.

In November 1993, Envirogen submitted a proposal to Blasland and Bouck Engineers about performing a biological treatability study using both the Kalamazoo River and the Bryant Mill Pond sediments in order to determine the feasibility of using biological treatment for degrading the sediments of PCBs. The results initially showed that the river sample contained 17.9 mg/kg of PCBs and the pond had 271 mg/kg. After three different test conditions (Aerobic Biotreatment), bioaugmentation proved to be most effective in lowering the PCB levels from 17.9 mg/kg to 5.5 mg/kg in the river and the pond levels dropped from 271 mg/kg to 130 mg/kg. Anaerobic studies were also discussed in this report.

(40) Simpson Plainwell Paper Company, July of 1997, Focused feasibility study—12th Street landfill operable unit, Plainwell, Michigan: Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site.

The purpose of this focused feasibility study by Geraghty & Miller, Inc. on behalf of Simpson Plainwell Paper Company was to develop and evaluate possible remedial alternatives for the 12th Street landfill, on the basis of the results of the remedial investigation report.

(43) Blasland, Bouck & Lee, Inc., April 1998, Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site—King Highway Landfill Operable Unit cosure, Landfill gas monitoring plan.

The landfill gas monitoring plan proposes a gas monitoring system and describes the procedures for the post-remediation landfill gas monitoring at The King Highway landfill OU.

(46) Camp Dresser & McKee, January of 1999, Evaluation report of Plainwell Dam

This report summarizes the visual inspec-

tion and provides recommendations for the temporary stabilization of the dam prior to its demolition. The report is part of the Camp Dresser & McKee's ongoing investigation and design of remediation of PCB contaminated sediments in the Kalamazoo River.

(47) Camp Dresser & McKee, January 1999, Evaluation report of Trowbridge Dam.

This report summarizes the visual inspection of the Trowbridge Dam on the Kalamazoo River near Allegan, Mich. Also included in the report are recommendations for temporary stabilization of the dam before its planned demolition. This study was part of the Camp Dresser & McKee's ongoing investigation and design of remediation of PCB contaminated sediments in the Kalamazoo River.

(48) Camp Dresser & McKee, June 1999, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site: Baseline ecological risk assessment.

This report describes and identifies the actual or potential onsite conditions that can result from unacceptable risks to exposed organisms. The main focus of the report is to estimate risks and to identify appropriate and protective cleanup levels of PCBs. This report compares measured PCB concentrations in different types of exposure media such as surface water, sediment, and fish to predicted biological effects.

(49) Golder Associates, Inc., August 1999, Data summary report on May 1999 sampling event, West Kalamazoo Avenue landfill site.

This report summarizes the procedures used and the data collected for the May 1999 semi-annual ground-water sampling.

(51) Camp Dresser & McKee, April 2000, Otsego Dam—Evaluation and phase II investigation report.

This report summarizes the results of both the phase I and phase II investigations at the Otsego Dam and confirms the recommendations for temporary stabilization of the dam prior to its demolition. Camp Dresser & McKee (CDM) was asked to provide recommendations for temporary stabilization of the dam. This inspection was part of CDM's ongoing investigation and design remediation of PCB-contaminated sediments in the Kalamazoo River.

(53) Stratus Consulting, Inc., May 30, 2000, Kalamazoo River environment site, Michigan—Preassessment screen.

This report focuses on the conclusion made by the trustees (the MDEQ, the Attorney General of the State of Michigan, and the Secretary of the Interior as represented by the Regional Director of the U.S. Fish and Wildlife Service, in coordination with the Secretary of Commerce as represented by the National Oceanic and Atmospheric Administration (NOAA)). The trustees concluded that there was, in fact, a reasonable opportunity to make a successful claim for natural-resource damage on the Kalamazoo River environment site. The conclusion is based on a "rapid review of readily available information that focuses on resources for which the Federal or State agency or Indian Tribe may assert trusteeship."

(54) Stratus Consulting, Inc., November 2000, Kalamazoo River environment site—Stage I assessment plan.

This assessment plan follows the Kalamazoo River environment preassessment screen prepared in May 2000. The MDEQ, the Attorney General of the State of Michigan, and the Secretary of the Interior as represented by the Regional Director of the U.S. Fish and Wild-

life Service, in coordination with the Secretary of Commerce as represented by the National Oceanic and Atmospheric Administration (NOAA), collectively assessed the damages from the release of hazardous substances to the natural resources of the Kalamazoo River environment. The purpose of this report is to describe both the approach and the methods in which the Stage I Assessment Plan was developed.

(55) Quantitative Environmental Analysis, LLC., June 2001, Review of Kalamazoo River PCB fate model developed by Limno-Tech, Inc.

The PCB fate model was developed for and applied to the Kalamazoo River by Limno-Tech, Inc. (LTI). The model focused on determining its reliability for use as a management tool in order to evaluate remedial alternatives. The review concentrated on evaluating the primary components of the PCB fate model. In order to fully understand PCB-fate and transport, a preliminary analysis of PCB fate and transport data from the Kalamazoo River is presented in this report, along with its results. The conclusions made about the reliability of the model are based on various lines of evidence found in the review.

REFERENCES DESCRIBING PCB SAFETY

(4) Wilkins & Wheaton, 1986, Program for effective residuals management for the Allied Paper, Inc. solid waste disposal facility for residuals disposal.

This report describes the program for effective residuals management for the Allied Paper, Inc., solid-waste disposal facility, prepared as a requirement for the reissuance of NPDES permit no. MI0000779. The report discusses the handling and disposal of residual solids at the Allied Paper, Inc., solid-waste disposal facility, the physical and chemical characteristics of the materials, and the environmental aspects of the site.

(16) Blasland, Bouck & Lee, Inc., June 1993, Remedial investigation/feasibility study health and safety plan—Kalamazoo River study group.

This publication addresses the health and safety procedures, methods, and requirements for field activities performed at the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. This plan was prepared for the Blasland & Bouck Engineers employees on behalf of the Kalamazoo River study group. It includes the minimum safety requirements regarding Occupational Safety and Health Administration (OSHA) and Michigan Occupational Safety and Health Administration (MIOSHA).

REFERENCES DESCRIBING PCB TESTING AND CLEANUP

(2) Wilkins & Wheaton Testing Laboratory, Inc., 1985, Short term waste characterization study for Allied Paper, Inc., Kalamazoo, Michigan.

This report, prepared by the request of Allied Paper, evaluates any potential effects Allied Paper may have on the water quality of Portage Creek. It provides the analytical testing and background information needed to evaluate seasonal fluctuations on Portage Creek upstream and downstream from Allied Paper. This study involves the sampling and analysis of Allied Paper's effluent discharge into Portage Creek for purgeable halocarbons, 1,2-dichlorobenzene, and β-chloronapthalene over a 4-week period. During this 4-week period, samples were collected on the following dates: September 4, 12, 18, and 25, 1985. A summary of the analytical results are tabulated in the report. The results show that

1,2-dichlorobenzene and β-chloronapthalene were not detected in any of the samples over a 4-week period. None of the purgeable halocarbons were detected consistently over the 4 weeks.

(5) Yeasted, Joseph G., Ph.D., P.E., March 1986, Feasibility study of alternatives—Kalamazoo River PCB project Kalamazoo and Allegan Counties, Michigan: v. 1 and 2.

Volume 1: This study analyzed methods of reducing human exposure to PCBs by reducing the amount of PCBs in fish found in the Kalamazoo River to less than 2.0 mg/kg (ppm). This feasibility study also aims at determining a cost-effective, technically feasible, and environmentally sound alternative to minimize the further release of PCB-contaminated sediments. Collecting and evaluating existing data, PCB-model development, screening of remedial technologies, and evaluating remedial-action alternatives are the type's of work conducted in this study.

Volume 2: This volume contains the appendices to volume I described above.

(6) Yeasted, Joseph G., Ph.D., P.E., July 1986, Feasibility study of alternatives, addendum—Kalamazoo River PCB project, Kalamazoo and Allegan Counties, Michigan.

The March 1986 report **(5)** was released for public review and comment. The addendum provides responses to the comments that were given concerning the March 1986 report "Feasibility study of alternatives for the Kalamazoo River PCB project."

(7) O'Brien & Gere Engineers, Inc., January 1989, Description of containment work details assumed for purposes of preparing preliminary cost estimates.

This report evaluates the work to contain contaminated sediments in the Bryant Pond area of Portage Creek. The report is divided into four chapters, which include potential work activities for each alternative, such as site preparation; sediment dams; access roads; stream-channel separation; capping; and other related tasks. Optional groundwater diversion options and description of other related remedial considerations also are mentioned.

(8) Peerless-Midwest, Inc., November 29, 1989, Aquifer performance analysis—Wells TW1 and TW2.

The purpose of this analysis was for Peerless-Midwest, Inc., to drill two test wells at the Allied Paper, Inc./H.M. Holdings site at 2030 Portage Street in Kalamazoo, Mich., to determine the feasibility of dewatering part of the site to allow the excavation of a channel and determine aquifer characteristics. The reason for doing this is to reroute the course of Portage Creek. A site map, well logs, pumped-well-test data sheets, and graphical analysis plots are included in this report.

(10) GZA-Donohue, June 1990, Evaluating sediment burial rates and PCB partition coefficients.

The main purpose of this documented study was to evaluate historical sediment burial rates and PCB partition coefficients in four of the dams with PCB-contaminated sediments deposited behind them. These include the Lake Allegan, City of Allegan, Otsego City, and Bryant Mill Pond impoundments. By cesium dating of sediment cores, historical rates of sedimentation were determined. The report states that the burial of PCB contaminated sediments through future sedimentation should decrease the concentration of PCBs in the river fish. The data and the results show a wide variation in historical sedimentation rates within an impoundment and suggest that current sedi-

mentation rates in each impoundment may be close to zero.

(11) Eco Logic International Inc., November 14, 1991, Congener specific analysis of polychlorinated biphenyls.

This report introduces a new method of PCB analysis referred to as "PCB fingerprinting", which was developed by Eco Logic. This proposal contains information on the Eco Logic congener specific PCB analysis. This technique would provide accurate measurement of PCB congeners found in industrial mixtures. Congener-specific PCB data may be used in statistical principal component analysis involving pattern-recognition techniques for the identification of specific PCB sources. Included are descriptions of the analytical methodology, quality-assurance/quality-control protocols, pattern-recognition techniques, and risk assessment.

(13) Simpson Plainwell Paper Company, January 7, 1993, Test pit investigation work plan—Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site, 12th Street landfill operable unit.

This plan provides data to characterize the residuals at the 12th Street landfill and further investigates the landfill's electrical conductivity and magnetic abnormalities. The 12th Street landfill covers 6.5 acres in Otsego Township, approximately 0.5 mi northeast of the intersection of Highway M-89 and 12th Street and 1.5 mi northwest of the city of Plainwell. The work includes the excavation of test pits in areas where electrical and magnetic abnormalities were measured during previous investigations and also includes the initial characterization of landfill berms. The purpose of investigating these geophysical abnormalities is to address the possibility that there are drums at the landfill. The investigations as proposed are designed to assess potential sources of releases to ground water and to provide information for evaluating source-control remedial alternatives for this landfill.

(15) Brenton, Robert; Applied Science & Technology, Inc., May 14, 1993, Sediment sampling.

Because the discharge from the Eaton Corporation facility enters the Kalamazoo River southwest of the city of Marshall, the Eaton Corporation retained Applied Science and Technology, Inc. to sample sediment in the Kalamazoo River and test the samples for PCBs. The objective for this program was to determine whether the soft sediments downstream from the Eaton facility contain PCBs. In order to provide an adequate distance to insure complete mixing of the discharge, the sampling sites were located downstream from the discharge beyond the point where the two branches of the river reconnect. Also, a section of the river containing both proposed sampling zones was examined to identify any outfalls that may affect river quality. The results show that all sediment samples had PCB concentrations below the detection limit.

(17) Blasland & Bouck Engineers, P.C., July 1993, Allied Paper, Inc. Operable unit remedial investigation/focused feasibility study workplan.

This investigation, done by the Kalamazoo River Study Group determined the nature and extent of the constituents present in residuals, soil, ground water, and surface water, and also determined the potential for threats to the public health, welfare, and environment. The work plan describes the studies to be done at the Allied Paper, Inc. OU. This report includes the sampling objectives, analyses, sample types, sample locations and frequency, and schedule. Although this study focuses on PCBs, samples of various environmental media plans to be analyzed to determine whether there is an

unacceptable increase in risk posed by the levels of other constituents found.

(18) Camp Dresser & McKee, October 1993, Biota sampling plan for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site.

This biota-sampling program was designed to provide supporting data for the ecological risk assessment to be done in conjunction with the human-health risk assessment for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. The objective of this sampling plan was to collect tissue-concentration data from certain terrestrial and aquatic species to support the development of a site-specific food-web model and human-health risk assessment model. These models would be used to estimate PCB concentrations in water, soil, and sediment samples. This report describes the sampling, analysis, quality-assurance, and reporting procedures that were used by the Michigan Department of Natural Resources (MDNR), Potentially Responsible Parties, and Camp Dresser & McKee. The sampling, analysis, and quality-assurance project plan describes the sampling and tissue preparation procedures that were implemented at the site to provide representative and accurate data used in developing site-specific bioaccumulation factors for PCBs in resident biota.

(21) Blasland, Bouck & Lee, Inc., February 1994, Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site remedial investigation/feasibility study—Results of phase I TBSA soil sampling: technical memorandum 2.

The objective of phase I was to collect soil samples from 11 candidate Terrestrial Biota Sampling Areas (TBSA) for PCB analysis to permit the final selection of 5 TBSAs for biota sampling based on the results of their PCB analyses. Eight individual soil samples were collected and analyzed with a field screening kit for PCB from the 11 preliminary areas. PCB levels ranging from 6.1 mg/kg to 31 mg/kg were detected in TBSA2, TBSA3, TBSA4, TBSA5, TBSA6, TBSA7, TBSA8, TBSA9, and TBSA10 (table 12 of the document). The levels of PCB reported for these preliminary composite samples are not inconsistent with the historical data for these areas.

(22) Blasland, Bouck & Lee, Inc., February 1994, Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site remedial investigation/feasibility study—Results of the floodplain soil investigation: technical memorandum 3, v. 1.

The main purpose of the Kalamazoo River/ Portage Creek flood plain soils investigation was to determine whether previous flooding might have transported sediments containing PCB in significant quantities to the flood-plain. Sampling was done on selected flood-prone areas along the Kalamazoo River and Portage Creek. A total of five sampling transects were established between Portage Creek and the city of Allegan. These transects extend to the approximate limit of the 100-year flood plain. At each transect, samples were collected from five to nine locations within the 100-year flood plain. Although the sampling extends to the 100-year flood-plain elevation, sampling was focused in the areas closer to the Kalamazoo River. When the sampling results were screened against the MDNR 1.0 mg/kg type B criterion pursuant to Act 307, the sampling results for the Kalamazoo River flood-plain transects indicated that flooding events have not transported PCB to flood-plain soils to levels that would present a risk to human health.

(23) Blasland, Bouck & Lee, Inc., March 1994, Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site remedial

investigation/feasibility study—King Highway landfill operable unit, technical memorandum 6, v. 1.

The objective of the King Highway landfill OU investigation was to determine PCB concentrations present in the residuals, native soils, ground water/leachate, and surface water. Another purpose of this investigation was to find potential threats to public health and to the environment caused by the release of these hazardous substances. Potential migration pathways, potential environmental and human exposure risk, screening for the presence of other constituents, collection of data necessary to prepare an endangerment assessment and to evaluate alternatives, and evaluation of the geotechnical properties of the dikes and residuals all are addressed in this technical memorandum. This memorandum includes a presentation of the results and the preliminary findings of the investigation. Field data, analytical data, and the results are also included through the use of tables and figures.

(27) Blasland, Bouck & Lee, Inc., May 1994, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site remedial investigation/feasibility study—Allied Paper, Inc. operable unit results of the air investigation: technical memorandum 4, v. 1.

The main purpose of the PCB air-monitoring investigation for this OU was to locate potential PCB emissions from the atmosphere along the perimeter of the OU when emissions are at their greatest. This OU is located on Portage Creek within the city of Kalamazoo, Mich. and occupies approximately 51 acres between Cork Street and Alcott Street. Hourly air samples were collected every sixth day from June to August 1993. Analytical, field, and meteorological data, as well as a description of the sampling techniques, results, and preliminary findings, can be found in this report.

(28) Blasland, Bouck & Lee, Inc., May 1994, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site remedial investigation/feasibility study—Willow Boulevard/A-site operable unit results of the air investigation: technical memorandum 5, v. 2.

Appendix F (15 Air Rounds) includes results of analyses performed to detect PCB. It is an assessment for the air sampling of the PCB data package for this specific OU. Data review check sheets are used in the review of this package.

(29) Blasland, Bouck & Lee, Inc., May 1994, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site—PRP case study, Kalamazoo Metal Recyclers, Kalamazoo, Michigan.

This report describes the study of PCB data collected in 1989 in an uncovered fluff pile at the Kalamazoo metal recyclers, 1525 King Highway, Kalamazoo, Mich. PCBs were present at a concentration of 55 mg/kg. The fluff pile was stored outside on a large concrete slab, and therefore there was potential for uncontrolled discharges of PCBs to the surrounding ground.

(30) Geraghty & Miller, Inc., May 1994, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site remedial investigation/feasibility study—12th Street landfill operable unit Plainwell, Michigan: technical memorandum 8, v. 1.

A Remedial Investigation (RI) was done at the landfill to determine the nature and extent of any contamination and to evaluate any potential threat to public health, welfare, or environment that could be caused by the release of any hazardous substance. Soil borings were drilled, monitoring wells were installed along the landfill boundary, and ground-water samples were collected for analysis. Soil borings were augered and soil sam-

ples were collected to determine the extent of the residuals. The horizontal hydraulic conductivity of the surficial aquifer was determined through slug tests at several of the monitoring wells. The results of this investigation are in the appendix of their report.

(31) Lockheed Environmental Systems & Technologies Company, May 11, 1994, PCB data validation for samples analyzed by Michigan Department of Natural Resources for the Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site PCB field-screening technology demonstration and evaluation.

The purpose of this report is to validate the MDNR's set of PCB results so that the data can be used with confidence in evaluating the performance of the field-screening methods used. It provides data validation for the PCB analysis done by gas chromatography in river sediment, soil, and landfilled paper-waste samples collected at the Allied Paper Superfund Site. This report validated data generated by the MDNR environmental laboratory, which was part of a demonstration designed to evaluate three rapid field-screening techniques for their use as a PCB analytical site characterization tools.

(32) Weston, Roy F., Inc., June 1994, Kalamazoo River mammal study—Analytical report.

This report includes analyses of tissue samples collected for the Kalamazoo River mammal study in Kalamazoo, Mich. Also included in this report is a data review and preparation of an analytical report, which contains a summary of the analytical methods and results.

(33) Blasland, Bouck & Lee, Inc., February 1995, Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site remedial investigation/feasibility study—Willow Boulevard/A-site operable unit, technical memorandum 9, v. 1, 3, and 4.

Volume 1: The Willow Boulevard/A-Site OU southwest of the intersection of business I-94 and Highway M-96 in Kalamazoo Township. This site was acquired by the Georgia-Pacific Corporation from the Kalamazoo Paper Company in 1967. It received dewatered papermaking residuals excavated from the King Highway dewatering lagoons from the mid-1960s until the disposal operations stopped in 1975. The residuals contained clay, paper fibers, and PCBs. In 1990, the MDNR submitted a closure plan for the site. The main objectives for the investigation of this site were to determine the amount of PCBs present in the residuals, soils, sediments, ground water, and surface water and to determine the potential for threats to public health and the environment. The investigation included the sampling and analysis of the media found in borings, cores, monitoring wells, and piezometers. This investigation also includes a residual characterization, a hydrologic investigation, soil and sediment investigation, air investigation, surface-water investigation, and a wetlands assessment. The results are summarized on page 46 of the report.

Volume 3: Appendix D is an assessment of the PCB data package for this specific OU. Data-review check sheets used in the review of the package and corrected sample results for PCB analyses are included in this assessment. In this volume of memorandum 9, an analysis and assessment of volatile and semivolatile organic compounds is presented. Inorganic analyses were also done and are presented along with a data assessment.

Volume 4: Appendix D involves volatile, semivolatile, pesticide/PCB, and inorganic analyses. Same as volume 3 analyses but for different samples.

(37) Geraghty & Miller, Inc., March 1996, Remedial investigation addendum 1—12th Street landfill operable unit Plainwell, Michigan, Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site.

This report describes the methods and findings of ground-water sampling during the first RI at the 12th Street landfill OU of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. During this first RI in September 1993, ground-water samples collected from monitoring wells and leachate samples collected from leachate head wells were analyzed for PCBs at the Contract Required Quantitation Limit (CRQL) of 0.001 mg/L, which was specified in the approved work plan. However, when reviewing this data, MDEQ expressed concern that PCBs may be present in ground water and leachate at concentrations between 0.001 and 0.002 mg/L. In order to evaluate this concern, the MDEQ required that another round of ground-water and leachate samples be collected and analyzed for PCBs at a Total Maximum Daily Load (TMDL) of 0.0002 mg/L. PCBs were not detected in unfiltered samples of ground water. PCBs quantified as Aroclor 1242 were detected in one of three unfiltered samples of three unfiltered samples of leachate at a concentration of 0.0014 mg/L.

(38) Simpson Plainwell Paper Company, December 1996, Remedial investigation report—12th Street landfill operable unit Plainwell, Michigan, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site.

This report describes the Remedial Investigation (RI) done on behalf of the Simpson Plainwell Paper Company at the 12th Street Landfill near the City of Plainwell, Mich. The purpose of this report is to summarize the investigative activities and their findings, both in the technical memoranda and RI addendum report. The sampling methods and results of the samples collected from the Kalamazoo River next to the landfill are presented and then used to evaluate the fate and transport processes for the identified hazardous chemicals.

(41) Blasland, Bouck & Lee, Inc., August 1997, Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site remedial investigation/feasibility study: technical memorandum 7, v. 1.

The Allied Paper, Inc. OU remedial investigation aims at assessing the potential threats to public health or to the environment caused by the release of PCBs. This investigation is to primarily assess the nature of PCBs in residuals, native soil, ground water, and surface water in the area. Presentation of the results and the preliminary findings of the OU investigation can be found in this technical memorandum. Also included in this report are field and analytical data and also historical PCB data for soils and sediment in the former Bryant Mill Pond area.

(42) Camp Dresser & McKee, October 1997, Allied Paper Inc./Portage/Creek Kalamazoo River Superfund Site—Final technical memorandum, mink/muskrat biota sampling.

Much of the historical data show the presence of PCBs in various media in the study area. However, these data were not sufficient to further characterize the bioaccumulation of PCBs in the organisms inhabitating the river ecosystem. Therefore, further investigations were needed. An ecological-assessment program was developed by the MDEQ in which a biota-sampling plan was made. The main purpose of this plan was to collect and analyze tissue from the muskrat and mink to determine the PCB concentrations in whole body, liver, and kidney to later be used to support the

development of a site-specific food-web model used in the ecological-risk assessment (ERA). The data collected were also to be used in the ERA to determine the potential risks to the Kalamazoo ecosystem.

(45) Blasland, Bouck & Lee, Inc., July 1998, Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site—King Highway landfill operable unit closure, Groundwater monitoring plan.

This plan describes the methods and procedures for monitoring ground water at the King Highway landfill OU. This was to be done throughout the post-remediation period, and the results were to be used as an indicator of the effectiveness of the plan. A plan had to be developed because of the results of the remedial investigation/focused feasibility study. Therefore, a remedial action for this OU was selected, which included stabilizing the dike at the perimeter of the OU, consolidating residuals into Cell 4, backfilling the remaining volume in Cell 4 using imported fill material, and installing a cover system on Cells 1, 2, 3, and 4 to minimize infiltration. The results of this sampling show that PCBs were not present in ground water at this OU, but they were detected in residuals, native soils, and leachate.

(50) Blasland, Bouck & Lee, Inc., October 1999, Addendum to technical memorandum 7: v. 1.

This report describes the results of supplemental ground-water sampling in 1995, 1997, and 1998. The sampling was completed as part of the remedial investigation of the Allied Paper, Inc. This report is an addendum to the technical memorandum 7 report dated August 1997, which describes the findings of the first round of ground-water sampling done in 1993. These supplemental sampling events focused on evaluating ground water for the presence of PCBs to determine whether the PCBs were artifacts of well construction or whether they represent the ground-water conditions. The results of this investigation showed the presence of PCBs in the ground water and also found that its flow was toward Portage Creek.

(52) Blasland, Bouck & Lee, Inc., May 2000, Biota and surface water investigations and wetlands assessment: technical memorandum 11, v. 1.

This report includes the results of the surface-water and biota sampling investigations and also includes an assessment of the wetlands present in the Allied Paper, Inc., OU. It also discusses the former Bryant Mill Pond removal action that took place in May 1999. The tests were mainly for PCB detection.

(56) Rheaume and others, 2002, Sediment characteristics and configuration within three dam impoundments on the Kalamazoo River, Michigan, 2000: U.S. Geological Survey Water-Resources Investigation Report 02-4098.

The removal of the remnants of three hydroelectric dams on the Kalamazoo River near Plainwell, Otsego, and Allegan, Mich., has been proposed. The USEPA has designated this reach of the Kalamazoo River as a Federal Superfund site because of the historical discharge of papermill waste containing polychlorinated biphenyls. If the dam foundations are removed, the PCB contaminated sediment could move, therefore, it was nessecary to estimate the configuration of the sediment before work begins. This report describes the data collected by the USGS, in cooperation with the MDEQ, regarding the volume, character, and size distribution of instream sediments in three of the impoundments on the Kalamazoo River. This data were used utilized to determine the configuration of the present-day and pre-dam stream channels.

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