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UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF MICHIGAN
SOUTHERN DIVISION

GEORGIA-PACIFIC CONSUMER PRODUCTS, LP, FORT JAMES CORPORATION, and GEORGIA-PACIFIC, LLC, Plaintiffs, v. NCR CORPORATION, INTERNATIONAL PAPER COMPANY, and WEYERHAEUSER COMPANY, Defendants.	Civil Action No. 1:11-cv-483 Judge Robert J. Jonker

PLAINTIFFS' AMENDED NOTICE OF DEPOSITION OF USEPA, REGION 5

To: COUNSEL FOR ALL PARTIES

PLEASE TAKE NOTICE that Plaintiffs will take the oral deposition of a designee of the **United States Environmental Protection Agency, Region 5** on **November 14, 2014, beginning at 9:00 a.m.**, at the **Holiday Inn Express, 2276 Pipestone Road, Benton Harbor, Michigan, 49022**, before a duly authorized officer certified to administer oaths and take depositions.

The deposition will be recorded by stenographic and/or videographic means and will be taken for the purpose of discovery, for use as evidence at any hearing or trial, and for any other purposes authorized by law. You are invited to attend and cross-examine.

2461

Dated: November 7, 2014

GEORGIA-PACIFIC CONSUMER PRODUCTS, LP., FORT JAMES CORPORATION, and GEORGIA-PACIFIC LLC

By: /s/ George P. Sibley, III

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CERTIFICATE OF SERVICE

I hereby certify that on November 7, 2014, I caused a copy of the foregoing to be sent to counsel for each party via e-mail.

By: /s/ George P. Sibley, III

UNITED STATES DISTRICT COURT

for the

Western District of Michigan

Georgia-Pacific Consumer Products, LP, et al. *Plaintiff* v. NCR Corporation, et al. *Defendant*	))))))	Civil Action No. 1:11-cv-483

AMENDED SUBPOENA TO TESTIFY AT A DEPOSITION IN A CIVIL ACTION

To: United States Enviomment Protection Agency, Region 5

(Name of person to whom this subpoena is directed)

☑ *Testimony:* **YOU ARE COMMANDED** to appear at the time, date, and place set forth below to testify at a deposition to be taken in this civil action. If you are an organization, you must designate one or more officers, directors, or managing agents, or designate other persons who consent to testify on your behalf about the following matters, or those set forth in an attachment:
Please see the attached Schedule A for a list of deposition topics.

Place: Holiday Inn Express 2276 Pipestone Road Benton Harbor, Michigan 49022	Date and Time: 11/14/2014 9:00 am

The deposition will be recorded by this method: Stenography and Video

☐ *Production:* You, or your representatives, must also bring with you to the deposition the following documents, electronically stored information, or objects, and must permit inspection, copying, testing, or sampling of the material:

The following provisions of Fed. R. Civ. P. 45 are attached – Rule 45(c), relating to the place of compliance; Rule 45(d), relating to your protection as a person subject to a subpoena; and Rule 45(e) and (g), relating to your duty to respond to this subpoena and the potential consequences of not doing so.

Date: 11/7/2014

CLERK OF COURT

Signature of Clerk or Deputy Clerk

OR

Attorney's signature

The name, address, e-mail address, and telephone number of the attorney representing *(name of party)* Georgia-Pacific, who issues or requests this subpoena, are:
George P. Sibley, III, 951 E. Bryd Street, Richmond, VA 23219, gsibley@hunton.com, 804-788-8200

Notice to the person who issues or requests this subpoena

If this subpoena commands the production of documents, electronically stored information, or tangible things before trial, a notice and a copy of the subpoena must be served on each party in this case before it is served on the person to whom it is directed. Fed. R. Civ. P. 45(a)(4).

Civil Action No. 1:11-cv-483

PROOF OF SERVICE

(This section should not be filed with the court unless required by Fed. R. Civ. P. 45.)

I received this subpoena for *(name of individual and title, if any)* _____

on *(date)* _____ .

☐ I served the subpoena by delivering a copy to the named individual as follows: _____

_____

_____ on *(date)* _____ ; or

☐ I returned the subpoena unexecuted because: _____

_____ .

Unless the subpoena was issued on behalf of the United States, or one of its officers or agents, I have also tendered to the witness the fees for one day's attendance, and the mileage allowed by law, in the amount of $ _____ .

My fees are $ _____ for travel and $ _____ for services, for a total of $ 0.00 .

I declare under penalty of perjury that this information is true.

Date: _____

_____
Server's signature

_____
Printed name and title

_____
Server's address

Additional information regarding attempted service, etc.:

Federal Rule of Civil Procedure 45 (c), (d), (e), and (g) (Effective 12/1/13)

(c) Place of Compliance.

(1) *For a Trial, Hearing, or Deposition.* A subpoena may command a person to attend a trial, hearing, or deposition only as follows:
(A) within 100 miles of where the person resides, is employed, or regularly transacts business in person; or
(B) within the state where the person resides, is employed, or regularly transacts business in person, if the person
(i) is a party or a party's officer; or
(ii) is commanded to attend a trial and would not incur substantial expense.

(2) *For Other Discovery.* A subpoena may command:
(A) production of documents, electronically stored information, or tangible things at a place within 100 miles of where the person resides, is employed, or regularly transacts business in person; and
(B) inspection of premises at the premises to be inspected.

(d) Protecting a Person Subject to a Subpoena; Enforcement.

(1) *Avoiding Undue Burden or Expense; Sanctions.* A party or attorney responsible for issuing and serving a subpoena must take reasonable steps to avoid imposing undue burden or expense on a person subject to the subpoena. The court for the district where compliance is required must enforce this duty and impose an appropriate sanction—which may include lost earnings and reasonable attorney's fees—on a party or attorney who fails to comply.

(2) *Command to Produce Materials or Permit Inspection.*
(A) *Appearance Not Required.* A person commanded to produce documents, electronically stored information, or tangible things, or to permit the inspection of premises, need not appear in person at the place of production or inspection unless also commanded to appear for a deposition, hearing, or trial.
(B) *Objections.* A person commanded to produce documents or tangible things or to permit inspection may serve on the party or attorney designated in the subpoena a written objection to inspecting, copying, testing, or sampling any or all of the materials or to inspecting the premises—or to producing electronically stored information in the form or forms requested. The objection must be served before the earlier of the time specified for compliance or 14 days after the subpoena is served. If an objection is made, the following rules apply:
(i) At any time, on notice to the commanded person, the serving party may move the court for the district where compliance is required for an order compelling production or inspection.
(ii) These acts may be required only as directed in the order, and the order must protect a person who is neither a party nor a party's officer from significant expense resulting from compliance.

(3) *Quashing or Modifying a Subpoena.*

(A) *When Required.* On timely motion, the court for the district where compliance is required must quash or modify a subpoena that:

(i) fails to allow a reasonable time to comply;
(ii) requires a person to comply beyond the geographical limits specified in Rule 45(c);
(iii) requires disclosure of privileged or other protected matter, if no exception or waiver applies; or
(iv) subjects a person to undue burden.
(B) *When Permitted.* To protect a person subject to or affected by a subpoena, the court for the district where compliance is required may, on motion, quash or modify the subpoena if it requires:

(i) disclosing a trade secret or other confidential research, development, or commercial information; or
(ii) disclosing an unretained expert's opinion or information that does not describe specific occurrences in dispute and results from the expert's study that was not requested by a party.
(C) *Specifying Conditions as an Alternative.* In the circumstances described in Rule 45(d)(3)(B), the court may, instead of quashing or modifying a subpoena, order appearance or production under specified conditions if the serving party:
(i) shows a substantial need for the testimony or material that cannot be otherwise met without undue hardship; and
(ii) ensures that the subpoenaed person will be reasonably compensated.

(e) Duties in Responding to a Subpoena.

(1) *Producing Documents or Electronically Stored Information.* These procedures apply to producing documents or electronically stored information:
(A) *Documents.* A person responding to a subpoena to produce documents must produce them as they are kept in the ordinary course of business or must organize and label them to correspond to the categories in the demand.
(B) *Form for Producing Electronically Stored Information Not Specified.* If a subpoena does not specify a form for producing electronically stored information, the person responding must produce it in a form or forms in which it is ordinarily maintained or in a reasonably usable form or forms.
(C) *Electronically Stored Information Produced in Only One Form.* The person responding need not produce the same electronically stored information in more than one form.
(D) *Inaccessible Electronically Stored Information.* The person responding need not provide discovery of electronically stored information from sources that the person identifies as not reasonably accessible because of undue burden or cost. On motion to compel discovery or for a protective order, the person responding must show that the information is not reasonably accessible because of undue burden or cost. If that showing is made, the court may nonetheless order discovery from such sources if the requesting party shows good cause, considering the limitations of Rule 26(b)(2)(C). The court may specify conditions for the discovery.

(2) *Claiming Privilege or Protection.*
(A) *Information Withheld.* A person withholding subpoenaed information under a claim that it is privileged or subject to protection as trial-preparation material must:
(i) expressly make the claim; and
(ii) describe the nature of the withheld documents, communications, or tangible things in a manner that, without revealing information itself privileged or protected, will enable the parties to assess the claim.
(B) *Information Produced.* If information produced in response to a subpoena is subject to a claim of privilege or of protection as trial-preparation material, the person making the claim may notify any party that received the information of the claim and the basis for it. After being notified, a party must promptly return, sequester, or destroy the specified information and any copies it has; must not use or disclose the information until the claim is resolved; must take reasonable steps to retrieve the information if the party disclosed it before being notified; and may promptly present the information under seal to the court for the district where compliance is required for a determination of the claim. The person who produced the information must preserve the information until the claim is resolved.

(g) Contempt.
The court for the district where compliance is required—and also, after a motion is transferred, the issuing court—may hold in contempt a person who, having been served, fails without adequate excuse to obey the subpoena or an order related to it.

For access to subpoena materials, see Fed. R. Civ. P. 45(a) Committee Note (2013).

Schedule A

1. The geographic extent of the Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site ("the Site").

2. The identity of parties that EPA has identified as potentially responsible parties ("PRPs") and has asked to participate in the cleanup of the Site.

3. The identity of parties that have participated in cleanup efforts at the Site to date.

4. The identity of parties that have refused to participate in cleanup efforts at the Site.

5. A general description of work performed at the Site to date.

6. EPA's reasons for concluding that the removal actions at the Plainwell Impoundment and Plainwell Dam No. 2 Impoundment that were directed by the 2007 Administrative Settlement Agreement and Order on Consent ("AOC") between EPA, Millennium Holdings, LLC and Georgia-Pacific, LLC and the 2009 AOC between EPA and Georgia-Pacific, LLC were time-critical.

7. EPA's present expectation regarding the need for future removal or remedial actions at the Site.

8. EPA's process for reviewing and approving deliverables submitted by PRPs pursuant to AOCs.

9. EPA's reasons for assuming responsibility as lead agency at the Site.

10. The source(s) of PCBs at the Site.

11. The PCBs that predominate at the Site and that necessitate past and future cleanup activities.

12. Estimates of total PCBs in the River, both before the clean-up and currently, and their locations.

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ENVIRONMENTAL PROTECTION AGENCY

4[illegible]R Part 300

[FRL-3566-6]

National Priorities List for Uncontrolled Hazardous Waste Sites; Proposed Update No. 8

AGENCY: Environmental Protection Agency.

ACTION: Proposed rule.

SUMMARY: The Environmental Protection Agency ("EPA") is proposing the eighth update to the National Priorities List ("NPL"). This update proposes to add 10 new sites to the NPL. The NPL is Appendix B to the National Oil and Hazardous Substances Contingency Plan ("NCP"), which was promulgated on July 16, 1982 pursuant to section 105 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 ("CERCLA") (amended by the Superfund Amendments and Reauthorization Act of 1986 ("SARA")) and Executive Order 12580 (52 FR 2923, January 29, 1987). CERCLA requires that the NCP include a list of national priorities among the known releases or threatened releases of hazardous [illegible]ances, pollutants, or contaminants [illegible]ghout the United States, and that the list be revised at least annually. The NPL, initially promulgated on September 8, 1983 (48 FR 40658), constitutes this list.

These sites are being proposed because they meet the listing requirements of the NPL. This notice provides the public with an opportunity to comment on placing these sites on the NPL.

This proposed rule brings the number of proposed NPL sites to 283, 22 of them in the Federal section; 890 are on the final NPL, 41 of them in the Federal section. Final and proposed sites now total 1,173.

DATES: Comments must be submitted on or before July 5, 1989.

ADDRESSES: Comments may be mailed to Larry Reed, Acting Director, Hazardous Site Evaluation Division (Attn: NPL Staff), Office of Emergency and Remedial Response (OS-230), U.S. Environmental Protection Agency, 401 M Street SW., Washington DC 20460. Addresses for the Headquarters and Regional dockets are provided below. For further details on what these [illegible]ckets contain, see the Public [illegible]ment Section, Section I, of the [illegible]PLEMENTARY INFORMATION portion of this preamble.

Tina Maragousis, Headquarters, U.S. EPA CERCLA Docket Office, Waterside Mall, 401 M Street, SW., Washington, DC 20460, 202/382-3046

Evo Cunha, Region 1, U.S. EPA Waste Management Records Center, HES-CAN 6, J.F. Kennedy Federal Building, Boston, MA 02203, 617/565-3300

U.S. EPA, Region 2, Document Control Center, Superfund Docket, 26 Federal Plaza, 7th Floor, Room 740, New York, NY 10278, Latchmin Serrano, 212/264-5540, Ophelia Brown, 212/264-1154

Diane McCreary, Region 3, U.S. EPA Library, 5th Floor, 841 Chestnut Building, 9th & Chestnut Streets, Philadelphia, PA 19107, 215/597-0580

Gayle Alston, Region 4, U.S. EPA Library, Room G-6, 345 Courtland Street NE., Atlanta, GA 30365, 404/347-4216

Cathy Freeman, Region 5, U.S. EPA, 5 HS-12, 230 South Dearborn Street, Chicago, IL 60604, 312/886-6214

Deborah Vaughn-Wright, Region 6, U.S. EPA, 1445 Ross Avenue, Mail Code 6H-MA, Dallas, TX 75202-2733, 214/655-6740

Brenda Ward, Region 7, U.S. EPA Library, 726 Minnesota Avenue, Kansas City, KS 66101, 913/236-2828

Dolores Eddy, Region 8, U.S. EPA Library, 999 18th Street, Suite 500, Denver, CO 80202-2405, 303/293-1444

Linda Sunnen, Region 9, U.S. EPA Library, 6th Floor, 215 Fremont Street, San Francisco, CA 94105, 415/974-8082

David Bennett, Region 10, U.S. EPA, 9th Floor, 1200 6th Avenue, Mail Stop HW-093, Seattle, WA 98101, 206/442-2103

FOR FURTHER INFORMATION CONTACT: Martha Otto, Hazardous Site Evaluation Division, Office of Emergency and Remedial Response (OS-230), U.S. Environmental Protection Agency, 401 M Street SW., Washington, DC, 20460, or the Superfund Hotline, Phone (800) 424-9346 (382-3000 in the Washington, DC metropolitan area).

SUPPLEMENTARY INFORMATION:

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I. Introduction
II. Purpose and Implementation of the NPL
III. NPL Update Process
IV. Statutory Requirements and Listing Policies
V. Contents of Proposed NPL Update #8
VI. Regulatory Impact Analysis
VII. Regulatory Flexibility Act Analysis

I. Introduction

Background

In 1980, Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. 9601-9657 ("CERCLA" or the "Act") in response to the dangers of uncontrolled or abandoned hazardous waste sites. CERCLA was amended in 1986 by the Superfund Amendments and Reauthorization Act ("SARA"), Public Law No. 99-499, stat. 1613 *et. seq.* To implement CERCLA, the Environmental Protection Agency ("EPA" or "the Agency") promulgated the revised National Oil and Hazardous Substances Contingency Plan ("NCP"), 40 CFR Part 300, on July 16, 1982 (47 FR 31180), pursuant to CERCLA section 105 and Executive Order 12316 (46 FR 42237, August 20, 1981). The NCP, further revised by EPA on September 16, 1985 (50 FR 37624) and November 20, 1985 (50 FR 47912), sets forth guidelines and procedures needed to respond under CERCLA to releases and threatened releases of hazardous substances, pollutants, or contaminants. On December 21, 1988 (53 FR 51394), EPA proposed revisions to the NCP in response to SARA.

Section 105(a)(8)(A) of CERCLA, as amended by SARA, requires that the NCP include criteria for determining priorities among releases or threatened releases throughout the United States for the purpose of taking remedial action and, to the extent practicable, take into account the potential urgency of such action for the purpose of taking removal action. Removal action involves cleanup or other actions that are taken in response to releases or threats of releases on a short-term or temporary basis (CERCLA section 101(23)). Remedial action tends to be long-term in nature and involves response actions that are consistent with a permanent remedy for a release (CERCLA section 101(24)). Criteria for determining priorities for possible remedial actions financed by the Trust Fund established under CERCLA are included in the Hazard Ranking System ("HRS"), which EPA promulgated as Appendix A of the NCP (47 FR 31219, July 16, 1982). On December 23, 1988 (53 FR 51962), EPA proposed revisions to the HRS in response to SARA. EPA intends to issue the revised HRS as soon as possible. However, until the proposed revisions have been subject to public comment and put into effect, EPA will continue to propose and promulgate sites using the current HRS, in accordance with CERCLA section 105(c)(1) and Congressional intent, as explained on March 31, 1989 (54 FR 13296).

Section 105(a)(8)(B) of CERCLA, as amended by SARA, requires that the statutory criteria provided by the HRS be used to prepare a list of national priorities among the known releases or threatened releases of hazardous

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substances, pollutants, or contaminants throughout the United States. The list, which is Appendix B of the NCP, is the National Priorities List ("NPL"). Section 105(a)(8)(B) also requires that the NPL be revised at least annually. A site can undergo CERCLA-financed remedial action only after it is placed on the NPL, as provided in the NCP at 40 CFR 300.66(c)(2) and 300.68(a).

An original NPL of 406 sites was promulgated on September 8, 1983 (48 FR 40658). The NPL has been expanded since then, most recently on March 31, 1989 (54 FR 13296). The Agency also has published a number of proposed rulemakings to add sites to the NPL, most recently Update #7 on June 24, 1988 (53 FR 23988).

EPA may delete sites from the NPL where no further response is appropriate, as explained in the NCP at 40 CFR 300.66(c)(7). To date, the Agency has deleted 26 sites from the final NPL.

This notice proposes to add 10 sites to the NPL. Adding these 10 sites to the 273 sites previously proposed brings the total number of proposed sites to 283. The final NPL contains 890 sites, for a total of 1,173 final and proposed sites.

EPA is proposing to include on the NPL sites at which there are or have been releases or threatened releases of hazardous substances, pollutants, or contaminants. The discussion below refer to "releases or threatened releases" simply as "releases," "facilities," or "sites."

Public Comment Period

This Federal Register notice opens the formal 60-day comment period for NPL Update #8. Comments may be mailed to Larry Reed, Acting Director, Hazardous Site Evaluation Division (Attn: NPL staff), Office of Emergency and Remedial Response (OS-230), U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC 20460.

The Headquarters and Regional public dockets for the NPL (see ADDRESSES portion of this notice) contain documents relating to the scoring of these proposed sites. The dockets are available for viewing "by appointment only" after the appearance of this notice. The hours of operation for the Headquarters docket are from 9:00 a.m. to 4:00 p.m., Monday through Friday excluding Federal holidays. Please contact individual Regional dockets for hours.

The Headquarters docket for NPL Update #8 contains HRS score sheets for each proposed site, a Documentation Record for each site describing the information used to compute the score, a list of documents referenced in the Documentation Record, and pertinent information for any site affected by statutory requirements and listing policies.

Each Regional docket includes all information available in the Headquarters docket for sites in that Region, as well as the actual reference documents, which contain the data EPA relied upon in calculating or evaluating the HRS scores for sites in that Region. These reference documents are available only in the Regional dockets. They may be viewed "by appointment only" in the appropriate Regional Docket or Superfund Branch office. Requests for copies may be directed to the appropriate Regional docket or Superfund Branch.

An informal written request, rather than a formal request, should be the ordinary procedure for obtaining copies of any of these documents.

EPA considers all comments received during the formal comment period. During the comment period, comments are available to the public only in the Headquarters docket. A complete set of comments pertaining to sites in a particular EPA Region will be available for viewing in the Regional docket approximately one week after the formal comment period closes. Comments received after the comment period closes will be available in the Headquarters docket and in the appropriate Regional Office docket on an "as received" basis. An informal written request, rather than a formal request, should be the ordinary procedure for obtaining copies of any comments. After considering the relevant comments received during the comment period, EPA will add to the NPL all proposed sites that meet EPA's requirements. In past NPL rulemakings, EPA has considered, to the extent practicable, comments received after the close of the comment period. EPA will attempt to do so in this rulemaking as well.

Early Comments

In certain instances, interested parties have written to EPA concerning sites that were not at that time proposed to the NPL. If those sites are later proposed to the NPL, parties should review their earlier concerns and, if they still consider them appropriate, resubmit those concerns for consideration during the formal comment period. Site-specific correspondence received prior to formal proposal generally will not be included in the docket.

Comments Lacking Specificity

EPA anticipates that some comments will consist of or include additional studies or supporting documentation, e.g., hydrogeology reports, lab data, and previous site studies. Where commenters do not indicate what specific scoring issues the supporting documentation addresses, or what they want EPA to evaluate in the supporting documentation, EPA can only attempt to respond to such documents as best it can. Any commenter submitting additional documentation to EPA should indicate what specific points in that documentation EPA is to consider. As the U.S. Court of Appeals for the District of Columbia Circuit noted in *Northside Sanitary Landfill* v. *Thomas & EPA*, 849 F. 2d 1516, 1520 (D.C. Cir. 1988) cert. pending No. 88-1035, during notice-and-comment rulemaking a commenter must explain with some specificity how any documents submitted are relevant to issues in the rulemaking.

Availability of Information

EPA has published a statement describing what background information (resulting from the initial investigation of potential CERCLA sites) the Agency discloses in response to Freedom of Information Act requests (52 FR 5578, February 25, 1987).

II. Purpose and Implementation of the NPL

Purpose

The primary purpose of the NPL is stated in the legislative history of CERCLA (Report of the Committee on Environment and Public Works, Senate Report No. 96-848, 96th Cong., 2d Sess. 60 (1980)):

> The priority lists serves primarily informational purposes, identifying for the States and the public those facilities and sites or other releases which appear to warrant remedial actions. Inclusion of a facility or site on the list does not in itself reflect a judgment of the activities of its owner or operator, it does not require those persons to undertake any action, nor does it assign liability to any person. Subsequent government action in the form of remedial actions or enforcement actions will be necessary in order to do so, and these actions will be attended by all appropriate procedural safeguards.

The purpose of the NPL, therefore, is primarily to serve as an informational and management tool. The initial identification of a site for the NPL is intended primarily to guide EPA in determining which sites warrant further investigation to assess the nature and extent of the public health and environmental risks associated with the site and to determine what CERCLA-financed remedial action(s), if any, may be appropriate. The NPL also serves to notify the public of sites EPA believes warrant further investigation.

Federal facility sites are eligible for the NPL pursuant to the NCP at 40 CFR 300.66(c)(2). However, section 111(e)(3) of CERCLA, as amended by SARA, limits the expenditure of CERCLA monies at federally-owned facilities. Federal facility sites are also subject to the requirements of CERCLA section 120, added by SARA.

Implementation

A site can undergo remedial action financed by the Trust Fund only after it is placed on the final NPL as outlined in the NCP at 40 CFR 300.66(c)(2) and 300.68(a). However, EPA may take enforcement actions under CERCLA or other applicable statutes against responsible parties regardless of whether the site is on the NPL, although, as a practical matter, the focus of EPA's enforcement actions has been and will continue to be on NPL sites. Similarly, in the case of removal actions, EPA has the authority to act at any site, whether listed or not, that meets the criteria of the NCP at 40 CFR 300.65–67.

EPA's policy is to pursue cleanup of NPL sites using the appropriate response and/or enforcement actions available to the Agency, including authorities other than CERCLA. Listing a site will serve as notice to any potentially responsible party that the Agency may initiate CERCLA-financed remedial action. The Agency will decide on a site-by-site basis whether to take enforcement or other action under CERCLA or other authorities, proceed directly with CERCLA-financed response actions and seek to recover response costs after cleanup, or do both. To the extent feasible, once sites are on the NPL, EPA will determine high-priority candidates for Superfund-financed response action and/or enforcement action through both State and Federal initiatives. These determinations will take into account which approach is more likely to most expeditiously accomplish cleanup of the site while using CERCLA's limited resources as efficiently as possible.

Remedial response actions will not necessarily be funded in the same order as a site's ranking on the NPL—that is, its HRS score. The information collected to develop HRS scores is not sufficient in itself to determine either the extent of contamination or the appropriate response for a particular site. EPA relies on further, more detailed studies in the remedial investigation/feasibility study (RI/FS) to address these concerns.

The RI/FS determines the type and extent of contamination. It also takes into account the amount of contaminants in the environment, the risk to affected populations and environment, the cost to correct problems at the site, and the response actions that have been taken by potentially responsible parties or others. Decisions on the type and extent of action to be taken at these sites are made in accordance with the criteria contained in Subpart F of the NCP. After conducting these additional studies, EPA may conclude that it is not desirable to initiate a CERCLA remedial action at some sites on the NPL because of more pressing needs at other sites, or because a private party cleanup is already underway pursuant to an enforcement action. Given the limited resources available in the Trust Fund, the Agency must carefully balance the relative needs for response at the numerous sites it has studied. It is also possible that EPA will conclude after further analysis that the site does not warrant remedial action.

RI/FS at Proposed Sites. An RI/FS can be performed at proposed sites (or even non-NPL sites) pursuant to the Agency's removal authority under CERCLA, as outlined in the NCP at 40 CFR 300.68(a)(1). (Section 101(23) of CERCLA defines "remove" or "removal" to include "such actions as may be necessary to monitor, assess and evaluate the release or threat of release * * *." The definition of "removal" also includes "action taken under section 104(b) of this Act * * *," which authorizes the Agency to perform studies, investigations, and other information-gathering activities.)

Although an RI/FS is generally conducted at a site after the site has been placed on the NPL, in a number of circumstances the Agency elects to conduct an RI/FS at a proposed NPL site in preparation for a possible CERCLA-financed remedial action, such as when the Agency believes that a delay may create unnecessary risks to human health or the environment. In addition, the Agency may conduct an RI/FS to assist in determining whether to conduct a removal or enforcement action at a site.

Facility (Site) Boundaries. A "facility" is defined under CERCLA section 101(9) and the NCP at 40 CFR 300.6 as "(A) any building, structure, * * * well, pit, pond, * * * or (B) any site or area where a hazardous substance has been deposited, stored, disposed of, or placed, or otherwise come to be located * * *." (The term "site" is frequently used interchangeably with facility.) The "come to be located" language implements the broad remedial purposes of CERCLA, giving EPA authority to clean up contamination when it has spread from the original source. In *U.S. v. Bliss*, 667 F. Supp. 1298, 1305 (E.D. Mo. 1987), the courts have affirmed this interpretation:

> As the Special Master noted succinctly in *United States v. Conservation Chemical Co.*, 619 F. Supp. [162,] at 185 [(W.D.Mo. 1985)], "simply put, the term 'facility' includes any place where hazardous substances come to be located."
>
> Thus, to show that an area is a "facility", the plaintiff need only show that a hazardous substance has been placed there or has "otherwise come to be located" there.

The extent of the contamination, and thus the "facility", is first described when a release or threatened release is scored using the HRS. However, HRS scoring and the subsequent listing of a release merely represent the initial determination that a certain area may need to be addressed under CERCLA. Accordingly, EPA contemplates that the preliminary description of facility boundaries at the time of scoring will need to be refined and improved as more information is developed as to where the contamination has come to be located; this refining step generally comes during the RI/FS stage. As the NCP provides at 40 CFR 300.68(d):

> An RI/FS shall * * * determine the nature and extent of the threat presented by the release and * * * evaluate proposed remedies. This includes * * * the gathering of sufficient information to determine the necessity for and proposed extent of remedial action.

The preliminary description of a facility when it is listed does not preclude the Agency, during the RI/FS, from following the contamination as far as it goes, and then considering the facility, for response purposes, as the entire area where hazardous substances have come to be located, even if that area extends beyond the boundary for which the site was named.

III. NPL Update Process

There are three mechanisms for placing sites on the NPL. The principal mechanism is the application of the HRS. The HRS serves as a screening device to evaluate the relative potential of uncontrolled hazardous substances to cause human health or safety problems, or ecological or environmental damage. The HRS score is calculated by estimating risks presented in three potential "pathways" of human or environmental exposure: ground water, surface water, and air. Within each pathway of exposure, the HRS considers three categories of factors "that are designed to encompass most aspects of the likelihood of exposure to a hazardous substance through a release and the magnitude or degree of harm from such exposure": (1) Factors that

indicate the presence or likelihood of a release to the environment; (2) factors that indicate the nature and quantity of substances presenting the potential threat; and (3) factors that indicate the human or environmental "targets" potentially at risk from the site. Factors within each of these three categories are assigned a numerical value according to a set scale. Once numerical values are computed for each factor, the HRS uses mathematical formulas that reflect the relative importance and interrelationships of the various factors to arrive at a final site score on a scale of 0 to 100. The resultant HRS score represents an estimate of the relative "probability and magnitude of harm to the human population or sensitive environment from exposure to hazardous substances as a result of the contamination of ground water, surface water, or air (47 FR 31180, July 16, 1982). Those sites that score 28.50 or greater on the HRS are eligible for the NPL.

Under the second mechanism for adding sites to the NPL, each State may designate a single site as its top priority, regardless of the HRS score. This mechanism is provided by section 105(a)(8)(B) of CERCLA, as amended by SARA, which requires that, to the extent practicable, the NPL include within the 100 highest priorities, one facility designated by each State representing the greatest danger to public health, welfare, or the environment among known facilities in the State.

The third mechanism for listing, included in the NCP at 40 CFR 300.66(b)(4) (50 FR 37624, September 16, 1985), has been used only in rare instances. It allows certain sites with HRS scores below 28.50 to be eligible for the NPL if all of the following occur:

- The Agency for Toxic Substances and Disease Registry of the U.S. Department of Health and Human Services has issued a health advisory which recommends dissociation of individuals from the release.
- EPA determines that the release poses a significant threat to public health.
- EPA anticipates that it will be more cost-effective to use its remedial authority than to use its removal authority to respond to the release.

States have the primary responsibility for identifying sites, computing HRS scores, and submitting candidate sites to the EPA Regional Offices. EPA Regional Offices conduct a quality control review of the States' candidate sites, and may assist in investigating, sampling, monitoring, and scoring sites. Regional Offices may also consider candidate sites in addition to those submitted by States. EPA Headquarters conducts further quality assurance audits to ensure accuracy and consistency among the various EPA and State offices participating in the scoring. The Agency then proposes the sites that meet the eligibility criteria (and EPA's additional listing requirements) and solicits public comment on the proposal. Based on these comments and further review by EPA, the Agency determines final HRS scores and places those sites that still qualify on the NPL.

IV. Statutory Requirements and Listing Policies

CERCLA restricts EPA's authority to respond to certain categories of releases of hazardous substances, pollutants, or contaminants by expressly excluding some substances, such as petroleum, from the response program. In addition, CERCLA section 105(a)(8)(B) directs EPA to list priority sites "among" the known releases or threatened releases of hazardous substances, pollutants, or contaminants, and section 105(a)(8)(A) directs EPA to consider certain enumerated and "other appropriate" factors in doing so. Thus, as a matter of policy, EPA has the discretion not to use CERCLA to respond to certain types of releases. For example, EPA has chosen not to list sites that result from contamination associated with facilities licensed by the Nuclear Regulatory Commission (NRC), on the grounds that the NRC has the authority and expertise to clean up releases from those facilities (48 FR 40661, September 8, 1983). Where other authorities exist, placing the site on the NPL for possible remedial action under CERCLA may not be appropriate. Therefore, EPA has chosen to defer certain types sites from the NPL even though CERCLA may provide authority to respond. If, however, the Agency later determines that sites not listed as a matter of policy are not being properly responded to, the Agency may place them on the NPL. The listing policies and statutory requirements of particular relevance to this proposed rule cover sites involving Subtitle C of the Resource Conservation and Recovery Act (RCRA) and sites with "special study wastes." They are discussed below. These and other listing policies and statutory requirements have been explained in greater detail in previous rulemakings, the latest being June 24, 1988 (53 FR 23978 and 53 FR 23988).

Releases From Resource Conservation and Recovery Act (RCRA) Sites

On June 10, 1986 (51 FR 21054), EPA announced a decision on components of a policy for the listing or the deferral from listing on the NPL of several categories of non-Federal sites subject to RCRA Subtitle C corrective action authorities. Under the policy, sites not subject to RCRA Subtitle C corrective action authorities will continue to be placed on the NPL. Examples of such site include:

- Facilities that ceased treating, storing, or disposing of hazardous waste prior to November 19, 1980 (the effective date of Phase I of the Subtitle C regulations) and to which the RCRA corrective action or other authorities of Subtitle C cannot be applied.
- Sites at which only materials exempted from the statutory or regulatory definition of solid waste or hazardous waste are managed.
- Contamination areas resulting from the activities of RCRA hazardous waste handlers to which RCRA Subtitle C corrective action authorities do not apply, such as hazardous waste generators or transporters, which are not required to have Interim Status or a final RCRA permit.

Also under the policy, certain RCRA sites at which Subtitle C corrective action authorities are available may also be listed if they meet the criteria for listing (e.g., an HRS score of 28.50 or greater) and they fall within one of the following categories:

- Facilities owned by persons who have demonstrated an inability to finance a cleanup as evidenced by their invocation of the bankruptcy laws.
- Facilities that have lost authorization to operate, and for which there are additional indications that the owner or operator will be unwilling to undertake corrective action.
- Sites, analyzed on a case-by-case basis, whose owners or operators have a clear history of unwillingness to undertake correction action.

On August 9, 1988 (53 FR 30005), EPA published a policy for determining whether RCRA facilities are unwilling to perform corrective actions, and therefore should be proposed to the NPL. Additionally, on August 9, 1988 (53 FR 30002), EPA published a policy statement requesting comment on a policy for determining when an owner/operator should be considered unable to pay for addressing the contamination at a RCRA-regulated site.

On June 24, 1988 (53 FR 23978), EPA proposed to list RCRA sites in several other categories which the Agency considers appropriate for placement on the NPL. These categories are non- or late filers, converters, protective filers, and sites holding permits issued before enactment of the Hazardous and Solid Waste Amendments of 1984.

This update proposes a RCRA site in the converter category:

- Tri-Cities Barrel Co., Inc., Port Crane, New York.

Documents supporting the RCRA determination for this site are available for review in both the Headquarters and appropriate Regional docket.

Commenters are encouraged to provide documentation where they believe EPA's RCRA determination is in error.

Sites of Special Study Wastes

Section 105(g) of CERCLA, as amended by SARA, requires additional information before sites involving RCRA "special study wastes" can be proposed for the NPL (until revisions to the HRS are effected). Section 105(g) applies to sites that (1) were not on or proposed for the NPL as of October 17, 1986 and (2) contain sufficient quantities of special study wastes as defined under RCRA sections 3001(b)(2) (drilling fluids), 3001(b)(3)(A)(ii) (mining wastes), and 3001(b)(3)(A)(iii) (cement kiln dust). Before these sites can be added to the NPL, SARA requires that the following information be considered:

- The extent to which the HRS score for the facility is affected by the presence of the special study waste at or released from the facility.
- Available information as to the quantity, toxicity, and concentration of hazardous substances that are constitutents of any special study waste at or released from the facility; the extent of or potential for release of such hazardous constituents; the exposure or potential exposure to human population and environment; and the degree of hazard to human health or the environment posed by the release of such hazardous constituents at the facility.

Update #8 proposes three sites containing or potentially containing special study wastes. EPA has placed in the dockets addenda that evaluate for each proposed site the information called for in section 105(g). The addenda indicate that the special study wastes present a threat to human health and the environment, and that the sites should be proposed to the NPL. The site sare:

- Eastern Michaud Flats Contamination, Pocatello, Idaho.
- Kerr-McGee Chemical Corp. (Soda Springs Plant), Soda Springs, Idaho.
- Monsanto Chemical Co. (Soda Springs Plant), Soda Springs, Idaho.

CERCLA section 125, as amended by SARA, addresses special study wastes described in RCRA section 3001(b)(3)(A)(i) (fly ash and related wastes). No sites in this rule are subject to the provisions of section 125.

V. Contents of Proposed NPL Update #8

Table 1 following this preamble lists 10 sites proposed for the NPL in Update #8. Each entry contains the name of the facility and the State and city or county in which it is located. All sites received HRS scores of 28.50 or above. Each proposed site is placed by score in a group corresponding to groups of 50 sites presented within the final NPL. For example, a site in Group 8 of the proposed update has a score that falls within the range of scores covered by a the eighth group of 50 sites on the final NPL. The NPL is arranged by HRS scores and is presented in groups of 50 to emphasize that minor differences in scores do not necessarily represent significantly different levels of risk.

In the past, each entry was accompanied by one or more notations reflecting the status of response and cleanup activities at the site at the time this list was prepared. EPA is developing a report summarizing response activities at NPL sites. The report will be available shortly. In the interim, information on activities at the new proposed sites is available in the site summaries or upon request to the appropriate Regional Office.

VI. Regulatory Impact Analysis

The costs of cleanup actions that may be taken at sites are not directly attributable to listing on the NPL, as explained below. Therefore, the Agency has determined that this rulemaking is not a "major" regulation under Executive Order 12291. EPA has conducted a preliminary analysis of economic implications of today's proposal to add new sites. EPA believes that the kinds of economic effects associated with this proposed revision are generally similar to those identified in the regulatory impact analysis (RIA) prepared in 1982 for revisions to the NCP pursuant to section 105 of CERCLA (47 FR 31180, July 16, 1982) and the economic analysis prepared when amendments to the NCP were proposed (50 FR 5882, February 12, 1985). The Agency believes the anticipated economic effects related to proposing the addition of these sites to the NPL can be characterized in terms of the conclusions of the earlier RIA and the most recent economic analysis. This rule was submitted to the Office of Management and Budget for review as required by Executive Order 12291.

Costs

EPA has determied that this proposed rulemaking is not a "major" regulation under Executive Order 12291 because inclusion of a site on the NPL does not itself impose any costs. It does not establish that EPA will necessarily undertake remedial action, nor does it require any action by a private party or determine its liability for site response costs. Costs that arise out of site responses result from site-by-site decisions about what actions to take, not directly from the act of listing itself. Nonetheless, it is useful to consider the costs associated with responding to all sites included in this proposed rulemaking.

The major events that follow the proposed listing of a site on the NPL are a search for potentially responsible parties and a remedial investigation/feasibility study (RI/FS) to determine if remedial actions will be undertaken at a site. Design and constuction of the selected remedial alternative follow completion of the RI/FS, and operation and maintenance (O&M) activities may continue after construction has been completed.

EPA initially bears costs associated with responsible party searches. Responsible parties may bear some or all the costs of the RI/FS, remedial design and construction, and O&M, or EPA and the states may share costs.

The State cost share for site cleanup activities has been amended by section 104 of SARA. For privately-owned sites, as well as at publicly-owned but not publicly-operated sites, EPA will pay for 100% of the costs of the RI/FS and remedial planning, and 90% of the costs associated with remedial action. The State will be responsible for 10% of the remedial action. For publicly-operated sites, the State cost share is at least 50% of all response costs at the site, including the RI/FS and remedial design and construction of the remedial action selected. After the remedy is built, costs fall into two categories:

- For restoration of ground water and surface water, EPA will share in startup costs according to the criteria in the previous paragraph for 10 years or until a sufficient level of protectiveness is achieved before the end of 10 years.
- For other cleanups EPA will share for up to 1 year the cost of that portion of response needed to assure that a remedy is operational and functional. After that, the State assumes full responsibilities for O&M.

In previous NPL rulemakings, the Agency estimated the costs associated with these activities (RI/FS, remedial design, remedial action, and O&M) on an average per site and total cost basis. EPA will continue with this approach, using the most recent (1988) cost estimates available; these estimates are presented below. However, there is wide variation in costs for individual sites, depending on the amount, type, and extent of contamination. Additionally, EPA is unable to predict what portions of the total costs responsible parties will bear, since the distribution of costs depends on the extent of voluntary and negotiated response and the success of any cost-recovery actions.

Cost category	Average total cost per site [1]
[illegible]	1,100,000
Remedial Design	750,000
Remedial Action	[2] 13,500,000
Net present value of O&M [3]	[2] 3,770,000

[1] 1988 U.S. Dollars
[2] Includes State cost-share
[3] Assumes cost of O&M over 30 years, $400,000 for the first year and 10% discount rate.
Source: Office of Program Management, Office of Emergency and Remedial Response, U.S. EPA.

Costs to States associated with today's proposed rule arise from the required State cost-share of: (1) 10% of remedial actions and 10% of first-year O&M costs at privately-owned sites and sites which are publicly-owned but not publicly-operated; and (2) at least 50% of the remedial planning (RI/FS and remedial design), remedial action, and first-year O&M costs at publicly-operated sites. States will assume the cost for O&M after EPA's period of participation. Using the assumptions developed in the 1982 RIA for the NCP, EPA has assumed that 90% of the 10 sites proposed for the NPL in this rule will be privately-owned and 10% will be State- or locally-operated. Therefore, using the budget projections presented above, the cost to States of undertaking Federal remedial planning and actions, but excluding O&M costs, would be approximately $20 million. State O&M costs cannot be accurately determined because EPA, as noted above, will share O&M costs for up to 10 years for restoration of ground water and surface water, and it is not known how many sites will require this treatment and for how long. However, based on past experience, EPA believes a reasonable estimate is that it will share startup costs for up to 10 years at 25% of sites. Using this estimate, State O&M costs would be approximately $32 million.

Proposing a hazardous waste site for the final NPL does not itself cause firms responsible for the site to bear costs. Nonetheless, a listing may induce firms to clean up the sites voluntarily, or it may act as a potential trigger for subsequent enforcement or cost-recovery actions. Such actions may impose costs on firms, but the decisions to take such actions are discretionary and made on a case-by-case basis. Consequently, precise estimates of these effects cannot be made. EPA does not believe that every site will be cleaned up by a responsible party. EPA cannot project at this time which firms or industry sectors will bear specific portions of the response costs, but the Agency considers: the volume and nature of the waste at the sites; the strength of the evidence linking the wastes at the site to the parties; the parties' ability to pay; and other factors when deciding whether and how to proceed against the parties.

Economy-wide effects of this proposed amendment to the NCP are aggregations of effects of firms and State and local governments. Although effects could be felt by some individual firms and States, the total impact of this proposal on output, prices, and employment is expected to be negligible at the national level, as was the case in the 1982 RIA.

Benefits

The real benefits associated with today's proposal to place additional sites on the NPL are increased health and environmental protection as a result of increased public awareness of potential hazards. In addition to the potential for more Federally-financed remedial actions, expansion of the NPL could accelerate privately-financed, voluntary cleanup efforts. Proposing sites as national priority targets may also give States increased support for funding responses at particular sites.

As a result of the additional CERCLA remedies, there will be lower human exposure to high-risk chemicals, and higher-quality surface water, ground water, soil, and air. These benefits are expected to be significant, although difficult to estimate in advance of completing the RI/FS at these sites.

Associated with the costs are significant potential benefits and cost offsets. The distributional costs to firms of financing NPL remedies have corresponding "benefits" in that funds expended for a response generate employment, directly or indirectly (through purchased materials).

VII. Regulatory Flexibility Act Analysis

The Regulatory Flexibility Act of 1980 requires EPA to review the impacts of this action on small entities, or certify that the action will not have a significant impact on a substantial number of small entities. By small entities, the Act refers to small businesses, small government jurisdictions, and nonprofit organizations.

While this rule proposes revisions to the NCP, they are not typical regulatory changes since the revisions do not automatically impose costs. Proposing sites on the NPL does not in itself require any action by any private party, nor does it determine the liability of any party for the cost of cleanup at the site. Further, no identifiable groups are affected as a whole. As a consequence, it is hard to predict impacts on any group. A site's proposed inclusion on the NPL could increase the likelihood that adverse impacts to responsible parties (in the form of cleanup costs) will occur, but EPA cannot identify the potentially affected business at this time nor estimate the number of small businesses that might be affected.

The Agency does expect that certain industries and firms within industries that have caused a proportionately high percentage of waste site problems could be significantly affected by CERCLA actions. However, EPA does not expect the impacts from the listing of these 10 sites to have a significant economic impact on a substantial number of small businesses.

In any case, economic impacts would only occur through enforcement and cost-recovery actions, which are taken at EPA's discretion on a site-by-site basis. EPA considers many factors when determining what enforcement actions to take, including not only the firm's contribution to the problem, but also the firm's ability to pay.

The impacts (from cost recovery) on small governments and nonprofit organizations would be determined on a similar case-by-case basis.

List of Subjects in 40 CFR Part 300

Air pollution control, Chemicals, Hazardous materials, Intergovernmental relations, Natural resources, Oil pollution, Reporting and recordkeeping requirements, Superfund, Waste treatment and disposal, Water pollution control, Water supply.

Date: April 27, 1989.

Jonathan Z. Cannon,

Deputy Assistant Administrator, Office of Solid Waste and Emergency Response.

It is proposed to amend 40 CFR Part 300 as follows:

PART 300—[AMENDED]

1. The authority citation for Part 300 continues to read as follows:

Authority: 42 U.S.C. 9605; 42 U.S.C. 9620; 33 U.S.C. 1321(c)(2); E.O. 11735 (38 FR 21243); E.O. 12580 (52 FR 2923).

2. It is proposed to add the following sites by group to Appendix B of Part 300

TABLE 1.—NATIONAL PRIORITIES LIST, PROPOSED UPDATE 8 SITES (BY GROUP) MAY 1989

NPL Gr[1]	St/Site name	City/County
1	PA Publicker Industries Inc.	Philadelphia.
2	ID Eastern Michaud Flats Contamin.	Pocatello.

1.—NATIONAL PRIORITIES LIST, OPOSED UPDATE 8 SITES (BY GROUP) 1989—Continued

PL Gr[1]	St/Site name	City/County
3	ID Monsanto Chemical (Soda Springs).	Soda Springs.
4	ID Kerr-McGee Chemical (Soda Springs).	Soda Springs.
6	NY Tri-Cities Barrel Co., Inc.	Port Crane.
10	MO St Louis Airport/ HIS/Fut Coatings.	St. Louis County
10	UT Utah Power & Light/American Barrel.	Salt Lake City.
11	MI Allied Paper/ Portage Ck/ Kalamaz R.	Kalamazoo.
12	IA Sheller-Globe Corp. Disposal.	Keokuk.
14	NC Hevi-Duty Electric Co.	Goldsboro.

Number of Sites Proposed for Listing: 10

[1] Sites are placed in groups (Gr) corresponding to groups of 50 on the final NPL.

[FR Doc. 89-10723 Filed 5-4-89; 8:45 am]

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Part II

Environmental Protection Agency

40 CFR Part 300

National Priorities List for Uncontrolled Hazardous Waste Sites; Final Rule

ENVIRONMENTAL PROTECTION AGENCY

[illegible]R Part 300

[FRL-3825-8]

National Priorities List for Uncontrolled Hazardous Waste Sites

AGENCY: Environmental Protection Agency.

ACTION: Final rule.

SUMMARY: The Environmental Protection Agency ("EPA") is amending appendix B of the National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), 40 CFR part 300, which was originally promulgated on July 16, 1982, pursuant to section 105 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 ("CERCLA"). CERCLA has since been amended by the Superfund Amendments and Reauthorization Act of 1986 ("SARA") and is implemented by Executive Order 12580 (52 FR 2923, January 29, 1987). CERCLA requires that the NCP include a list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States, and that the list be revised at least annually. The [illegible]nal Priorities List ("NPL"), initially [illegible]ulgated as appendix B of the NCP on September 8, 1983 (48 FR 40658), constitutes this list and is being revised today by the addition of 106 sites, including 23 Federal facility sites. Based on a review of public comments on these sites, EPA has decided that they meet the eligibility requirements of the NPL and are consistent with the Agency's listing policies. In addition, today's action removes 10 sites, including one Federal facility site, from the proposed NPL. Information supporting these actions is contained in the Superfund Public Dockets.

This rule results in a final NPL of 1,187 sites, 116 of them in the Federal section; 20 sites are proposed to the NPL, none of them in the Federal section. Final and proposed sites now total 1,207.

EFFECTIVE DATE: The effective date for this amendment to the NCP shall be October 1, 1990. CERCLA section 305 provides for a legislative veto of regulations promulgated under CERCLA. Although *INS v. Chadha* 462 U.S. 919, 103 S. Ct. 2764 (1983), cast the validity of the legislative veto into question, EPA has transmitted a copy of this regulation to the Secretary of the Senate and the Clerk of the House of Representatives. If any section by Congress calls the effective date of this regulation into question, the Agency will publish a notice of clarification in the **Federal Register**.

ADDRESSES: Addresses for the Headquarters and Regional dockets follow. For further details on what these dockets contain, see section I of the **"SUPPLEMENTARY INFORMATION"** portion of this preamble.

Docket Coordinator, Headquarters, U.S. EPA CERCLA Docket Office, OS-245, Waterside Mall, 401 M Street, SW, Washington, DC 20460, 202/382-3046

Evo Cunha, Region 1, U.S. EPA Waste Management Records Center, HES-CAN 6, J.F. Kennedy Federal Building, Boston MA 02203, 617/573-5729

U.S. EPA, Region 2, Document Control Center, Superfund Docket, 26 Federal Plaza, 7th Floor, room 740, New York, NY 10278, Latchmin Serrano, 212/264-5540, Ophelia Brown, 212/264-1154

Diane McCreary, Region 3, U.S. EPA Library, 5th floor, 841 Chestnut Building, 9th & Chestnut Streets, Philadelphia, PA 19107, 215/597-0580

Beverly Fulwood, Region, 4, U.S. EPA Library, room C-6, 345 Courtland Street, NE., Atlanta, GA 30365, 404/347-4216

Cathy Freeman, Region 5, U.S. EPA, 5 HS-12, 230 South Dearborn Street, Chicago, Il, 60604, 312/886-6214

Bill Taylor, Region 6, U.S. EPA, 1445 Ross Avenue, Mail Code 6H-MA, Dallas, TX 75202-2733, 214/65-6740

Steven Wyman, Region 7, U.S. EPA Library, 726 Minnesota Avenue, Kansas City, KS 66101, 913/551-7241

Dolores Eddy, Region 8, U.S. EPA Library, 999 18th Street, suite 500, Denver, CO 80202-2405, 303/293-1444

Lisa Nelson, Region 9, 1235 Mission Street, San Francisco, CA 94103, 415/744-1441

David Bennett, Region 10, U.S. EPA, 9th Floor, 1200 6th Avenue, Mail Stop HW-093, Seattle WA 98101, 206/442-2103

FOR FURTHER INFORMATION CONTACT: Richard Webster, Hazardous Site Evaluation Division, Office of Emergency and Remedial Response (OS-230), U.S. Environmental Protection Agency, 401 M Street, SW., Washington, DC, 20460, or the Superfund Hotline, Phone (800) 424-9346 (382-3000 in the Washington, DC, metropolitan area).

SUPPLEMENTARY INFORMATION:

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I. Introduction

Background

In 1980, Congress enacted the Comprehensive Environmental Response, Compensation, and Liability Act, 42 U.S.C. sections 9601–9657 ("CERCLA" or the "Act"), in response to the dangers of uncontrolled hazardous waste sites. CERCLA was amended in 1986 by the Superfund Amendments and Reauthorization Act ("SARA"), Public Law No. 99–499, stat. 1613 *et seq.* To implement CERCLA, the Environmental Protection Agency ("EPA" or "the Agency") promulgated the revised National Oil and Hazardous Substances Pollution Contingency Plan ("NCP"), 40 CFR part 300, on July 16, 1982 (47 FR 31180) pursuant to CERCLA section 105 and Executive Order 12316 (46 FR 42237, August 20, 1981). The NCP, further revised by EPA on September 16, 1985 (50 FR 37624 and November 20, 1985 (50 FR 47912), sets forth guidelines and procedures needed to respond under CERCLA to releases and threatened releases of hazardous substances, pollutants, or contaminants. On March 8, 1990 (55 FR 8666), EPA revised the NCP in response to SARA.

Section 105(a)(8)(A) of CERCLA, as amended by SARA, requires that the NCP include "criteria for determining priorities among releases or threatened releases throughout the United States for the purpose of taking remedial action and, to the extent practicable taking into account the potential urgency of such action, for the purpose of taking removal action." Removal action involves cleanup or other actions that are taken in response to releases or threats of releases on a short-term or temporary basis (CERCLA section 101(23)). Remedial action tends to be long-term in nature and involves response actions that are consistent with a permanent remedy for a release (CERCLA section 101(24)). Criteria for determining priorities for possible remedial actions financed by the Trust Fund established under CERCLA are included in the Harzard Ranking System ("HRS"), which EPA promulgated as appendix A of the NCP (47 FR 31319, July 16, 1982).

On December 23, 1988 (53 FR 51962), EPA proposed revisions to the HRS in response to CERCLA section 105(c), added by SARA. EPA intends to issue the revised HRS as soon as possible. However, until the revised HRS is in effect, EPA will continue to use the current HRS in accordance with CERCLA section 105(c)(1) and Congressional intent, as explained in 54 FR 13299 (March 31, 1989).

Based in large part on the HRS criteria, and pursuant to section 105(a)(8)(B) of CERCLA, as amended by SARA, EPA prepared a list of national priorities among the known releases or threatened releases of hazardous substances, pollutant, or contaminants throughout the United States (the "National Priorities List" or "NPL"). The list has been promulgated as appendix B of the NCP. A site can undergo CERCLA-financed remedial action only after it is placed on the NPL, as provided in the NCP at 40 CFR 300.425(b)(1) (55 FR 8845, March 8, 1990). As CERCLA section 105(a)(8)(b) states, the NPL is a listing of "releases or threatened releases" of hazardous substances, pollutants, or contaminants. For simplicity, the discussion below may refer to these releases or threatened releases" simply as "releases", "facilities", or "sites".

An original NPL of 406 sites was promulgated on September 8, 1983 (48 FR 40658). Pursuant to CERCLA section 105(a)(8)(B), which requires that the NPL be revised at least annually, the NPL has been updated periodically, most recently on March 14, 1990 (55 FR 9688). The Agency also has proposed adding new sites to the NPL, most recently on October 26, 1989 (54 FR 43778).

EPA may delete sites from the NPL when no further response is appropriate, as provided in the NCP at 40 CFR 300.425(e) (55 FR 8845, March 8, 1990). To date, the Agency has deleted 29 sites from the final NPL, most recently on May 31, 1990 (55 FR 22030), when Reeser's Landfill, Upper Macungie Township, Pennsylvania, was deleted.

This rule adds 106 sites, including 23 Federal facility sites, to the NPL, and removes 10 sites from the proposed NPL, including one Federal facility site. Of the 10 sites being removed, seven have HRS scores below 28.50 and the other three can be addressed under corrective action authorities of Subtitle C of the Resource Conservation and Recovery Act (RCRA). EPA has carefully considered public comments submitted for the sites in this final rule and has made certain modifications in response to those comments. This rule results in a final NPL of 1,187 sites, 116 of them in the Federal section; 20 sites remain in proposed status, none of them in the Federal section. With these changes, final and proposed sites now total 1,207.

Information Available to the Public

The Headquarters and Regional public dockets for the NPL (see ADDRESSES portion of this notice) contain documents relating to the evaluation and scoring of sites in this final rule. The dockets are available for viewing, by appointment only, after the appearance of this notice. The hours of operation for the Headquarters docket are from 9 a.m. to 4 p.m., Monday through Friday, excluding Federal holidays. Please contact individual Regional dockets for hours.

The Headquarters docket contains HRS score sheets for each final site; a Documentation Record for each site describing the information used to compute the score; pertinent information for any site affected by special study waste or other requirements, or RCRA or other listing policies; a list of documents referenced in the Documentation Record; comments received; and the Agency's response to those comments. The Agency's responses are contained in the "Support Document for the Revised National Priorities List Final Rule—August 1990."

Each Regional docket includes all information available in the Headquarters docket for sites in that Region, as well as the actual reference documents, which contain the data principally relied upon by EPA in calculating or evaluating the HRS scores for sites in that Region. These reference documents are available only in the Regional dockets. They may be viewed, by appointment only, in the appropriate Regional Docket or Superfund Branch Office. Requests for copies may be directed to the appropriate Regional Docket or Superfund Branch. An informal written request, rather than a

formal request, should be the ordinary procedure for obtaining copies of any of these documents.

[illegible]pose and Implementation of the NPL

Purpose

The primary purpose of the NPL is stated in the legislative history of CERCLA (Report of the Senate Committee on Environment and Public Works, Senate Rep. No. 96-848, 96th Cong., 2d Sess. 60 (1980)):

The priority lists serve primarily informational purposes, identifying for the States and the public those facilities and sites or other releases which appear to warrant remedial actions. Inclusion of a facility or site on the list does not in itself reflect a judgment of the activities of its owner or operator, it does not require those persons to undertake any action; nor does it assign liability to any person. Subsequent government action in the form of remedial actions or enforcement actions will be necessary in order to do so, and these actions will be attended by all appropriate procedural safeguards.

The purpose of the NPL, therefore, is primarily to serve as an informational and management tool. The initial identification of a site for the NPL is intended primarily to guide EPA in determining which sites warrant further investigation to assess the nature and [illegible]t of the public health and [illegible]nmental risks associated with the [illegible]nd to determine what CERCLA-financed remedial action(s), if any, may be appropriate. The NPL also serves to notify the public of sites EPA believes warrant further investigation.

Federal facility sites are eligible for the NPL pursuant to the NCP at 40 CFR 300.425(b)(3) (55 FR 8845, March 8, 1990). However, section 111(e)(3) of CERCLA, as amended by SARA, limits the expenditure of CERCLA monies at federally-owned facilities. Federal facility sites also are subject to the requirements of CERCLA section 120, added by SARA.

Implementation

A site may undergo remedial action financed by the Trust Fund established under CERCLA ("Superfund") only after it is placed on the final NPL as outlined in the NCP at 40 CFR 300.425(b)(1) (55 FR 8845, March 8, 1990). However, EPA may take enforcement actions under CERCLA or other applicable statutes against responsible parties regardless of whether the site is on the NPL, although, as a practical matter, the focus of EPA's enforcement actions has been and will continue to be on NPL sites. Similarly, in [illegible]se of removal actions, EPA has the [illegible]rity to act at any site, whether listed or not, that meets the criteria of the NCP at 40 CFR 300.415 (55 FR 8842, March 8, 1990).

EPA's policy is to pursue cleanup of NPL sites using the appropriate response and/or enforcement actions available to the Agency, including authorities other than CERCLA. Listing a site will serve as notice to any potentially responsible party that the Agency may initiate CERCLA-financed remedial action. The Agency will decide on a site-by-site basis whether to take enforcement or other action under CERCLA or other authorities, proceed directly with CERCLA-financed response actions and seek to recover response costs after cleanup, or do both. To the extent feasible, once sites are on the NPL, EPA will determine high-priority candidates for Superfund-financed response action and/or enforcement action through both State and Federal initiatives. These determinations will take into account which approach is more likely to most expeditiously accomplish cleanup of the site while using CERCLA's limited resources as efficiently as possible.

Remedial response actions will not necessarily be funded in the same order as a site's ranking on the NPL—that is, its HRS score. The information collected to develop HRS scores is not sufficient in itself to determine either the extent of contamination or the appropriate response for a particular site. EPA relies on further, more detailed studies in the remedial investigation/feasibility study (RI/FS) to address these concerns.

The RI/FS determines the nature and extent of the threat posed by the release or threatened release. It also takes into account the amount of contaminants in the environment, the risk to affected populations and environment, the cost to correct problems at the site, and the response actions that have been taken by potentially responsible parties or others. Decisions on the type and extent of action, if any, to be taken at these sites are made in accordance with the criteria contained in subpart E of the NCP (55 FR 8839, March 8, 1990). After conducting these additional studies, EPA may conclude that it is not desirable to initiate a CERCLA remedial action at some sites on the NPL because of more pressing needs at other sites, or because a private party cleanup is already underway pursuant to an enforcement action. Given the limited resources available in the Trust Fund, the Agency must carefully balance the relative needs for response at the numerous sites it has studied. It is also possible that EPA will conclude after further analysis that the site does not warrant remedial action.

Revisions to the NPL such as today's rulemaking may move some previously listed sites to a lower position on the NPL. However, if EPA has initiated action such as an RI/FS at a site, it does not intend to cease such actions to determine if a subsequently listed site should have a higher priority for funding. Rather, theAgency will continue funding site studies and remedial actions once they have been initiated, even if higher-scoring sites are later added to the NPL.

RI/FS at Proposed sites

An RI/FS may be performed at proposed sites (or even sites that have not yet been proposed for the NPL) pursuant to the Agency's removal authority under CERCLA, as outlined in the NCP at 40CFR 300.425(b)(1) (55 FR 8845, March 8, 1990). Section 101(23) of CERCLA defines "remove" or "removal" to include "such actions as may be necessary to monitor, assess and evaluate the release or threat of release * * *." The definition of "removal" also includes "action taken under section 104(b) of this Act * * *," which authorizes the Agency to perform studies, investigations, and other information-gathering activities.

Although an RI/FS generally is conducted at a site after the site has been placed on the NPL, in a number of circumstances the Agency elects to conduct an RI/FS at a proposed NPL site in preparation for a possible CERCLA-financed remedial action, such as when the Agency believes that a delay may create unnecessary risks to human health or the environment. In addition, the Agency may conduct an RI/FS to assist in determining whether to conduct a removal or enforcement action at a site.

Facility (Site) Boundaries

The NPL does not describe releases in precise geographical terms, and the Agency believes that it would be neither feasible nor consistent with the limited purpose of the NPL (as the mere identification of releases), for it to do so. CERCLA section 105(a)(8)(B) directs EPA to list national priorities among the known "releases or threatened releases" of hazardous substances. Thus, the purpose of the NPL is merely to identify releases of hazardous substances that are priorities for further evaluation. Although CERCLA "facility" is broadly defined to include any area where a hazardous substance release has "come to be located" (CERCLA section 101(9)), the listing process itself is not intended to define or reflect the boundaries of

such facilities or releases.[1] The names of sites are provided for purposes of identification only; the sites are not limited to the boundaries of properties that may be referred to in the name. Of course, HRS data upon which listing is based will, to some extent, describe which release is at issue; that is, the NPL site would include all releases evaluated as part of that HRS analysis (including noncontiguous releases evaluated under the NPL aggregation policy, *see* 48 FR 40663 (September 8, 1983)).

EPA regulations do provide that the "nature and extent of the threat presented by a "release" will be determined by an RI/FS as more information is developed on site contamination (40 CFR 300.430(d)(2) (55 FR 8847, March 8, 1990)). During the RI/FS process, the release may be found to be larger or smaller than was originally known, as more is learned about the source and the migration of the contamination. However, this inquiry focuses on an evaluation of the threat posed; the boundaries of the release need not be defined, and in any event are independent of listing. Moreover, it generally is impossible to discover the full extent of where the contamination "has come to be located" before all necessary studies and remedial work are completed at a site; indeed, the boundaries of the contamination can be expected to change over time. Thus, in most cases, it will be impossible to describe the boundaries of a release with certainty.

For these reasons, the NPL need not be amended if further research into the extent of the contamination expands the apparent boundaries of the release. As discussed above, the NPL is only of limited significance, as it does not assign liability to any party or to the owner of any specific property. *See* Report of the Senate Committee on Environment and Public Works, Senate Rep. No. 96-848, 96th Cong., 2d Sess. 60 (1980), quoted at 48FR 40659 (September 8, 1983). If a party contests liability for releases on discrete parcels of property, it may do so if and when the Agency brings an action against that party to recover costs or to compel a response action at that property.

At the same time, however, the RI/FS or the Record of Decision (which defines the remedy selected) may offer a useful indication to the public of the areas of contamination at which the Agency is considering taking a response action, based on information known at that time. For example, EPA may evaluate (and list) a release over a 400-acre area, but the Record of Decision may select a remedy over 100 acres only. This information may be useful to a landowner seeking to sell the other 300 acres, but it would result in no formal change in the fact that a release is included on the NPL. The landowner (and the public) also should note in such a case that if further study (or the remedial construction itself) reveals that the contamination is located on or has spread to other areas, the Agency may address those areas as well.

This view of the NPL as an initial identification of a release that is not subject to constant re-evaluation is consistent with the Agency's policy of not rescoring NPL sites, or as stated in 49 FR 37081, September 21, 1984:

> EPA recognizes that the NPL process cannot be perfect, and it is possible that errors exist or that new data will alter previous assumptions. Once the initial scoring effort is complete, however, the focus of EPA activity must be on investigating sites in detail and determining the appropriate response. New data or errors can be considered in that process * * * [T]he NPL serves as a guide to EPA and does not determine liability or the need for response.

III. NPL Update Process

There are three mechanisms for placing sites on the NPL. The principal mechanism is the application of the HRS. The HRS serves as a screening device to evaluate the relative potential of uncontrolled hazardous substances to cause human health or safety problems, or ecological or environmental damage. The HRS score is calculated by estimating risks presented in three potential "pathways" of human or environmental exposure: Ground water, surface water, and air. Within each pathway of exposure, the HRS considers three categories of factors "that are designed to encompass most aspects of the likelihood of exposure to a hazardous substance through a release and the magnitude or degree of harm from such exposure": (1) Factors that indicate the presence or likelihood of a release to the environment; (2) factors that indicate the nature and quantity of the substances presenting the potential threat; and (3) factors that indicate the human or environmental "targets" potentially at risk from the site. Factors within each of these three categories are assigned a numerical value according to a set scale. Once numerical values are computed for each factor, the HRS uses mathematical formulas that reflect the relative importance and interrelationships of the various factors to arrive at a final site score on a scale of 0 to 100. The resultant HRS score represents an estimate of the relative "probability and magnitude of harm to the human population or sensitive environment from exposure to hazardous substances as a result of the contamination of ground water, surface water, or air" (47 FR 31180, July 16, 1982). Those sites that score 28.50 or greater on the HRS are eligible for the NPL.

Under the second mechanism for adding sites to the NPL, each State may designate a single site as its top priority, regardless of the HRS score. This mechanism is provided by section 105(a)(8)(B) of CERCLA, as amended by SARA, which requires that, to the extent practicable, the NPL include within the 100 highest priorities, one facility designated by each State representing the greatest danger to public health, welfare, or the environment among known facilities in the State.

The third mechanism for listing, included in the NCP at 40 CFR 300.425(c)(3) (55 FR 8845, March 8, 1990), has been used only in rare instances. It allows certain sites with HRS scores below 28.50 to be eligible for the NPL if all of the following occur:

- The Agency for Toxic Substances and Disease Registry (ATSDR) of the U.S. Department of Health and Human Services has issued a health advisory that recommends dissociation of individuals from the release.
- EPA determines that the release poses a significant threat to public health.
- EPA anticipates that it will be more cost-effective to use its remedial authority than to use its removal authority to respond to the release.

All of the sites in today's final rule have been placed on the NPL based on their HRS scores.

States have the primary responsibility for identifying non-Federal sites, computing HRS scores, and submitting candidate sites to the EPA Regional Offices. EPA Regional Offices conduct a quality control review of the States' candidate sites, and may assist in investigating, sampling, monitoring, and scoring sites. Regional Offices also may consider candidate sites in addition to those submitted by States. EPA Headquarters conducts further quality assurance audits to ensure accuracy and consistency among the various EPA and State offices participating in the scoring. The Agency then proposes the sites that meet one of the three criteria for listing (as well as statutory requirements and EPA's listing policies) and solicits public

[1] Although CERCLA section 101(9) sets out the definition of "facility" and not "release," those terms are often used interchangeably. (See CERCLA section 105(a)(8)(B), which defines the NPL as a list of "releases" as well as of the highest priority "facilities.") (For ease of reference, EPA also uses the term "site" interchangeably with "release" and "facility.")

omment on the proposal. Based on ıese comments and further review by PA Agency determines final HRS co d places those sites that still uality on the final NPL.

V. Statutory Requirements and Listing olicies

CERCLA restricts EPA's authority to espond to certain categories of releases f hazardous substances, pollutants, or ontaminants by expressly excluding ome substances, such as petroleum, om the response program. In addition, ERCLA section 105(a)(8)(B) directs PA to list priority sites "among" the nown releases or threatened releases f hazardous substances, pollutants, or ontaminants, and section 105(a)(8)(A) irects EPA to consider certain numerated and "other appropriate" actors in doing so. Thus, as a matter of olicy, EPA has the discretion not to use ERCLA to respond to certain types of eleases. Where other authorities exist, lacing the site on the NPL for possible emedial action under CERCLA may not e appropriate. Therefore, EPA has hosen to defer certain types of sites rom the NPL even though CERCLA may rovide authority to respond. For xample, EPA has chosen not to list it t result from contamination is ed with facilities licensed by the Jucr r Regulatory Commission (NRC), n the grounds that NRC has the uthority and expertise to clean up eleases from those facilities (48 FR 0861, September 8, 1983). If, however, he Agency later determines that sites leferred as a matter of policy are not eing properly responded to, the Agency nay place them on the NPL.

The Agency has solicited comment on policy to expand deferral to other 'ederal and State authorities (53 FR 1415, December 21, 1988); however, that olicy is not currently in effect and has ot been applied to sites in this rule. The gency has committed not to implement ny part of an expanded deferral policy ntil public and Congressional concerns ave been fully reviewed and analyzed, nd a decision reached on whether or ot to implement such a policy.

The listing policies and statutory equirements of relevance to this final ule cover Resource Conservation and ecovery Act (RCRA) (U.S.C. 6901–691i) sites, Federal facility sites, sites ith "special study wastes," and adioactive mining waste sites. These ther listing policies and statutory ments have been explained in us rulemakings, the latest being ebruary 21, 1990 (55 FR 6154).

Releases From Resource Conservation and Recovery Act (RCRA) Sites

On June 10, 1986 (51 FR 21054), EPA announced a decision on components of a policy for the listing on the NPL of several categories of non-Federal sites subject to RCRA subtitle C corrective action authorities. Under the policy, sites not subject to RCRA subtitle C corrective action authorities will continue to be placed on the NPL. Examples of such sites include:

- Facilities that ceased treating, storing, or disposing of hazardous waste prior to November 19, 1980 (the effective date of Phase I of the Subtitle C regulations) and to which the RCRA corrective action or other authorities of Subtitle C cannot be applied.
- Sites at which only materials exempted from the statutory or regulatory definition of solid waste or hazardous waste are managed.
- Contamination areas resulting from the activities of RCRA hazardous waste handlers to which RCRA Subtitle C corrective action authorities do not apply, such as hazardous waste generators or transporters, which are not required to have Interim Status or a final RCRA permit.

Further, the policy stated that certain RCRA sites at which subtitle C corrective action authorities are available also may be listed if they meet the criterion for listing (i.e., an HRS score of 28.50 or greater) and they fall within one of the following categories:

- Facilities whose owners have demonstrated an inability to finance corrective action as evidenced by their invocation of the bankruptcy laws.
- Facilities that have lost authorization to operate, and for which there are additional indications that the owner or operator will be unwilling to undertake corrective action.
- Facilities, analyzed on a case-by-case basis, whose owners or operators have a clear history or unwillingness to undertake corrective action.

On August 9, 1988 (53 FR 30005), EPA announced a policy for determining whether RCRA facilities are unwilling to perform corrective actions, and therefore should be proposed to the NPL. Additionally, on August 9, 1988 (53 FR 30002), EPA requested comment on a draft policy for determining when an owner/operator should be considered unable to pay for addressing the contamination at a RCRA-regulated site; that draft policy is still under review.

On June 24, 1988 (53 FR 23976), EPA announced its intent to list several other categories of RCRA facilities that the Agency considers appropriate for the NPL. These categories are non- or late filers, converters (i.e., facilities whose part A permits have been withdrawn), protective filers, and sites holding RCRA permits issued before enactment of the Hazardous and Solid Waste Amendments (HSWA) of 1984. (Further definition of these terms is contained in the June 24, 1988 policy announcement.) Consistent with this policy, 23 RCRA sites were placed on the final NPL on October 4, 1989 (54 FR 41000).

In this final rule, EPA is adding to the NPL five sites that are subject to RCRA subtitle C corrective action authorities. These sites are being placed on the NPL under the NPL/RCRA policy. Three sites are converters, one site has lost its RCRA authorization to operate and appears unwilling to undertake corrective action, and one site has contamination that may not be addressable under RCRA. Listing a site because of an unresolved question as to whether RCRA subtitle C corrective action authorities apply to all contamination associated with the site is consistent with EPA's NPL/RCRA policy (53 FR 23983, June 24, 1988).

In addition, EPA is not listing three sites under the NPL/RCRA policy because they can be addressed under RCRA Subtitle C corrective action authorities. Of these, one site was proposed as a pre-HSWA permittee, but is not being listed because the pre-HSWA permit has expired and the owner/operator is now subject to a new permit which includes corrective action requirements (see 54 FR 41006, October 4, 1989). Another site is a converter, but is not being listed because the owner/operator has agreed to corrective action under a RCRA consent corrective action order (see 54 FR 41005, October 4, 1989). The third site is a late filer, but is not being listed because the site has come within the RCRA system and demonstrated a history of compliance with RCRA regulations (see 54 FR 41005, October 4, 1989).

Releases From Federal Facility Sites

On March 13, 1989 (54 FR 10520), the Agency announced a policy for listing Federal facility sites, if they meet the prescribed eligibility criteria (*e.g.*, an HRS score of 28.50 or greater), even if the Federal facility also is subject to the corrective action authorities of RCRA subtitle C. In that way, cleanup, if appropriate, could be affected at those sites under CERCLA.

Federal facility sites are placed in a separate section of the NPL. This rule adds 23 Federal facility sites to the final NPL and drops one, bringing the total number of final Federal facilities sites to 116. No Federal facility sites remain proposed to the NPL.

Releases of Radioactive Materials

CERCLA section 101(22) excludes several types of releases of radioactive materials from the statutory definition of "release." These releases are therefore not eligible for CERCLA response actions or the NPL. The exclusions apply to (1) releases of source, by-product, or special nuclear material from a nuclear incident if these releases are subject to financial protection requirements under section 170 of the Atomic Energy Act, and (2) any release of source, by-product, or special nuclear material from any processing site designated under the Uranium Mill Tailings Radiation Control Act of 1978 (UMTRCA). Accordingly, such radioactive releases have not been considered eligible for the NPL.

As a policy matter, EPA has also chosen not to list releases of source, by-product, or special nuclear material from any facility with a current license issued by the NRC, on the grounds that the NRC has full authority to require cleanup of releases from such facilities (48 FR 40658, September 8, 1983). EPA will, however, list releases from facilities that hold a current license issued by a State pursuant to an agreement between the State and the NRC under section 274 of the Atomic Energy Act. Facilities whose licenses are no longer in effect are also considered for listing.

In this final rule, EPA is adding to the NPL three sites with radioactive releases that meet EPA's criteria for the NPL. None of the three sites has releases that are excluded by statute from the NPL. The sites are also not excluded by EPA's NPL/NRC policy because they were not contaminated as a result of a NRC-licensed operation.

Releases of Special Study Wastes

Section 105(g) of CERCLA, as amended by SARA, requires EPA to consider certain factors before adding sites involving RCRA "special study wastes" to the NPL. Section 105(g) applies to sites that (1) were not on or proposed for the NPL as of October 17, 1986 and (2) contain significant quantities of special study wastes as defined under RCRA sections 3001(b)(2) [drilling fluids], 3001(b)(3)(A)(ii) [mining wastes], and 3001(b)(3)(A)(iii) [cement kiln dusts]. Before these sites can be added to the NPL, section 105(g) requires that the following information be considered:

- The extent to which the HRS score for the facility is affected by the presence of the special study waste at or released from the facility.
- Available information as to the quantity, toxicity, and concentration of hazardous substances that are constituents of any special study waste at, or released from, the facility; the extent of or potential for release of such hazardous constituents; the exposure or potential exposure to human population and environment; and the degree of hazard to human health or the environment posted by the release of such hazardous constituents at the facility.

This final rule includes 14 sites containing or potentially containing special study wastes subject to section 105(g). EPA has placed in the dockets an addendum that evaluates for each site the information called for in section 105(g). The addenda indicate that the special study wastes present a threat to human health and the environment, and that the sites should be added to the NPL.

CERCLA section 125, as amended by SARA, addresses specific special study wastes described in RCRA section 3001(b)(3)(A)(i) [fly ash and related wastes]. No sites in this rule are subject to section 125.

Response to Public Comments on Special Study Waste Sites

When EPA proposed to include on the NPL the special study waste sites in this final rule, the Agency received several public comments. The Agency's responses to site-specific comments are contained in the "Support Document for the Revised National Priorities List Final Rule—August 1990." (See section V of this final rule).

EPA also received general (i.e., non-site-specific) comments from one organization concerning the Agency's evaluation of sites with coal tar special study waste. A summary of the issues raised in these comments and the Agency's response was contained in the final rule published on February 21, 1990 (55 FR 6158). EPA's response generally applies to the coal tar and other special study waste sites included in this final rule as well.

V. Disposition of Sites in Today's Final Rule

This final rule promulgates 106 sites (Table 1) and removes 10 sites from several proposed rulemakings. These 116 sites are from the following proposed updates:

- Update #2 (49 FR 40320, October 15, 1984): 10 sites
- Update #5 (51 FR 21099, June 10, 1986): 2 sites
- Update #6 (52 FR 2492, January 22, 1987): 6 sites
- Update #7 (53 FR 23988, June 24, 1988): 54 sites
- Update #8 (54 FR 19528, May 5, 1989): 4 sites
- Update #9 (54 FR 29820, July 14, 1989): 17 sites
- Update #10 (54 FR 43778, October 26, 1989): 23 sites

EPA read all comments received on these sites, including late comments. In past rules, EPA responded even to late comments. However, given the volume and number of late comments received and the need to make final decisions on all currently proposed sites prior to the date that the revised HRS takes effect, EPA was not able to respond to all late comments received for sites in this rule. EPA has responded (in the Support Document) to those comments postmarked no later than October 31, 1988 for all sites included in this final rule that were proposed in Updates #2, 5, 6, and 7, to those comments postmarked no later than September 12, 1989 for sites in its final rule that were proposed in Update #8, to those comments postmarked no later than October 3, 1989 for sites in this final rule that were proposed in Update #9, and to those comments postmarked no later than February 6, 1990 for sites in this final rule that were proposed in Update #10. (EPA had previously indicated that it may no longer be able to consider late comments (53 FR 23990, June 24, 1988 and, most recently 54 FR 43779, October 26, 1989)). Although EPA has not responded to all late comments, it has read all late comments and endeavored to respond in the Support Document to those late comments that bring to the Agency's attention a fundamental error in the scoring of a site. In addition, the Agency has routinely responded to late comments resulting from EPA correspondence that provided commenters with more recent data or requested that the commenters be more specific in their comments.

TABLE 1.—NATIONAL PRIORITIES LIST, NEW FINAL SITES (BY RANK)

[August 1990]

NPL		St	Site name	City/county
Gr [1]	Rank			
2	68	IA	Lehigh Portland Cement Co.	Mason City.
2	72	ID	Eastern Michaud Flats Contamin.	Pocatello.
2	74	IA	Northwestern States Portland Cem.	Mason City.
2	78	PA	Salford Quarry	Salford Township.
3	114	ID	Monsanto Chemical (Soda Springs).	Soda Springs.
4	159	WA	Seattle Mun Lndfill (Kent Highlnds).	Kent.

TABLE 1.—NATIONAL PRIORITIES LIST, NEW FINAL SITES (BY RANK)—Continued

[August 1990]

NPL Gr [1]	NPL Rank	St	Site name	City/county
4	164	IL	Beloit Corp	Rockton.
4	176	IN	Whiteford Sales&Ser/Nationalease.	South Bend.
4	188	CA	Industrial Waste Processing.	Fresno.
5	205	IL	MIG/Dewane Landfill.	Belvidere.
5	223	WI	Better Brite Chrome & Zinc Shops.	DePere.
6	284	IA	Peoples Natural Gas Co.	Dubuque.
6	285	MO	Oronogo-Duenweg Mining Belt.	Jasper County.
6	293	AR	Monroe Auto Equip (Paragould Plt).	Paragould.
6	295	IA	E.I. Du Pont (County Rd X23).	West Point.
7	332	AL	T.H. Agricul & Nutri (Montgomery).	Montgomery.
7	335	CA	Sulphur Bank Mercury Mine.	Clear Lake.
7	339	NM	Prewitt Abandoned Refinery.	Prewitt.
[illegible]	344	MI	Peerless Plating Co.	Muskegon.
7	347	KY	Fort Hartford Coal Co Stone Quarry.	Olaton.
8	356	IA	White Farm Equipment Co. Dump.	Charles City.
9	413	PA	Ohio River Park	Neville Island.
9	414	GA	Woolfolk Chemical Works, Inc.	Fort Valley
9	416	IN	Tippecanoe Sanitary Landfill, Inc.	Lafayette.
9	417	IN	Conrail Rail Yard (Elkhart).	Elkhart.
9	423	MN	Dakhue Sanitary Landfill.	Cannon Falls.
9	428	SD	Williams Pipe Line Disposal Pit.	Sioux Falls.
9	436	AK	Arctic Surplus	Fairbanks.
9	447	UT	Sharon Steel (Midvale Tailings).	Midvale.
10	459	PA	Westinghouse Elec (Sharon Plant).	Sharon.
11	505	CA	Western Pacific Railroad Co.	Oroville.
11	513	IL	Kerr-McGee (Reed-Keppler Park).	West Chicago.
11	516	FL	Woodbury Chemical (Princeton Plant).	Princeton.
[illegible]	521	AZ	Apache Powder Co.	St. David.

TABLE 1.—NATIONAL PRIORITIES LIST, NEW FINAL SITES (BY RANK)—Continued

[August 1990]

NPL Gr [1]	NPL Rank	St	Site name	City/county
11	522	NV	Carson River Mercury Site.	Lyon/Churchill Cnty.
11	542	TX	Tex-Tin Corp	Texas City.
12	554	IL	Kerr-McGee (Residential Areas).	W Chic/DuPage Cnty.
12	564	IA	Fairfield Coal Gasification Plant.	Fairfield.
12	570	NJ	Chemical Insecticide Corp.	Edison Township.
12	573	DE	Chem-Solv, Inc	Cheswold.
12	575	FL	Madison County Sanitary Landfill.	Madison.
12	584	CO	Chemical Sales Co.	Denver.
12	587	CA	Hexcel Corp	Livermore.
12	588	CA	Crazy Horse Sanitary Landfill.	Salinas.
12	589	OR	Union Pacific Railroad Tie Treat.	The Dalles.
13	635	VA	Abex Corp	Portsmouth.
13	637	MI	Allied Paper/Portage Ck/Kalamaz R.	Kalamazoo.
13	640	WA	Centralia Municipal Landfill.	Centralia.
14	660	GA	Diamond Shamrock Corp. Landfill.	Cedartown.
14	662	CT	Cheshire Ground Water Contamin.	Cheshire.
14	699	FL	B&B Chemical Co., Inc.	Hialeah.
15	703	FL	BMI-Textron	Lake Park.
15	709	IL	Kerr-McGee (Sewage Treat Plant).	West Chicago.
15	748	KY	Caldwell Lace Leather Co., Inc.	Auburn.
15	750	IL	Adams County Quincy Landfills 2&3.	Quincy.
16	791	LA	Combustion, Inc.	Denham Springs.
16	799	IA	Farmers' Mutual Cooperative.	Hospers.
17	806	IA	Sheller-Globe Corp. Disposal.	Keokuk.
17	814	DE	Kent County Landfill (Houston).	Houston.
17	828	DE	Koppers Co., Inc. (Newport Plant).	Newport.
17	829	NJ	Lodi Municipal Well.	Lodi.
17	838	DE	Sealand Limited	Mount Pleasant.

TABLE 1.—NATIONAL PRIORITIES LIST, NEW FINAL SITES (BY RANK)—Continued

[August 1990]

NPL Gr [1]	NPL Rank	St	Site name	City/county
17	845	SC	Para-Chem Southern, Inc.	Simpsonville.
18	854	WA	North Market Street.	Spokane
18	868	PA	Paoli Rail Yard	Paoli.
18	874	WY	Mystery Bridge Rd/U.S. Highway 20.	Evanville.
18	895	NE	Nebraska Ordnance Plant (Former).	Mead.
19	901	CA	Advanced Micro Devices (Bldg. 915).	Sunnyvale.
19	922	OH	Reilly Tar & Chemical (Dover Plnt).	Dover.
19	942	FL	Anaconda Aluminum/Milgo Electron.	Miami.
19	950	TN	Murray-Ohio Mfg (Horseshoe Bend).	Lawrenceburg.
20	952	NJ	Higgins Disposal	Kingston.
20	990	MI	Cannelton Industries, Inc.	Sault Sainte Marie.
20	1000	NC	Heyi-Duty Electric Co.	Goldsboro.
21	1003	MO	Westlake Landfill.	Bridgeton.
21	1022	NY	Sealand Restoration, Inc.	Lisbon.
21	1030	KY	Green River Disposal, Inc.	Maceo.
21	1034	IL	Central Illinois Public Serv Co.	Taylorville.
21	1045	PA	Dublin TCE Site	Dublin Borough.
21	1047	WI	Waste Management (Brookfield Lfl).	Brookfield.
21	1049	NE	10th Street Site	Columbus.
22	1052	CA	Watkins-Johnson Co. (Stewart Div).	Scotts Valley.
22	1053	CA	Intersil Inc./Siemens Components.	Cupertino.

Number of New Final Sites: 83.

[1] Sites are placed in groups (Gr) corresponding to groups of 50 on the final NPL.

NATIONAL PRIORITIES LIST, FEDERAL FACILITY SITES, NEW FINAL (BY GROUP)

[August 1990]

NPL Gr [1]	St	Site name	City/county
3	ID	Mountain Home Air Force Base.	Mountain Home.
3	WA	Bangor Naval Submarine Base.	Silverdale.

NATIONAL PRIORITIES LIST, FEDERAL FACILITY SITES, NEW FINAL (BY GROUP)—Continued

[August 1990]

NPL Gr [1]	St	Site name	City/county
3	UT	Tooele Army Depot (North Area).	Tooele.
6	AK	Standard Steel & Met Sal Yd (USDOT).	Anchorage.
7	AK	Elmendorf Air Force Base.	Greater Anchorage Bor.
8	AK	Fort Wainwright	Fairbanks N Star Bor.
8	FL	Homestead Air Force Base.	Homestead.
10	TX	Air Force Plant #4 Gener Dynamics.	Fort Worth.
11	TX	Longhorn Army Ammunition Plant.	Karnack.
11	NJ	Federal Aviation Admin Tech Cent.	Atlantic County.
11	NM	Lee Acres Landfill (USDOI).	Farmington.
12	PA	Tobyhanna Army Depot.	Tobyhanna.
12	AZ	Luke Air Force Base	Glendale.
13	CT	New London Submarine Base.	New London.
13	CA	Tracy Defense Depot.	Tracy.
14	NY	Seneca Army Depot	Romulus.
16	KS	Fort Riley	Junction City.
17	CA	Edwards Air Force Base.	Kern County.
17	SD	Ellsworth Air Force Base.	Rapid City.
	CA	Lawrence Livermore Lab-300 (USDOE).	Livermore.
21	NJ	Naval Weapons Stat Earle (Site A).	Colts Neck.
21	IA	Iowa Army Ammunition Plant.	Middletown.
22	HI	Schofield Barracks	Oahu.

Number of New Final Federal Facility Sites: 23.

[1] State top priority site.
[1] Sites are placed in groups (Gr) corresponding to groups of 50 on the final NPL.

Based on the comments received on the proposed sites, as well as investigation by EPA and the States (generally in response to comment) EPA recalculated the HRS scores for individual sites where appropriate. Where the public comments or additional information dropped a score below 28.50, the site has been removed from the NPL. EPA's response to site-specific public comments and explanations of any score changes made as a result of such comments are addressed in the "Support Document for the Revised National Priorities List Final Rule—August 1990."

RCRA Sites

Three sites are subject to subtitle C corrective action authorities, but the part A permits have been withdrawn (converter status). These sites are being added to the final NPL consistent with the NPL/RCRA policy:

- Advanced Micro Devices (Building 915), Sunnyvale, California (converter)
- Hexcel Corp., Livermore, California (converter)
- Westinghouse Electric Corp. (Sharon Plant), Sharon, Pennsylvania (converter)

One site is being listed, consistent with the NPL/RCRA policy, because the contamination may not be addressable under RCRA subtitle C corrective action authorities:

- Apache Powder Co., St. David, Arizona

Based on the NPL/RCRA policy announced on June 10, 1988 (51 FR 21057) and in effect at the time of proposal, one site is being listed because it has lost its RCRA authorization to operate and appears unwilling to undertake corrective action:

- Chem-Solv, Inc., Cheswold, Delaware

One site is not being listed because it is a late-filer that has come within the RCRA system and demonstrated a history of compliance with RCRA regulations:

- Kearney-KPF, Stockton, California (late filer)

One site is not being listed because it now is subject to a post-HSWA permit that includes corrective action requirements:

- Solvent Service, Inc., San Jose, California

One site is not being listed because it is a converter that has agreed to corrective action under a RCRA consent corrective action order:

- Warner Electric Brake & Clutch Co., Roscoe, Illinois

Documentation supporting EPA's decisions on these sites is available in the Support Document.

Federal Facility Sites

This final rule adds 23 Federal facility sites to the NPL (Table 1) and drops 1 from the proposed NPL.

Radioactive Release Sites

Three sites with radioactive releases are being added to the final NPL consistent with the NPL/NRC policy because the sites were not contaminated as a result of a NRC-licensed operation:

- Kerr-McGee (Reed-Keppler Park), West Chicago, Illinois
- Kerr-McGee (Residential Areas), West Chicago/DuPage County, Illinois
- Kerr-McGee (Sewage Treatment Plant), West Chicago, Illinois

Special Study Waste Sites

Fourteen sites containing or possibly containing special study wastes are being added to the NPL in this rule.

- Sulphur Bank Mercury Mine, Clear Lake, California (mining wastes)
- Sealand Limited, Mount Pleasant, Delaware (coal tar wastes)
- Eastern Michaud Flats Contamination, Pocatello, Idaho (mining wastes)
- Monsanto Chemical Co. (Soda Springs Plant), Soda Springs, Idaho (mining wastes)
- Central Illinois Public Service Co., Taylorville, Illinois (coal tar wastes)
- Fairfield Coal Gasification Plant, Fairfield, Iowa (coal tar wastes)
- Lehigh Portland Cement Co., Mason City, Iowa (cement kiln dust)
- Northwestern States Portland Cement Co., Mason City, Iowa (cement kiln dust)
- Peoples Natural Gas Co., Dubuque, Iowa (coal tar wastes)
- Oronogo-Duenweg Mining Belt, Jasper County, Missouri (mining wastes)
- Lee Acres Landfill (USDOI), Farmington, New Mexico (drilling muds and produced waters)
- Carson River Mercury Site, Lyon/Churchill Counties, Nevada (mining wastes)
- Reilly Tar & Chemical Corp. (Dover Plant), Dover, Ohio (coal tar wastes)
- Tex-Tin Corp., Texas City, Texas (mining wastes)

Score Revisions

EPA has revised the HRS scores for 37 sites based on its review of comments and additional information developed by EPA and the States (Table 2). Some of the changes have placed the sites in different groups of 50 sites. For seven of these sites, the public comments have resulted in scores below the cut-off of 28.50. Accordingly, these sites are being dropped from the proposed NPL at this time:

- Magnolia City Landfill, Magnolia, Arkansas
- Concord Naval Weapons Station, Concord, California
- Ford Motor Co. (Sludge Lagoon), Ypsilanti, Michigan
- Gautier Oil Co., Inc., Gautier, Mississippi
- Sunray Oil Co. Refinery, Allen, Oklahoma
- Rio Grande Oil Co. Refinery, Sour Lake, Texas
- Fort Howard Paper Co. (Sludge Lagoons), Green Bay, Wisconsin

TABLE 2.—SITES WITH HRS SCORE CHANGES

State/site name	Location	HRS score	
		Proposed	Final
AR/Magnolia City Landfill	Magnolia	29.49	(1)
AZ/Apache Powder Co.	St. David	49.74	38.09

TABLE 2.—SITES WITH HRS SCORE CHANGES—Continued

State/site name	Location	HRS score	
		Proposed	Final
CA/Concord Naval Weapon Station.	Concord	29.92	(1)
CA/Crazy Horse Sanitary Landfill.	Salinas	39.92	37.93
CA/Intersil Inc./Siemens Components.	Cupertino	37.79	28.90
CA/Sulphur Bank Mercury Mine.	Clear Lake.	46.59	44.42
CA/Tracy Defense Depot.	Tracy	31.12	37.16
CA/Watkins-Johnson Co. (Stewart Division).	Scotts Valley.	44.46	28.90
CT/Cheshire Ground Water Contamination.	Cheshire	38.11	35.57
DE/Kent County Landfill (Houston).	Houston	38.11	33.62
FL/BMI-Textron	Lake Park.	37.93	35.34
FL/Woodbury Chemical Co (Princeton Plant).	Princeton	39.76	39.43
IA/Fairfield Coal Gasification Plant.	Fairfield	33.78	36.05
IA/Northwestern States [illegible]rtland [illegible]ment Co.	Mason City.	58.18	57.80
[illegible]heller-Globe Corp. Disposal.	Keokuk	35.42	33.86
IA/White Farm Equipment Co. Dump.	Charles City.	53.42	43.40
IL/Beloit Corp.	Rockton	40.15	52.08
IL/Central Illinois Public Service Co.	Taylorville.	48.91	28.95
KY/Green River Disposal, Inc.	Maceo	31.24	29.12
MI/Ford Motor Co. (Sludge Lagoon).	Ypsilanti	31.55	(1)
MI/Peerless Plating Co.	Muskegon.	38.95	43.94
MO/Oronogo-Duenweg Mining Belt.	Jasper County.	46.33	46.20
MS/Gautier Oil Co., Inc.	Gautier	29.79	(1)
NC/Heyl-Duty Electric Co.	Goldsboro.	32.05	29.88
NJ/Higgins Disposal.	Kingston	35.73	30.87
NJ/Naval Weapons Station Earle (Site A).	Colts Neck.	37.21	29.65
NM/Lee Acres Landfill (USDOI).	Farmington.	37.01	39.37
NM/Prewitt Abandoned Refinery.	Prewitt	29.49	44.24
NY/Seneca Army Depot.	Romulus	37.30	35.52
[illegible]/Sunray Oil [illegible] Refinery.	Allen	35.47	(1)
[illegible]hio River Park.	Neville Island.	49.27	42.24
TN/Murray-Ohio Manufacturing Co. (Horseshoe Bend Dump).	Lawrenceburg.	40.27	30.93
TX/Rio Grande Oil Co. Refinery.	Sour Lake.	36.80	(1)
UT/Sharon Steel Corp. (Midvale Tailings).	Midvale	73.49	41.85
UT/Tooele Army Depot (North Area).	Tooele	38.32	53.95
WI/Fort Howard Paper Co. Sludge Lagoons.	Green Bay.	30.83	(1)
WY/Mystery Bridge Rd/U.S. Highway 20.	Evansville.	45.22	32.10

[1] Score indeterminate but below 28.50.

Name Revisions

The names of two sites addressed in this final rule have been changed in response to information received during the comment period. The changes are intended to reflect more accurately the location, nature, or potential sources of contamination at the sites:

- Cheshire Ground Water Contamination (formerly Cheshire Associates Property), Cheshire, Connecticut
- North Market Street (formerly Tosco Corp. (Spokane Terminal)), Spokane, Washington

VI. Disposition of All Proposed Sites/Federal Facility Sites

To date, EPA has proposed 10 major updates to the NPL. This rule results in a total of 20 non-Federal sites that continue to be proposed pending completion of response to comment, resolution of technical issues, and resolution of various policy issues (Table 3). All sites that remain proposed will be considered for future final rules. Although these sites remain proposed, the comment periods have not been extended or reopened.

TABLE 3.—NPL PROPOSALS

Update #	Date/Federal Register citation	Number of sites/Federal facility sites	
		Proposed	Remaining proposed
1	9/8/83 48 FR 40674	132/1	1/0
2	10/15/84 49 FR 40320	208/36	11/0
3	4/10/85 50 FR 14115	26/6	0/0
4	9/18/85 50 FR 37950	38/3	0/0
5	6/10/86 51 FR 21099	43/2	2/0
6	1/22/87 52 FR 2492	63/1	1/0
7	6/24/88 53 FR 23988	215/14	4/0
8	5/5/89 54 FR 19526	10/0	0/0
9	7/14/89 54 FR 29820	0/52	0/0
10	10/26/89 54 FR 43778	23/2	1/0
ATSDR	8/16/89 54 FR 33846	2/0	0/0
Total		760/117	20/0

VII. Contents of the NPL

The 106 new sites added to the NPL in this rule (Table 1) have been incorporated into the NPL in order of their HRS scores except where EPA modified the order to reflect top priorities designated by the States, as discussed in greater detail in previous rules, the most recent on March 31, 1989 (54 FR 13296).

The NPL appears at the end of this final rule and will be codified as part of appendix B to the NCP. Sites on the NPL are arranged according to their scores on the HRS. The NPL is presented in groups of 50 sites to emphasize that minor differences in HRS scores do not necessarily represent significantly different levels of risk. Except for the first group, the score range within the groups, as indicated in the list, is less than 4 points. EPA considers the sites within a group to have approximately the same priority for response actions. For convenience, the sites are numbered.

The following three sites previously were placed on the NPL because they met the requirements of the NCP at § 300.425(c)(3), as explained in section III of this rule:

- Forest Glen Mobile Home Subdivision, Niagara Falls, New York
- Radium Chemical Co., Inc., New York, New York
- Lansdowne Radiation Site, Lansdowne, Pennsylvania

These sites have HRS scores less than 28.50 and appear at the end of the list.

This rule adds 23 new sites to the Federal facility section of the NPL by group number.

III. Regulatory Impact Analysis

The costs of cleanup actions that may be taken at sites are not directly attributable to placement on the NPL, as explained below. Therefore, the Agency has determined that this rulemaking is not a "major" regulation under Executive Order 12291. EPA has conducted a preliminary analysis of economic implications of this amendment to the NCP. EPA believes that the kinds of economic effects associated with this revision generally are similar to those effects identified in the regulatory impact analysis (RIA) prepared in 1982 for the revisions to the NCP pursuant to section 105 of CERCLA and the economic analysis prepared when amendments to the NCP were proposed (50 FR 5882, February 12, 1985). The Agency believes the anticipated economic effects related to adding these 106 sites to the NPL can be characterized in terms of the conclusions of the earlier RIA and the most recent economic analysis. This rule was submitted to the Office of Management and Budget for review as required by Executive Order 12291.

Costs

EPA has determined that this rulemaking is not a "major" regulation under Executive Order 12291 because inclusion of a site on the NPL does not itself impose any costs. It does not establish that EPA necessarily will undertake remedial action, nor does it require any action by a private party or determine its liability for site response costs. Costs that arise out of site responses result from site-by-site decisions about what actions to take, not directly from the act of listing itself. Nonetheless, it is useful to consider the costs associated with responding to all sites included in this rulemaking.

The major events that follow the proposed listing of a site on the NPL are a search for potentially responsible parties and a remedial investigation/feasibility study (RI/FS) to determine if remedial actions will be undertaken at a site. Design and construction of the selected remedial alternative follow completion of the RI/FS, and operation and maintenance (O&M) activities may continue after construction has been completed.

EPA initially bears costs associated with responsible party searches. Responsible parties may bear some or all the costs of the RI/FS, remedial design and construction, and O&M, or EPA and the States may share costs.

The State cost share for site cleanup activities has been amended by section 104 of SARA. For privately-owned sites, as well as for publicly-owned but not publicly-operated sites, EPA will pay for 100% of the costs of the RI/FS and remedial planning, and 90% of the costs associated with remedial action. The State will be responsible for 10% of the remedial action. For publicly-operated sites, the State cost share is at least 50% of all response costs at the site, including the RI/FS and remedial design and construction of the remedial action selected. After the remedy is built, costs fall into two categories:

- For restoration of ground water and surface water, EPA will share in startup costs according to the criteria in the previous paragraph for 10 years or until a sufficient level of protectiveness is achieved before the end of 10 years.
- For other cleanups, EPA will share for up to 1 year the cost of that portion of response needed to assure that a remedy is operational and functional. After that, the State assumes full responsibilities for O&M.

In previous NPL rulemakings, the Agency estimated the costs associated with these activities (RI/FS), remedial design, remedial action, and O&M) on an average per site and total cost basis. EPA will continue with this approach, using the most recent (1988) cost estimates available; these estimates are presented below. However, there is wide variation in costs for individual sites, depending on the amount, type, and extent of contamination. Additionally, EPA is unable to predict what portions of the total costs responsible parties will bear, since the distribution of costs depends on the extent of voluntary and negotiated response and the success of any cost-recovery actions.

Cost category	Average total cost per site [1]
RI/FS	1,300,000
Remedial Design	1,500,000
Remedial Action	[2] 25,000,000
Net present value of O&M [3]	[2] 3,770,000

[1] 1988 U.S. Dollars.
[2] Includes State cost-share.
[3] Assumes cost of O&M over 30 years, $400,000 for the first year and 10% discount rate.

SOURCE: Office of Program Management, Office of Emergency and Remedial Response, U.S. EPA.

Costs to States associated with today's final rule arise from the required State cost-share of: (1) 10% of remedial actions and 10% of first-year O&M costs at privately-owned sites and sites that are publicly-owned but not publicly-operated; and (2) at least 50% of the remedial planning (RI/FS and remedial design), remedial action, and first-year O&M costs at publicly-operated sites. States will assume the cost for O&M after EPA's period of participation. Using the assumptions developed in the 1982 RIA for the NCP, EPA has assumed that 90% of the 83 non-Federal sites added to the NPL in this rule will be privately-owned and 10% will be State- or locally-operated. Therefore, using the budget projections presented above, the cost to States of undertaking Federal remedial planning and actions, but excluding O&M costs, would be approximately $301.6 million. State O&M costs cannot be accurately determined because EPA, as noted above, will share O&M costs for up to 10 years for restoration of ground water and surface water, and it is not known how many sites will require this treatment and for how long. However, based on past experience, EPA believes a reasonable estimate is that it will share startup costs for up to 10 years at 25% of sites. Using this estimate, State O&M costs would be approximately $265.5 million.

Placing a hazardous waste site on the NPL does not itself cause firms responsible for the site to bear costs. Nonetheless, a listing may induce firms to clean up the sites voluntarily, or it may act as a potential trigger for subsequent enforcement or cost-recovery actions. Such actions may impose costs on firms, but the decisions to take actions are discretionary and made on a case-by-case basis. Consequently, precise estimates of these effects cannot be made. EPA does not believe that every site will be cleaned up by a responsible party. EPA cannot project at this time which firms or industry sectors will bear specific portions of the response costs, but the Agency considers: The volume and nature of the waste at the sites; the strength of the evidence linking the wastes at the site to the parties; the parties' ability to pay; and other factors when deciding whether and how to proceed against the parties.

Economy-wide effects of this amendment to the NCP are aggregations of effects on firms and State and local governments. Although effects could be felt by some individual firms and States, the total impact of this amendment on output, prices, and employment is expected to be negligible at the national level, as was the case in the 1982 RIA.

Benefits

The real benefits associated with today's amendment placing additional sites on the NPL are increased health and environmental protection as a result of increased public awareness of

potential hazards. In addition to the potential for more Federally-financed remedial actions, expansion of the NPL could accelerate privately-financed, voluntary cleanup efforts. Listing sites as national priority targets also may give States increased support for funding responses at particular sites.

As a result of the additional CERCLA remedies, there will be lower human exposure to high-risk chemicals, and higher-quality surface water, ground water, soil, and air. These benefits are expected to be significant, although difficult to estimate in advance of completing the RI/FS at these sites.

IX. Regulatory Flexibility Act Analysis

The Regulatory Flexibility Act of 1980 requires EPA to review the impacts of this action on small entities, or certify that the action will not have a significant impact on a substantial number of small entities. By small entities, the Act refers to small businesses, small government jurisdictions, and nonprofit organizations.

While modifications to the NPL are considered revisions to the NCP, they are not typical regulatory changes since the revisions do not automatically impose costs. The placing of sites on the NPL does not in itself require any action by any private party, nor does it determine the liability of any party for the cost of cleanup at the site. Further, no identifiable groups are affected as a whole. As a consequence, it is hard to predict impacts on any group. Placing a site on the NPL could increase the likelihood that adverse impacts to responsible parties (in the form of cleanup costs) will occur, but EPA cannot identify the potentially affected business at this time nor estimate the number of small businesses that might be affected.

The Agency does not expect that certain industries and firms within industries that have caused a proportionately high percentage of waste site problems could be significantly affected by CERCLA actions. However, EPA does not expect the impacts from the listing of these 83 non-Federal sites to have a significant economic impact on a substantial number of small businesses.

In any case, economic impacts would occur only through enforcement and cost-recovery actions, which are taken at EPA's discretion on a site-by-site basis. EPA considers many factors when determining what enforcement actions to take, including not only the firm's contribution to the problem, but also the firm's ability to pay.

The impacts (from cost recovery) on small governments and nonprofit organizations would be determined on a similar case-by-case basis.

List of Subjects in 40 CFR Part 300

Air pollution control, Chemicals, Hazardous materials, Intergovernmental relations, Natural resources, Oil pollution, Reporting and recordkeeping requirements, Superfund, Waste treatment and disposal, Water pollution control, Water supply.

Dated: August 22, 1990.

Mary Gade,

Acting Assistant Administrator, Office of Solid Waste and Emergency Response.

40 CFR part 300 is amended as follows:

PART 300—[AMENDED]

1. The authority citation for part 300 continues to read as follows:

Authority: 42 U.S.C. 9605; 42 U.S.C. 9620; 33 U.S.C. 1321(c)(2); E.O. 11735 (38 FR 21243); E.O. 12580 (52 FR 2923).

2. Appendix B of part 300 is revised to read as set forth below.

Appendix B—National Priorities List

NATIONAL PRIORITIES LIST (BY RANK)

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
Group 1 (HRS Scores 75.60–59.54)				
1	02	NJ	Lipari Landfill	Pitman.
2	03	DE	Tybouts Corner Landfill*.	New Castle County.
3	03	PA	Bruin Lagoon	Bruin Borough.
4	02	NJ	Helen Kramer Landfill.	Mantua Township.
5	01	MA	Industri-Plex	Woburn.
6	02	NJ	Price Landfill*	Pleasantville.
7	02	NY	Pollution Abatement Services*.	Oswego.
8	07	IA	LaBounty Site	Charles City.
9	03	DE	Army Creek Landfill.	New Castle County.
10	02	NJ	CPS/Madison Industries.	Old Bridge Township.
11	01	MA	Nyanza Chemical Waste Dump.	Ashland.
12	02	NJ	GEMS Landfill	Gloucester Township.
13	05	MI	Berlin & Farro	Swartz Creek.
14	01	MA	Baird & McGuire	Holbrook.
15	02	NJ	Lone Pine Landfill.	Freehold Township.
16	01	NH	Somersworth Sanitary Landfill.	Somersworth.
17	05	MN	FMC Corp. (Fridley Plant).	Fridley.
18	06	AR	Vertac, Inc	Jacksonville.
19	01	NH	Keefe Environmental Services.	Epping.
20	08	MT	Silver Bow Creek/Butte Area.	Sil Bow/Deer Lodge.
21	08	SD	Whitewood Creek*.	Whitewood.
22	06	TX	French, Ltd	Crosby.
23	05	MI	Liquid Disposal, Inc.	Utica.
24	01	NH	Sylvester*	Nashua.
25	03	PA	Tysons Dump	Upper Merion Twp.
26	03	PA	McAdoo Associates*.	McAdoo Borough.
27	06	TX	Motco, Inc.*	La Marque.
28	05	OH	Arcanum Iron & Metal.	Darke County.
29	08	MT	East Helena Site	East Helena.
30	06	TX	Sikes Disposal Pits.	Crosby.
31	04	AL	Triana/Tennessee River.	Limestone/Morgan.
32	09	CA	Stringfellow*	Glen Avon Heights.
33	01	ME	McKin Co	Gray.
34	06	TX	Crystal Chemical Co.	Houston.
35	02	NJ	Bridgeport Rental & Oil Services.	Bridgeport.
36	08	CO	Sand Creek Industrial.	Commerce City.
37	06	TX	Geneva Industries/Fuhrmann Energy.	Houston.
38	01	MA	W.R. Grace & Co Inc (Acton Plant).	Acton.
39	05	MN	New Brighton/Arden Hills.	New Brighton.
40	05	MN	Reilly Tar (St. Louis Park Plant)*.	St. Louis Park.
41	02	NJ	Vineland Chemical Co., Inc.	Vineland.
42	02	NJ	Burnt Fly Bog	Marlboro Township.
43	04	FL	Schuylkill Metals Corp.	Plant City.
44	03	PA	Publicker Industries Inc.	Philadelphia.
45	02	NY	Old Bethpage Landfill.	Oyster Bay.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
46	04	FL	Reeves Southeast Galvanizing Corp.	Tampa.
47	02	NJ	Shieldalloy Corp	Newfield Borough.
48	08	MT	Anaconda Co. Smelter.	Anaconda.
49	10	WA	Western Processing Co., Inc.	Kent.
50	05	WI	Omega Hills North Landfill.	Germantown.
Group 2 (HRS Scores 59.41–57.89, except for State top priority sites)				
51	04	FL	American Creosote (Pensacola Pit).	Pensacola.
52	02	NJ	Caldwell Trucking Co.	Fairfield.
53	02	NY	GE Moreau	South Glen Falls.
54	05	IN	Seymour Recycling Corp.*	Seymour.
55	04	FL	Peak Oil Co./Bay Drum Co.	Tampa.
56	05	OH	United Scrap Lead Co., Inc.	Troy.
57	07	KS	Cherokee County	Cherokee County.
58	06	OK	Tar Creek (Ottawa County).	Ottawa County.
59	02	NJ	Brick Township Landfill.	Brick Township.
60	02	NJ	Brook Industrial Park.	Bound Brook.
61	05	MI	American Anodco, Inc.	Ionia.
62	10	WA	Frontier Hard Chrome, Inc.	Vancouver.
63	05	WI	Janesville Old Landfill.	Janesville.
64	05	MI	Northernaire Plating.	Cadillac.
65	04	SC	Independent Nail Co.	Beaufort.
66	05	WI	Janesville Ash Beds.	Janesville.
67	04	SC	Kalama Specialty Chemicals.	Beaufort.
68	07	IA	Lehigh Portland Cement Co.	Mason City.
69	04	FL	Davie Landfill	Davie.
70	05	OH	Miami County Incinerator.	Troy.
71	10	WA	ALCOA (Vancouver Smelter).	Vancouver.
72	10	ID	Eastern Michaud Flats Contamin.	Pocatello.
73	09	AZ	Tucson International Airport Area.	Tucson.
74	07	IA	Northwestern States Portland Cem.	Mason City.
75	05	WI	Wheeler Pit	La Prairie Township.
76	05	IN	International Minerals (E. Plant).	Terre Haute.
77	04	FL	Gold Coast Oil Corp.	Miami.
78	03	PA	Salford Quarry	Salford Township.
79	05	MI	Gratiot County Landfill*.	St. Louis.
80	01	RI	Picillo Farm*	Coventry.
81	01	MA	New Bedford Site*.	New Bedford.
82	06	LA	Old Inger Oil Refinery*.	Darrow.
83	05	OH	Chem-Dyne*	Hamilton.
84	04	SC	SCRDI Bluff Road*.	Columbia.
85	01	CT	Laurel Park, Inc.*	Naugatuck Borough.
86	08	CO	Marshall Landfill*	Boulder County.
87	05	IL	Outboard Marine Corp.*.	Waukegan.
88	06	NM	South Valley*	Albuquerque.
89	01	VT	Pine Street Canal*.	Burlington.
90	03	WV	West Virginia Ordnance*.	Point Pleasant.
91	07	MO	Ellsville Site*	Ellsville.
92	08	ND	Arsenic Trioxide Site*.	Southeastern ND.
93	07	IA	Aidex Corp.*	Council Bluffs.
94	05	WI	N.W. Mauthe Co., Inc.*.	Appleton.
95	04	TN	North Hollywood Dump*.	Memphis.
96	04	KY	A.L. Taylor (Valley of Drums)*.	Brooks.
97	09	GU	Ordot Landfill*	Guam.
98	04	MS	Flowood Site*	Flowood.
99	08	UT	Rose Park Sludge Pit*.	Salt Lake City.
100	07	KS	Arkansas City Dump*.	Arkansas City.
Group 3 (HRS Scores 57.80–52.58)				
101	10	WA	General Electric (Spokane Shop).	Spokane.
102	09	CA	Operating Industries, Inc. Lndfll.	Monterey Park.
103	02	NY	Wide Beach Development.	Brant.
104	09	CA	Iron Mountain Mine.	Redding.
105	02	NJ	Scientific Chemical Processing.	Carlstadt.
106	08	CO	California Gulch	Leadville.
107	02	NJ	D'Imperio Property.	Hamilton Township.
108	05	MN	Oakdale Dump	Oakdale.
109	05	IL	Parsons Casket Hardware Co.	Belvidere.
110	05	IL	A & F Material Reclaiming, Inc.	Greenup.
111	03	PA	Douglassville Disposal.	Douglasville.
112	05	MN	Koppers Coke	St. Paul.
113	01	MA	Plymouth Harbor/Cannon Eng. Corp.	Plymouth.
114	10	ID	Monsanto Chemical (Soda Springs).	Soda Springs.
115	10	ID	Bunker Hill Mining & Metallurg.	Smelterville.
116	02	NY	Hudson River PCBs.	Hudson River.
117	02	NJ	Universal Oil Products (Chem Div).	East Rutherford.
118	09	CA	Aerojet General Corp.	Rancho Cordova.
119	10	WA	Com Bay, South Tacoma Channel.	Tacoma.
120	03	PA	Osborne Landfill	Grove City.
121	08	UT	Portland Cement (Kiln Dust 2 & 3).	Salt Lake City.
122	01	CT	Old Southington Landfill.	Southington.
123	02	NY	Syosset Landfill	Oyster Bay.
124	02	NY	Circuitron Corp	East Farmingdale.
125	09	AZ	Nineteenth Avenue Landfill.	Phoenix.
126	10	OR	Teledyne Wah Chang.	Albany.
127	10	WA	Midway Landfill	Kent.
128	02	NY	Sinclair Refinery	Wellsville.
129	04	AL	Mowbray Engineering Co.	Greenville.
130	05	MI	Spiegelberg Landfill.	Green Oak Township.
131	04	FL	Miami Drum Services.	Miami.
132	02	NJ	Reich Farms	Pleasant Plains.
133	10	ID	Union Pacific Railroad Co.	Pocatello.
134	02	NJ	South Brunswick Landfill.	South Brunswick.
135	03	PA	Raymark	Hatboro.
136	04	AL	Ciba-Geigy Corp. (McIntosh Plant).	McIntosh.
137	04	FL	Kassauf-Kimerling Battery.	Tampa.
138	05	IL	Wauconda Sand & Gravel.	Wauconda.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

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NPL rank	EPA reg.	St	Site name	City/county
139	05	MI	Bofors Nobel, Inc.	Muskegon.
140	06	TX	Bailey Waste Disposal.	Bridge City.
141	01	NH	Ottati & Goss/Kingston Steel Drum.	Kingston.
142	05	MI	Ott/Story/Cordova Chemical Co.	Dalton Township.
143	05	MI	Thermo-Chem, Inc.	Muskegon.
144	09	CA	Brown & Bryant, Inc. (Arvin Plant).	Arvin.
145	03	VA	Greenwood Chemical Co.	Newtown.
146	02	NJ	NL Industries	Pedricktown.
147	05	MN	St. Regis Paper Co.	Cass Lake.
148	04	KY	Brantley Landfill	Island.
149	04	NC	Aberdeen Pesticide Dumps.	Aberdeen.
150	01	VT	Burgess Brothers Landfill.	Woodford.
Group 4 (HRS Scores 52.58–50.23)				
151	02	NJ	Ringwood Mines/Landfill.	Ringwood Borough.
[illegible]	04	FL	Whitehouse Oil Pits.	Whitehouse.
153	04	GA	Hercules 009 Landfill.	Brunswick.
154	02	NY	Jones Sanitation	Hyde Park.
155	01	VT	Parker Sanitary Landfill.	Lyndon.
156	05	MI	Velsicol Chemical Corp. (Michigan).	St. Louis.
157	05	OH	Summit National	Deerfield Township.
158	02	NY	Love Canal	Niagara Falls.
159	10	WA	Seattle Mun Lndfll (Kent Highlnds).	Kent.
160	03	DE	Coker's Sanitation Service Lndfls.	Kent County.
161	05	MI	Rockwell International (Allegan).	Allegan.
162	05	MN	Pine Bend Sanitary Landfill.	Dakota County.
163	07	IA	Lawrence Todtz Farm.	Camanche.
164	05	IL	Beloit Corp.	Rockton.
165	05	IN	Fisher-Calo	LaPorte.
166	04	FL	Pioneer Sand Co.	Warrington.
167	05	MI	Springfield Township Dump.	Davisburg.
[illegible]	03	PA	Hranica Landfill	Buffalo Township.
169	04	NC	Martin-Marietta, Sodyeco, Inc.	Charlotte.
170	03	DE	E.I. Du Pont (Newport Plant Lf).	Newport.
171	03	PA	Hellertown Manufacturing Co.	Hellertown.
172	04	FL	Zellwood Ground Water Contamin.	Zellwood.
173	05	MI	Packaging Corp. of America.	Filer City.
174	05	WI	Muskego Sanitary Landfill.	Muskego.
175	10	ID	Kerr-McGee Chemical (Soda Springs).	Soda Springs.
176	05	IN	Whiteford Sales & Ser/National Lease.	South Bend.
177	02	NY	Hooker (S Area)	Niagara Falls.
178	03	PA	Lindane Dump	Harrison Township.
179	08	CO	Central City-Clear Creek.	Idaho Springs.
180	02	NJ	Ventron/Velsicol	Wood Ridge Borough.
181	04	FL	Taylor Road Landfill.	Seffner.
182	01	RI	Western Sand & Gravel.	Burrillville.
183	02	NY	Rosen Brothers Scrap Yard/Dump.	Cortland.
184	04	SC	Koppers Co Inc (Florence Plant).	Florence.
185	02	NJ	Maywood Chemical Co.	Maywood/Rochelle Pk.
186	02	NJ	Nascolite Corp.	Millville.
187	05	OH	Industrial Excess Landfill.	Uniontown.
188	09	CA	Industrial Waste Processing.	Fresno.
189	06	OK	Hardage/Criner	Criner.
190	05	MI	Rose Township Dump.	Rose Township.
191	05	MN	Waste Disposal Engineering.	Andover.
192	02	NY	Liberty Industrial Finishing.	Farmingdale.
193	02	NJ	Kin-Buc Landfill	Edison Township.
194	05	IN	Waste, Inc., Landfill.	Michigan City.
195	05	OH	Bowers Landfill	Circleville.
196	06	TX	Brio Refining, Inc.	Friendswood.
197	02	NJ	Ciba-Geigy Corp.	Toms River.
198	05	MI	Butterworth #2 Landfill.	Grand Rapids.
199	02	NJ	American Cyanamid Co.	Bound Brook.
200	03	PA	Heleva Landfill	North Whitehall Twp.
Group 5 (HRS Scores 50.19–47.49)				
201	02	NJ	Ewan Property	Shamong Township.
202	02	NY	Batavia Landfill	Batavia.
203	05	IL	Woodstock Municipal Landfill.	Woodstock.
204	05	MN	Boise Cascade/Onan/Medtronics.	Fridley.
205	05	IL	MIG/Dewane Landfill.	Belvidere.
206	01	RI	Landfill & Resource Recovery.	North Smithfield.
207	05	MI	Hi-Mill Manufacturing Co.	Highland.
208	03	PA	Butler Mine Tunnel.	Pittston.
209	04	FL	Northwest 58th Street Landfill.	Hialeah.
210	02	NJ	Delilah Road	Egg Harbor Township.
211	03	PA	Mill Creek Dump	Erie.
212	02	NJ	Glen Ridge, Radium Site.	Glen Ridge.
213	02	NJ	Montclair/West Orange Radium Site.	Montclair/W Orange.
214	01	CT	Precision Plating Corp.	Vernon.
215	04	FL	Sixty-Second Street Dump.	Tampa.
216	05	MI	G&H Landfill	Utica.
217	01	VT	Bennington Municipal Sanitary Lfl.	Bennington.
218	04	NC	Celanese (Shelby Fiber Operations).	Shelby.
219	02	NJ	Metaltec/Aerosystems.	Franklin Borough.
220	05	WI	Schmalz Dump	Harrison.
221	04	TN	Carrier Air Conditioning Co.	Collierville.
222	05	MI	Motor Wheel, Inc.	Lansing.
223	05	WI	Better Brite Chrome & Zinc Shops.	DePere.
224	09	CA	Southern Calif Edison (Visalia).	Visalia.
225	02	NJ	Lang Property	Pemberton Township.
226	06	TX	Stewco, Inc.	Waskom.
227	02	NJ	Sharkey Landfill	Parsippany/Troy Hls.
228	09	CA	Selma Treating Co.	Selma.
229	06	LA	Cleve Reber	Sorrento.

National Priorities List (by Rank)—Continued

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NPL rank	EPA reg.	St	Site name	City/county
230	05	IL	Velsicol Chemical Corp. (Illinois).	Marshall.
231	07	MO	Wheeling Disposal Service Co. Lf.	Amazonia.
232	05	MI	Tar Lake	Mancelona Township.
233	02	NY	Johnstown City Landfill.	Town of Johnstown.
234	04	NC	NC State U (Lot 86, Farm Unit #1).	Raleigh.
235	08	CO	Lowry Landfill	Arapahoe County.
236	05	MN	MacGillis & Gibbs/Bell Lumber.	New Brighton.
237	03	PA	Huntersdown Road.	Straban Township.
238	03	MD	Woodlawn County Landfill.	Woodlawn.
239	05	WI	Hechimovich Sanitary Landfill.	Williamstown.
240	07	IA	Mid-America Tanning Co.	Sergeant Bluff.
241	07	NE	Lindsay Manufacturing Co.	Lindsay.
[illegible]	02	NJ	Combe Fill North Landfill.	Mount Olive Twp.
243	01	MA	Re-Solve, Inc	Dartmouth.
244	02	NJ	Goose Farm	Plumstead Township.
245	04	TN	Velsicol Chem (Hardeman County).	Toone.
246	02	NY	York Oil Co	Moira.
247	04	FL	Sapp Battery Salvage.	Cottondale.
248	04	SC	Wamchem, Inc	Burton.
249	02	NJ	Chemical Leaman Tank Lines, Inc.	Bridgeport.
250	05	WI	Master Disposal Service Landfill.	Brookfield.
Group 6 (HRS Scores 47.46–45.91)				
251	07	KS	Doepke Disposal (Holliday).	Johnson County.
252	02	NJ	Florence Land Recontouring Landfill.	Florence Township.
253	01	RI	Davis Liquid Waste.	Smithfield.
254	01	MA	Charles-George Reclamation Landfill.	Tyngsborough.
255	02	NJ	King of Prussia	Winslow Township.
[illegible]	03	VA	Chisman Creek	York County.
257	05	OH	Nease Chemical	Salem.
258	08	CO	Eagle Mine	Minturn/Redcliff.
259	02	NJ	Chemical Control	Elizabeth.
260	04	NC	Charles Macon Lagoon & Drum Stor.	Cordova.
261	04	SC	Leonard Chemical Co., Inc.	Rock Hill.
262	05	OH	Allied Chemical & Ironton Coke.	Ironton.
263	05	MI	Verona Well Field.	Battle Creek.
264	07	MO	Lee Chemical	Liberty.
265	01	CT	Beacon Heights Landfill.	Beacon Falls.
266	04	AL	Stauffer Chem (Cold Creek Plant).	Bucks.
267	05	MN	Burlington Northern (Brainerd).	Brainerd/Baxter.
268	05	MI	Torch Lake	Houghton County.
269	01	RI	Central Landfill	Johnston.
270	03	PA	Malvern TCE	Malvern.
271	02	NY	Facet Enterprises, Inc.	Elmira.
272	03	DE	Delaware Sand & Gravel Landfill.	New Castle County.
273	03	PA	Tonolli Corp	Nesquehoning.
274	04	NC	National Starch & Chemical Corp.	Salisbury.
275	03	PA	MW Manufacturing.	Valley Township.
276	03	VA	C & R Battery Co., Inc.	Chesterfield County.
277	04	TN	Murray-Ohio Dump.	Lawrenceburg.
278	05	IN	Environchem Corp.	Zionsville.
279	05	IN	MIDCO I	Gary.
280	05	OH	Ormet Corp.	Hannibal.
281	05	OH	South Point Plant	South Point.
282	01	CT	Gallup's Quarry	Plainfield.
283	03	PA	Whitmoyer Laboratories.	Jackson Township.
284	07	IA	Peoples Natural Gas Co.	Dubuque.
285	07	MO	Oronogo-Duenweg Mining Belt.	Jasper County.
286	04	FL	Coleman-Evans Wood Preserving Co.	Whitehouse.
287	02	NJ	Dayco Corp./L.E. Carpenter Co.	Wharton Borough.
288	03	PA	Shriver's Corner	Straban Township.
289	03	PA	Dorney Road Landfill.	Upper Macungie Twp.
290	03	PA	Berks Landfill	Spring Township.
291	05	IN	Northside Sanitary Landfill, Inc.	Zionsville.
292	05	IL	Interstate Pollution Control, Inc.	Rockford.
293	06	AR	Monroe Auto Equip (Paragould Pit).	Paragould.
294	06	OK	Oklahoma Refining Co.	Cyril.
295	07	IA	E.I. Du Pont (County Rd X23).	West Point.
296	09	CA	Pacific Coast Pipe Lines.	Fillmore.
297	02	NJ	Global Sanitary Landfill.	Old Bridge Township.
298	04	FL	Florida Steel Corp.	Indiantown.
299	03	PA	Occidental Chem/Firestone Tire.	Lower Pottsgrove Twp.
300	03	VA	Culpeper Wood Preservers, Inc.	Culpeper.
Group 7 (HRS Scores 45.91–43.75)				
301	05	IL	Pagel's Pit	Rockford.
302	05	MN	University Minn Rosemount Res Cen.	Rosemount.
303	05	MN	Freeway Sanitary Landfill.	Burnsville.
304	05	WI	Tomah Municipal Sanitary Landfill.	Tomah.
305	09	AZ	Litchfield Airport Area.	Goodyear/Avondale.
306	09	CA	Firestone Tire (Salinas Plant).	Salinas.
307	02	NJ	Spence Farm	Plumstead Township.
308	06	AR	Mid-South Wood Products.	Mena.
309	04	MS	Newsom Brothers/Old Reichhold.	Columbia.
310	09	CA	Atlas Asbestos Mine.	Fresno County.
311	09	CA	Coalinga Asbestos Mine.	Coalinga.
312	04	FL	Brown Wood Preserving.	Live Oak.
313	02	NY	Port Washington Landfill.	Port Washington.
314	05	IN	Columbus Old Municipal Lndfll #1.	Columbus.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

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NPL rank	EPA reg.	St	Site name	City/county
315	02	NJ	Combe Fill South Landfill.	Chester Township.
316	02	NJ	JIS Landfill	Jamesburg/S. Brnswck.
317	02	NY	Tronic Plating Co., Inc.	Farmingdale.
318	03	PA	Centre County Kepone.	State College Boro.
319	04	FL	Agrico Chemical Co.	Pensacola.
320	05	OH	Fields Brook	Ashtabula.
321	01	CT	Solvents Recovery Service New Eng.	Southington.
322	08	CO	Woodbury Chemical Co.	Commerce City.
323	02	NJ	Waldick Aerospace Devices, Inc.	Wall Township.
324	01	MA	Hocomonco Pond.	Westborough.
325	04	KY	Distler Brickyard	West Point.
326	02	NY	Ramapo Landfill	Ramapo.
327	09	CA	Coast Wood Preserving.	Ukiah.
[illegible]	09	CA	South Bay Asbestos Area.	Alviso.
329	02	NY	Mercury Refining, Inc.	Colonie.
330	04	FL	Hollingsworth Solderless Terminal.	Fort Lauderdale.
331	02	NY	Olean Well Field	Olean.
332	04	AL	T.H. Agricul & Nutri (Montgomery).	Montgomery.
333	09	CA	Fairchild Semiconduct (S San Jose).	South San Jose.
334	10	WA	Pasco Sanitary Landfill.	Pasco.
335	09	CA	Sulphur Bank Mercury Mine.	Clear Lake.
336	05	MN	Joslyn Manufacturing & Supply Co.	Brooklyn Center.
337	03	PA	York County Solid Waste/Refuse Lf.	Hopewell Township.
338	05	WI	Spickler Landfill	Spencer.
339	08	MN	Prewitt Abandoned Refinery.	Prewitt.
340	08	CO	Denver Radium Site.	Denver.
341	02	NY	Tri-Cities Barrel Co., Inc.	Port Crane.
342	03	PA	Route 940 Drum Dump.	Pocono Summit.
343	04	FL	Tower Chemical Co.	Clermont.
344	05	MI	Peerless Plating Co.	Muskegon.
[illegible]	01	VT	Darling Hill Dump.	Lyndon.
346	03	PA	C & D Recycling	Foster Township.
347	04	KY	Fort Hartford Coal Co Stone Curry.	Olaton.
348	07	MO	Syntex Facility	Verona.
349	08	MT	Milltown Reservoir Sediments.	Milltown.
350	05	MN	Arrowhead Refinery Co.	Hermantown.
Group 8 (HRS Scores 43.70–42.33)				
351	10	OR	Martin-Marietta Aluminum Co.	The Dalles.
352	08	CO	Uravan Uranium (Union Carbide).	Uravan.
353	02	NJ	Pijak Farm	Plumstead Township.
354	02	NJ	Syncon Resins	South Kearny.
355	05	MN	Oak Grove Sanitary Landfill.	Oak Grove Township.
356	07	IA	White Farm Equipment Co. Dump.	Charles City.
357	09	CA	Liquid Gold Oil Corp.	Richmond.
358	09	CA	Purity Oil Sales, Inc.	Malaga.
359	01	NH	Tinkham Garage	Londonderry.
360	04	FL	Alpha Chemical Corp.	Galloway.
361	02	NJ	Bog Creek Farm	Howell Township.
362	01	ME	Saco Tannery Waste Pits.	Saco.
363	03	PA	River Road Lf/Waste Mngmnt, Inc.	Hermitage.
364	02	PR	Frontera Creek	Rio Abajo.
365	04	FL	Pickettville Road Landfill.	Jacksonville.
366	05	OH	Alaco Anaconda	Gnadenhutten.
367	01	MA	Iron Horse Park	Billerica.
368	03	PA	Palmerton Zinc Pile.	Palmerton.
369	05	IN	Neal's Landfill (Bloomington).	Bloomington.
370	05	WI	Kohler Co. Landfill.	Kohler.
371	04	AL	Interstate Lead Co. (ILCO).	Leeds.
372	04	FL	Standard Auto Bumper Corp.	Hialeah.
373	07	KS	Hydro-Flex Inc	Topeka.
374	09	AZ	Hassayampa Landfill.	Hassayampa.
375	06	LA	Gulf Coast Vacuum Services.	Abbeville.
376	05	IL	Tri-County Lf/Waste Mgmt Illinois.	South Elgin.
377	01	MA	Sitresim Chemical Corp.	Lowell.
378	01	MA	Wells G&H	Woburn.
379	01	CT	Nutmeg Valley Road.	Wolcott.
380	02	NJ	Chemsol, Inc	Piscataway.
381	05	WI	Lauer I Sanitary Landfill.	Menomonee Falls.
382	05	MI	Petoskey Municipal Well Field.	Petoskey.
383	05	MN	Union Scrap Iron & Metal Co.	Minneapolis.
384	01	MA	Atlas Tack Corp	Fairhaven.
385	02	NJ	Radiation Technology, Inc.	Rockaway Township.
386	02	NJ	Fair Lawn Well Field.	Fair Lawn.
387	05	IN	Main Street Well Field.	Elkhart.
388	05	MN	Lehillier/Mankato Site.	Lehillier/Mankato.
389	01	WA	Lakewood Site	Lakewood.
390	03	PA	Industrial Lane	Williams Township.
391	04	FL	Airco Plating Co	Miami
392	05	IN	Fort Wayne Reduction Dump.	Fort Wayne.
393	05	WI	Onalaska Municipal Landfill.	Onalaska.
394	03	PA	A.I.W. Frank/Mid-County Mustang.	Exton.
395	05	WI	National Presto Industries, Inc.	Eau Claire.
396	02	NJ	Monroe Township Landfill.	Monroe Township.
397	03	PA	Commodore Semiconductor Group.	Lower Providence Twp.
398	02	NJ	Rockaway Borough Well Field.	Rockaway Township.
399	05	IL	Lenz Oil Service, Inc.	Lemont.
400	05	IN	Wayne Waste Oil	Columbia City.
Group 9 (HRS Scores 42.33–41.60)				
401	10	WA	Pacific Car & Foundry Co.	Renton.
402	07	IA	John Deere (Ottumwa Works Lndfls).	Ottumwa.
403	03	MD	Mid-Atlantic Wood Preservers, Inc.	Harmans.
404	03	PA	Novak Sanitary Landfill.	South Whitehall Twp.
405	05	IN	Himco Dump	Elkhart.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

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NPL rank	EPA reg.	St	Site name	City/county
406	10	ID	Pacific Hide & Fur Recycling Co.	Pocatello.
407	07	IA	Des Moines TCE	Des Moines.
408	02	NJ	Beachwood/Berkley Wells.	Berkley Township.
409	02	NJ	South Jersey Clothing Co.	Minotola.
410	02	NY	Vestal Water Supply Well 4-2.	Vestal.
411	02	PR	Vega Alta Public Supply Wells.	Vega Alta.
412	03	PA	Avco Lycoming (Williamsport Div).	Williamsport.
413	03	PA	Ohio River Park	Neville Island.
414	04	GA	Wolfolk Chemical Works, Inc.	Fort Valley.
415	05	IL	Southeast Rockford Grnd Wtr Con.	Rockford.
416	05	IN	Tippecanoe Sanitary Landfill, Inc.	Lafayette.
417	05	IN	Conrail Rail Yard (Elkhart).	Elkhart.
418	05	IN	Galen Myers Dump/Drum Salvage.	Osceola.
[illegible]	05	MI	Sturgis Municipal Wells.	Sturgis.
420	05	MI	Barrels, Inc	Lansing.
421	05	MI	State Disposal Landfill, Inc.	Grand Rapids.
422	05	MN	Washington County Landfill.	Lake Elmo
423	05	MN	Dakhue Sanitary Landfill.	Cannon Falls.
424	06	TX	Odessa Chromium #1.	Odessa.
425	06	TX	Odessa Chromium #2 (Andrews Hgwy).	Odessa.
426	07	IA	Electro-Coatings, Inc.	Cedar Rapids.
427	07	NE	Hastings Ground Water Contamin.	Hastings.
428	08	SD	Williams Pipe Line Disposal Pit.	Sioux Falls.
429	09	AZ	Indian Bend Wash Area.	Scottsdale/Tempe/Phnx.
430	09	CA	San Gabriel Valley (Area 1).	El Monte.
431	09	CA	San Gabriel Valley (Area 2).	Baldwin Park Area.
432	09	CA	San Fernando Valley (Area 1).	Los Angeles.
433	09	CA	San Fernando Valley (Area 2).	Los Angeles/Glendale.
[illegible]	09	CA	San Fernando Valley (Area 3).	Glendale.
435	09	CA	T.H. Agriculture & Nutrition Co.	Fresno.
436	10	AK	Arctic Surplus	Fairbanks.
437	10	WA	Com Bay, Near Shore/Tide Flats.	Pierce County.
438	05	IL	LaSalle Electric Utilities.	LaSalle.
439	05	IL	Cross Brothers Pail (Pembroke).	Pembroke Township.
440	04	GA	Cedartown Industries, Inc.	Cedartown.
441	04	NC	Jadco-Hughes Facility.	Belmont.
442	05	IN	Southside Sanitary Landfill.	Indianapolis.
443	02	NJ	Monitor Devices/Intercircuits Inc.	Wall township.
444	01	VT	BFI Sanitary Landfill (Rockingham).	Rockingham.
445	02	PR	Upjohn Facility	Barceloneta.
446	04	NC	Koppers Co Inc (Morrisville Plnt).	Morrisville.
447	08	UT	Sharon Steel (Midvale Tailings).	Midvale.
448	09	CA	McColl	Fullerton.
449	03	PA	Henderson Road	Upper Merion Twp.
450	02	NY	Hooker Chemical/Ruco Polymer Corp.	Hicksville.
Group 10 (HRS Scores 41.59-39.89)				
451	10	WA	Colbert Landfill	Colbert.
452	06	LA	Petro-Processors of Louisiana Inc.	Scotlandville.
453	03	PA	Westinghouse Elec (Sharon Plant).	Sharon.
454	02	NY	Applied Environmental Services.	Glenwood Landing.
455	02	PR	Barceloneta Landfill.	Florida Afuera.
456	01	NH	Tibbets Road	Barrington.
457	03	MD	Sand, Gravel & Stone.	Elkton.
458	03	PA	Delta Quarries/Stotler Landfill.	Antis/Logan Twps.
459	01	CT	Revere Textile Prints Corp.	Sterling.
460	05	MI	Spartan Chemical Co.	Wyoming.
461	02	NJ	Roebling Steel Co.	Florence.
462	03	PA	East Mount Zion	Springettsbury Twp.
463	04	GA	T.H. Agricul & Nutri (Albany).	Albany.
464	04	TN	Amnicola Dump	Chattanooga.
465	02	NJ	Vineland State School.	Vineland.
466	09	AZ	Motorola, Inc. (52nd Street Plant).	Phoenix.
467	01	MA	Groveland Wells	Groveland.
468	02	NY	General Motors (Cent Foundry Div).	Massena.
469	01	NH	Mottolo Pig Farm	Raymond.
470	03	VA	Buckingham County Landfill.	Buckingham.
471	04	SC	SCRDI Dixiana	Cayce.
472	05	MI	Roto-Finish Co., Inc.	Kalamazoo.
473	05	MN	Olmsted County Sanitary Landfill.	Oronoco.
474	07	MO	Quality Plating	Sikeston.
475	05	IN	Prestolite Battery Division.	Vincennes.
476	07	MO	Fulbright Landfill	Springfield.
477	02	NJ	Williams Property	Swainton.
478	02	NJ	Renora, Inc	Edison Township.
479	04	NC	FCX, Inc. (Washington Plant).	Washington.
480	03	PA	Jacks Creek/Sitkin Smelting & Ref.	Maitland.
481	06	NM	Cleveland Mill	Silver City.
482	02	NJ	Denzer & Schafer X-Ray Co.	Bayville.
483	02	NJ	Hercules, Inc. (Gibbstown Plant).	Gibbstown.
484	05	IN	Ninth Avenue Dump.	Gary.
485	03	MD	Bush Valley Landfill.	Abingdon.
486	04	SC	Golden Strip Septic Tank Service.	Simpsonville.
487	04	SC	Rock Hill Chemical Co.	Rock Hill.
488	06	TX	Texarkana Wood Preserving Co.	Texarkana.
489	06	AR	Gurley Pit	Edmondson.
490	04	FL	Petroleum Products Corp.	Pembroke Park.
491	01	RI	Peterson/Puritan, Inc.	Lincoln/Cumberland.
492	07	MO	Times Beach Site.	Times Beach.
493	05	MI	Wash King Laundry.	Pleasant Plains Twp.
494	05	MN	Whittaker Corp.	Minneapolis.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
495	05	WI	Algoma Municipal Landfill.	Algoma.
496	05	MN	NL Industries/Taracorp/Golden.	St. Louis Park.
497	09	CA	Westinghouse Elec (Sunnyvale Pit).	Sunnyvale.
498	01	CT	Kellogg-Deering Well Field.	Norwalk.
499	03	PA	Boarhead Farms	Bridgeton Township.
500	01	MA	Cannon Engineering Corp. (CEC).	Bridgewater.
Group 11 (HRS Scores 39.88–38.20)				
501	05	MI	H. Brown Co., Inc.	Grand Rapids.
502	02	NY	Nepera Chemical Co., Inc.	Maybrook.
503	02	NY	Niagara County Refuse.	Wheatfield.
504	04	FL	Sherwood Medical Industries.	Deland.
505	09	CA	Western Pacific Railroad Co.	Oroville.
[illegible]	04	AL	Olin Corp. (McIntosh Plant).	McIntosh.
507	05	MI	Southwest Ottawa County landfill.	Park township.
508	02	NY	Kentucky Avenue Well Field.	Horseheads.
509	02	NY	Pasley Solvents & Chemicals, Inc.	Hempstead.
510	06	TX	Sol Lynn/Industrial Transformers.	Houston.
511	02	NJ	Asbestos Dump	Millington.
512	04	KY	Lee's Lane Landfill.	Louisville.
513	05	IL	Kerr-McGee (Reed-Keppler Park).	West Chicago.
514	06	AR	Frit Industries	Walnut Ridge.
515	05	IL	Amoco Chemicals (Joliet Landfill).	Joliet.
516	04	FL	Woodbury Chemical (Princeton Plnt).	Princeton.
517	05	OH	Fultz Landfill	Jackson Township.
518	04	NC	New Hanover Cnty Airport Burn Pit.	Wilmington.
519	10	OR	Allied Plating, Inc.	Portland.
520	05	OH	Coshocton Landfill.	Franklin Township.
[illegible]	09	AZ	Apache Powder Co.	St. David.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
522	09	NV	Carson River Mercury Site.	Lyon/Churchill Cnty.
523	03	PA	AMP, Inc. (Glen Rock Facility).	Glen Rock.
524	04	NC	JFD Electronics/Channel Master.	Oxford.
525	04	TN	Arlington Blending & Packaging.	Arlington.
526	06	LA	PAB Oil & Chemical Service, Inc.	Abbeville.
527	04	FL	Sydney Mine Sludge Ponds.	Brandon.
528	06	NM	Cimarron Mining Corp.	Carrizozo.
529	01	RI	Davis (GSR) Landfill.	Glocester.
530	03	PA	Lord-Shope Landfill.	Girard township.
531	10	WA	FMC Corp. (Yakima Plt).	Yakima.
532	05	WI	Northern Engraving Co.	Sparta.
533	06	TX	South Cavalcade Street.	Houston.
534	01	MA	PSC Resources	Palmer.
535	05	MI	Forest Waste Products.	Otisville.
536	03	PA	Drake Chemical	Lock Haven.
537	09	CA	United Heckathorn Co.	Richmond.
538	01	NH	Kearsarge Metallurgical Corp.	Conway.
539	04	SC	Palmetto Wood Preserving.	Dixiana.
540	05	IL	Petersen Sand & Gravel.	Libertyville.
541	05	MI	Clare Water Supply.	Clare.
542	06	TX	Tex-Tin Corp.	Texas City.
543	03	PA	Havertown PCP	Haverford.
544	03	DE	New Castle Spill	New Castle County.
545	07	MO	St Louis Airport/HIS/Fut Coatings.	St. Louis County.
546	08	MT	Idaho Pole Co.	Bozeman.
547	03	DE	NCR Corp. (Millsboro Plant).	Millsboro.
548	05	IN	Lake Sandy Jo (M&M Landfill).	Gary.
549	05	IL	Johns-Manville Corp.	Waukegan.
550	05	MI	Chem Central	Wyoming Township.
Group 12 (HRS Scores 38.20–37.52)				
551	05	MI	Novaco Industries.	Temperance.
552	04	FL	Beulah Landfill	Pensacola.
553	05	MN	Windom Dump	Windom.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
554	05	IL	Kerr-McGee (Residential Areas).	W Chic/DuPage Cnty.
555	01	RI	Rose Hill Regional Landfill.	South Kingstown.
556	02	NJ	Jackson Township Landfill.	Jackson Township.
557	05	IL	NL Industries/Taracorp Lead Smelt.	Granite City.
558	04	KY	Red Penn Sanitation Co. Landfill.	Peewee Valley.
559	05	MI	K&L Avenue Landfill.	Oshtemo township.
560	05	OH	TRW Inc. (Minerva Plant).	Minerva.
561	10	WA	Kaiser Aluminum Mead Works.	Mead.
562	06	OK	Mosley Road Sanitary Landfill.	Oklahoma City.
563	01	CT	Barkhamsted-New Hartford Landfill.	Barkhamsted.
564	07	IA	Fairfield Coal Gasification Plant.	Fairfield.
565	05	MN	Perham Arsenic Site.	Perham.
566	05	MI	Charlevoix Municipal Well.	Charlevoix.
567	02	NJ	Montgomery Township Housing Devl.	Montgomery Township.
568	02	NJ	Rocky Hill Municipal Well.	Rocky Hill Borough.
569	02	NJ	Cinnaminson Ground Water Contamin.	Cinnaminson Township.
570	02	NJ	Chemical Insecticide Corp.	Edison Township.
571	02	NY	Brewster Well Field.	Putnam County.
572	02	NY	Vestal Water Supply Well 1-1.	Vestal.
573	03	DE	Chem-Solv, Inc	Cheswold.
574	03	PA	Bally Ground Water Contamination.	Bally Borough.
575	04	FL	Madison County Sanitary Landfill.	Madison.
576	04	FL	Chemform, Inc	Pompano Beach.
577	04	FL	Wilson Concepts of Florida, Inc.	Pompano Beach.
578	04	NC	Bypass 601 Ground Water Contamin.	Concord.
579	04	NC	FCX, Inc. (Statesville Plant).	Statesville.
580	04	SC	Laxington County Landfill Area.	Cayce.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
581	05	MI	Michigan Disposal (Cork Street Lf).	Kalamazoo.
582	07	MO	Solid State Circuits, Inc.	Republic.
583	07	NE	Waverly Ground Water Contamin.	Waverly.
584	08	CO	Chemical Sales Co.	Denver.
585	08	UT	Utah Power & Light/American Barrel.	Salt Lake City.
586	09	CA	Advanced Micro Devices, Inc.	Sunnyvale.
587	09	CA	Hexcel Corp	Livermore.
588	09	CA	Crazy Horse Sanitary Landfill.	Salinas.
589	10	OR	Union Pacific Railroad Tie Treat.	The Dalles.
590	10	WA	Hidden Valley Lndfll (Thun Field).	Pierce County.
591	10	WA	Yakima Plating Co.	Yakima.
592	05	MN	Nutting Truck & Caster Co.	Faribault.
593	02	NJ	U.S. Radium Corp.	Orange.
[illegible]	05	MI	Carter Industrials, Inc.	Detroit.
[illegible]	06	TX	Highlands Acid Pit.	Highlands.
596	03	PA	Resin Disposal	Jefferson Borough.
597	08	MT	Libby Ground Water Contamination.	Libby.
598	04	KY	Newport Dump	Newport.
599	04	SC	Sangamo/Twelve-Mile/Hartwell PCB.	Pickens.
600	03	PA	Moyers Landfill	Eagleville.
Group 13 (HRS Scores 37.52–35.79)				
601	01	NH	Savage Municipal Water Supply.	Milford.
602	05	MN	LaGrand Sanitary Landfill.	LaGrand Township.
603	05	IN	Poer Farm	Hancock County.
604	03	PA	Brown's Battery Breaking.	Shoemakersville.
605	02	NY	SMS Instruments, Inc.	Deer Park.
606	05	MI	Hedblum Industries.	Oscoda.
607	06	TX	United Creosoting Co.	Conroe.
608	02	NY	Byron Barrel & Drum.	Byron.
609	05	MI	Bendix Corp./Allied Automotive.	St. Joseph.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
610	08	WY	Baxter/Union Pacific Tie Treating.	Laramie.
611	02	NY	Anchor Chemicals.	Hicksville.
612	05	MI	Waste Management—Mich (Holland).	Holland.
613	03	VA	Arrowhead Assoc/Scovill Corp.	Montrose.
614	03	VA	Atlantic Wood Industries, Inc.	Portsmouth.
615	06	TX	North Cavalcade Street.	Houston.
616	02	NJ	Sayreville Landfill	Sayreville.
617	01	NH	Dover Municipal Landfill.	Dover.
618	02	NY	Ludlow Sand & Gravel.	Clayville.
619	03	VA	Saunders Supply Co.	Chuckatuck.
620	05	WI	City Disposal Corp. Landfill.	Dunn.
621	02	NJ	Tabernacle Drum Dump.	Tabernacle Township.
622	07	MO	Minker/Stout/Romaine Creek.	Imperial.
623	04	KY	Howe Valley Landfill.	Howe Valley.
624	01	CT	Yaworski Waste Lagoon.	Canterbury.
625	03	WV	Leetown Pesticide.	Leetown.
626	04	SC	Rochester Property.	Travelers Rest.
627	04	FL	Cabot/Koppers	Gainesville.
628	02	NJ	Evor Phillips Leasing.	Old Bridge Township.
629	03	PA	William Dick Lagoons.	West Cain Township.
630	05	IN	Douglass Road/Uniroyal, Inc., Lf.	Mishawaka.
631	03	PA	Lackawanna Refuse.	Old Forge Borough.
632	06	OK	Compass Industries (Avery Drive).	Tulsa.
633	02	NJ	Mannheim Avenue Dump.	Galloway Township.
634	05	IN	Neal's Dump (Spencer).	Spencer.
635	03	VA	Abex Corp.	Portsmouth.
636	02	NY	Fulton Terminals	Fulton.
637	05	MI	Allied Paper/Portage Ck/Kalamaz. R.	Kalamazoo.
638	06	LA	Dutchtown Treatment Plant.	Ascension Parish.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
639	03	PA	Westinghouse Elevator Co. Plant.	Gettysburg.
640	10	WA	Centralia Municipal Landfill.	Centralia.
641	01	NH	Auburn Road Landfill.	Londonderry.
642	03	WV	Flex Chemical, Inc.	Nitro.
643	05	MN	General Mills/Henkel Corp.	Minneapolis.
644	04	TN	Wrigley Charcoal Plant.	Wrigley.
645	05	OH	Laskin/Poplar Oil Co.	Jefferson Township.
646	05	OH	Old Mill	Rock Creek.
647	04	SC	Townsend Saw Chain Co.	Pontiac.
648	07	KS	Johns' Sludge Pond.	Wichita.
649	05	WI	Stoughton City Landfill.	Stoughton.
650	09	CA	Del Norte Pesticide Storage.	Crescent City.
Group 14 (HRS Scores 35.78–35.35)				
651	03	VA	Suffolk City Landfill.	Suffolk.
652	01	VT	Tansitor Electronics, Inc.	Bennington.
653	02	NJ	De Rewa Chemical Co.	Kingwood Township.
654	03	PA	Middletown Air Field.	Middletown.
655	02	NJ	Swope Oil & Chemical Co.	Pennsauken.
656	04	GA	Monsanto Corp. (Augusta Plant).	Augusta.
657	01	NH	South Municipal Water Supply Well.	Peterborough.
658	01	ME	Winthrop Landfill	Winthrop.
659	03	WV	Ordnance Works Disposal Areas.	Morgantown.
660	04	GA	Diamond Shamrock Corp. Landfill.	Cedartown.
661	05	OH	Zanesville Well Field.	Zanesville.
662	01	CT	Cheshire Ground Water Contamin.	Cheshire.
663	02	NY	Suffern Village Well Field.	Village of Suffern.
664	02	NY	Endicott Village Well Field.	Village of Endicott.
665	03	DE	Dover Gas Light Co.	Dover.
666	03	PA	Aladdin Plating	Scott Township.
667	03	PA	North Penn—Area 1.	Souderton.
668	03	PA	North Penn—Area 7.	North Wales.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
669	03	PA	North Penn—Area 6.	Lansdale.
670	03	PA	North Penn—Area 2.	Hatfield.
671	03	PA	North Penn—Area 5.	Montgomery Township.
672	04	FL	Harris Corp. (Palm Bay Plant).	Palm Bay.
673	05	IL	DuPage City Ldf/Blackwell Forest.	Warrenville.
674	05	MN	Kummer Sanitary Landfill.	Bemidji.
675	05	OH	Sanitary Landfill Co. (IWD).	Dayton.
676	05	WI	Eau Claire Municipal Well Field.	Eau Claire.
677	06	NM	Pagano Salvage	Los Lunas.
678	07	MO	Valley Park TCE	Valley Park.
679	09	CA	San Fernando Valley (Area 4).	Los Angeles.
680	09	CA	Monolithic Memories.	Sunnyvale.
681	09	CA	National Semiconductor Corp..	Santa Clara.
682	09	CA	Fresno Municipal Sanitary Lndfll.	Fresno.
[illegible]	09	CA	Newmark Ground Water Contamin.	San Bernardino.
684	04	GA	Powersville Site	Peach County.
685	05	MI	Grand Traverse Overall Supply Co..	Grettickville.
686	05	MI	Metamora Landfill.	Metamora.
687	02	NY	Niagara Mohawk Power (Saratoga Sp).	Saratoga Springs.
688	05	MI	Whitehall Municipal Wells.	Whitehall.
689	03	DE	Standard Chlorine of Delaware, Inc.	Delaware City.
690	05	MN	South Andover Site.	Andover.
691	02	NJ	Diamond Alkali Co..	Newark.
692	05	IN	Carter Lee Lumber Co..	Indianapolis.
693	01	NH	Fletcher's Paint Works & Storage.	Milford.
694	03	VA	Avtex Fibers, Inc.	Front Royal.
695	05	MI	Kentwood Landfill.	Kentwood.
696	05	MI	Electrovoice	Buchanan.
697	09	CA	Jasco Chemical Corp..	Mountain View.
698	02	NY	Katonah Municipal Well.	Town of Bedford.
[illegible]	04	FL	B&B Chemical Co., Inc.	Hialeah.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
700	07	KS	29th & Mead Ground Water Contamin.	Wichita.
701	09	CA	Teledyne Semiconductor.	Mountain View.
702	02	PR	Fibers Public Supply Wells.	Joboa.
703	04	FL	BMI-Textron	Lake Park.
704	03	VA	Dixie Caverns County Landfill.	Salem.
705	05	IN	Marion (Bragg) Dump.	Marion.
706	05	OH	Pristine, Inc.	Reading.
707	05	WI	Mid-State Disposal, Inc. Landfill.	Cleveland Township.
708	04	TN	American Creosote (Jackson Plant).	Jackson.
709	05	IL	Kerr-McGee (Sewage Treat Plant).	West Chicago.
710	08	CO	Broderick Wood Products.	Denver.
711	02	NY	C & J Disposal Leasing Co. Dump.	Hamilton.
712	05	OH	Buckeye Reclamation.	St. Clairsville.
713	02	NY	Preferred Plating Corp.	Farmingdale.
714	06	TX	Bio-Ecology Systems, Inc.	Grand Prairie.
715	08	UT	Monticello Rad Contaminated Props.	Monticello.
716	02	NJ	Woodland Route 532 Dump.	Woodland Township.
717	05	IN	American Chemical Service, Inc.	Griffith.
718	01	MA	Salem Acres	Salem.
719	02	NY	Richardson Hill Road Lndfll/Pond.	Sidney Center.
720	01	VT	Old Springfield Landfill.	Springfield.
721	03	PA	Bell Landfill	Terry Township.
722	02	NY	Solvent Savers	Lincklaen.
723	03	VA	U.S. Titanium	Piney River.
724	05	IL	Galesburg/Koppers Co.	Galesburg.
725	09	CA	J.H. Baxter & Co.	Weed.
726	02	NY	Hooker (Hyde Park).	Niagara Falls.
727	05	MI	SCA Independent Landfill.	Muskegon Heights.
728	02	NY	Action Anodizing, Plating Polish.	Copiague.
729	09	CA	MGM Brakes	Cloverdale.
730	06	LA	Bayou Sorrel Site.	Bayou Sorrel.
731	05	IL	H.O.D. Landfill	Antioch.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
732	05	MI	Duell & Gardner Landfill.	Dalton Township.
733	10	WA	Mica Landfill	Mica.
734	02	NJ	Ellis Property	Evesham Township.
735	04	KY	Distler Farm	Jefferson County.
736	09	CA	Waste Disposal, Inc.	Santa Fe Springs.
737	10	WA	Harbor Island (Lead).	Seattle.
738	05	WI	Lemberger Transport & Recycling.	Franklin Township.
739	05	OH	E.H. Schilling Landfill.	Hamilton Township.
740	05	MI	Cliff/Dow Dump	Marquette.
741	02	NY	Clothier Disposal	Town of Granby.
742	03	PA	Ambler Asbestos Piles.	Ambler.
743	10	WA	Queen City Farms.	Maple Valley.
744	02	NJ	Curcio Scrap Metal, Inc.	Saddle Brook Twp.
745	03	VA	L.A. Clarke & Son.	Spotsylvania County.
746	05	WI	Scrap Processing Co., Inc.	Medford.
747	03	MD	Southern Maryland Wood Treating.	Hollywood.
748	04	KY	Caldwell Lace Leather Co., Inc.	Auburn.
749	05	IL	Ilada Energy Co.	East Cape Girardeau.
750	05	IL	Adams County Quincy Landfills 2&3.	Quincy.
Group 16 (HRS Scores 34.21–33.73)				
751	05	MI	Kaydon Corp.	Muskegon.
752	05	WI	Sauk County Landfill.	Excelsior.
753	06	NM	Homestake Mining Co.	Milan.
754	06	TX	Dixie Oil Processors, Inc.	Friendswood.
755	09	CA	Beckman Instruments (Porterville).	Porterville.
756	05	MI	Muskegon Chemical Co.	Whitehall.
757	04	FL	Dubose Oil Products Co.	Cantonment.
758	05	MI	Mason County Landfill.	Pere Marquette Twp.
759	05	MI	Cemetery Dump	Rose Center.
760	07	IA	Red Oak City Landfill.	Red Oak.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
761	05	IN	Lakeland Disposal Service, Inc.	Claypool.
762	02	NJ	Hopkins Farm	Plumstead Township.
763	04	NC	Cape Fear Wood Preserving.	Fayetteville.
764	01	RI	Stamina Mills, Inc.	North Smithfield.
765	05	WI	Lemberger Landfill, Inc.	Whitelaw.
766	05	IN	Reilly Tar (Indianapolis Plant).	Indianapolis.
767	01	ME	Pinette's Salvage Yard.	Washburn.
768	01	CT	Durham Meadows.	Durham.
769	03	DE	Tyler Refrigeration Pit.	Smyrna.
770	05	MI	Kysor Industrial Corp.	Cadillac.
771	09	CA	Lorentz Barrel & Drug Co.	San Jose.
772	02	NJ	Wilson Farm	Plumstead township.
773	02	NY	Conklin Dumps	Conklin.
774	03	PA	Old City of York Landfill.	Seven Valleys.
775	03	PA	Modern Sanitation Landfill.	Lower Windsor Twp.
776	05	IL	Byron Salvage Yard.	Byron.
777	05	MI	North Bronson Industrial Area.	Bronson.
778	03	PA	Stanley Kessler	King of Prussia.
779	04	SC	Helena Chemical Co. Landfill.	Fairfax.
780	07	MO	Kem-Pest Laboratories.	Cape Girardeau.
781	02	NJ	Imperial Oil/Champion Chemicals.	Morganville.
782	02	NJ	Cosden Chemical Coatings Corp.	Beverly.
783	05	MN	St. Augusta San Lndfl/Engen Dump.	St. Augusta Township.
784	02	NJ	Myers Property	Franklin Township.
785	02	NJ	Pepe Field	Boonton.
786	04	KY	Tri-City Disposal Co.	Shepherdsville
787	10	WA	Northwest Transformer.	Everson.
788	02	NY	Genzale Plating Co.	Franklin Square.
789	05	MI	Albion-Sheridan Township Landfill.	Albion.
790	05	WI	Sheboygan Harbor & River.	Sheboygan.
791	06	LA	Combustion, Inc.	Denham Springs.
792	05	MI	Ossineke Ground Water Contamin.	Ossineke.
793	03	WV	Follansbee Site	Follansbee.
794	03	PA	Keystone Sanitation Landfill.	Union Township.
795	04	NC	Carolina Transformer Co.	Fayetteville.
796	02	NY	Carroll & Dubies Sewage Disposal.	Port Jervis.
797	02	NY	North Sea Municipal Landfill.	North Sea.
798	03	PA	Bendix Flight Systems Division.	Bridgewater Township.
799	07	IA	Farmers' Mutual Cooperative.	Hospers.
800	09	CA	Koppers Co. Inc. (Oroville Plant).	Oroville.
Group 17 (HRS Scores 33.73–32.87)				
801	09	CA	Louisiana-Pacific Corp.	Oroville.
802	01	CT	Linemaster Switch Corp.	Woodstock.
803	03	VA	H & H Inc., Burn Pit.	Farrington.
804	05	MI	South Macomb Disposal (LF 9 & 9A).	Macomb Township.
805	05	MI	U.S. Aviex	Howard Township.
806	07	IA	Sheller-Globe Corp. Disposal.	Keokuk.
807	03	PA	Walsh Landfill	Honeybrook Township.
808	02	NJ	Landfill & Development Co.	Mount Holly.
809	02	NJ	Upper Deerfield Township San Lndf.	Upper Deerfield Twp.
810	02	NY	Hertel Landfill	Plattekill.
811	02	NY	Haviland Complex.	Town of Hyde Park
812	02	NY	Malta Rocket Fuel Area.	Malta.
813	02	NY	Jones Chemicals, Inc.	Caledonia.
814	03	DE	Kent County Landfill (Houston).	Houston.
815	03	PA	Saegertown Industrial Area.	Saegertown.
816	04	GA	Cedartown Municipal Landfill.	Cedartown.
817	05	MI	Kent City Mobile Home Park.	Kent City.
818	05	MN	Adrian Municipal Well Field.	Adrian.
819	06	NM	AT & SF (Clovis)	Clovis.
820	07	KS	Strother Field Industrial Park.	Cowley County.
821	07	KS	Obee Road	Hutchinson.
822	09	CA	CTS Printex, Inc.	Mountain View.
823	02	NJ	Fried Industries	East Brunswick Twp.
824	02	NY	American Thermostat Co.	South Cairo.
825	08	ND	Minot Landfill	Minot.
826	03	DE	Koppers Co., Inc. (Newport Plant).	Newport.
827	04	TN	Lewisburg Dump	Lewisburg.
828	05	MI	McGraw Edison Corp.	Albion.
829	02	NJ	Lodi Municipal Well.	Lodi.
830	02	NY	Goldisc Recordings, Inc.	Holbrook.
831	02	NY	Islip Municipal Sanitary Landfill.	Islip.
832	09	CA	Sola Optical USA, Inc.	Petaluma.
833	04	KY	Airco	Calvert City.
834	03	PA	Metal Banks	Philadelphia.
835	05	IL	Yeoman Creek Landfill.	Waukegan.
836	02	NY	Sarney Farm	Amenia.
837	05	MI	Folkertsma Refuse.	Grand Rapids.
838	03	DE	Sealand Limited	Mount Pleasant.
839	01	MA	Ross Disposal Pit.	Lanesboro.
840	05	OH	Van Dale Junkyard.	Marietta.
841	08	MT	Montana Pole and Treating.	Butte.
842	04	NC	Geigy Chemical Corp(Aberdeen Pit).	Aberdeen.
843	04	KY	B.F. Goodrich	Calvert City.
844	04	KY	General Tire/Rubber(Mayfield Lnf).	Mayfield.
845	04	SC	Para-Chem Southern, Inc.	Simpsonville.
846	05	MI	Organic Chemicals, Inc.	Grandville.
847	02	NY	BioClinical Laboratories, Inc.	Bohemia.
848	02	NY	Volney Municipal Landfill.	Town of Volney.
849	02	NY	FMC Corp. (Dublin Road Landfill).	Town of Shelby.
850	05	WI	Tomah Fairgrounds.	Tomah.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
Group 18 (HRS Scores 32.77-31.94)				
851	01	MA	Sullivan's Ledge	New Bedford.
852	04	KY	Smith's Farm	Brooks.
853	05	WI	Madison Metro Sewer District Lag.	Blooming Grove.
854	10	WA	North Market Street.	Spokane.
855	10	OR	Joseph Forest Products.	Joseph.
856	02	PR	Juncos Landfill	Juncos.
857	07	KS	Big River Sand Co.	Wichita.
858	05	IN	Bennett Stone Quarry.	Bloomington.
859	10	WA	Wyckoff Co./Eagle Harbor.	Bainbridge Island.
860	04	SC	Beaunit Corp(Circular Knit & Dye).	Fountain Inn.
861	02	NJ	Industrial Latex Corp.	Wallington Borough.
862	04	FL	Munisport Landfill.	North Miami.
863	06	LA	D.L. Mud, Inc.	Abbeville.
[illegible]	04	AL	Stauffer Chem (LeMoyne Plant).	Axis.
865	02	NJ	M&T Delisa Landfill.	Asbury Park.
866	06	TX	Crystal City Airport.	Crystal City.
867	04	SC	Geiger (C & M Oil).	Ranteules.
868	03	PA	Paoli Rail Yard	Paoli.
869	05	WI	Moss-American(Kerr-McGee Oil Co.).	Milwaukee.
870	05	WI	Waste Research & Reclamation Co.	Eau Claire.
871	10	OR	Gould, Inc.	Portland.
872	01	ME	Union Chemical Co., Inc.	South Hope.
873	02	NY	Cortese Landfill	Vil of Narrowsburg.
874	08	WY	Mystery Bridge Rd/U.S. Highway 20.	Evansville.
875	09	CA	Monrose Chemical Corp..	Torrance.
876	05	MN	St. Louis River Site.	St. Louis County.
877	05	MI	Auto Ion Chemicals, Inc.	Kalamazoo.
878	03	PA	Recticon/Allied Steel Corp.	East Coventry Twp
879	05	WI	Hagen Farm	Stoughton.
[illegible]	04	SC	Carolawn, Inc.	Fort Lawn.
[illegible]	07	IA	Midwest Manufacturing/North Farm.	Kellogg.
882	03	PA	Berks Sand Pit	Longswamp Township.
883	09	CA	Valley Wood Preserving, Inc.	Turlock.
884	03	PA	Butz Landfill	Stroudsburg.
885	04	FL	City Industries, Inc.	Orlando.
886	05	MI	Sparta Landfill	Sparta Township.
887	05	IL	Acme Solvent (Morristown Plant).	Morristown.
888	01	NH	Holton Circle Ground Water Contam.	Londonderry.
889	02	NJ	Pomona Oaks Residential Wells.	Galloway Township.
890	02	NY	Rowe Industries Ground Water Cont.	Noyack/Sag Harbor.
891	03	PA	Habelka Auto Salvage Yard.	Weisenberg Township.
892	04	FL	Hipps Road Landfill.	Duval County.
893	05	MN	Long Prairie Ground Water Contam.	Long Prairie.
894	05	MN	Waite Park Wells	Waite Park.
895	07	NE	Nebraska Ordnance Plant (Former).	Mead.
896	09	CA	Applied Materials	Santa Clara.
897	09	CA	Intel Magnetics	Santa Clara.
898	09	CA	Intel Corp. (Santa Clara III).	Santa Clara.
899	09	CA	TRW Microwave, Inc (Building 825.	Sunnyvale.
900	09	CA	Synertek, Inc. (Building 1).	Santa Clara.
Group 19 (HRS Scores 31.94-30.93)				
901	09	CA	Advanced Micro Devices (Bldg. 915).	Sunnyvale.
902	04	FL	Pepper Steel & Alloys, Inc.	Medley.
903	02	NY	Mattiace Petrochemical Co., Inc.	Glen Cove.
904	01	ME	O'Connor Co.	Augusta.
905	05	WI	Oconomowoc Electroplating Co., Inc.	Ashippin.
906	05	IN	Continental Steel Corp.	Kokomo.
907	05	MI	Rasmussen's Dump.	Green Oak Township.
908	02	NY	Kenmark Textile Corp.	Farmingdale.
909	04	FL	Wingate Road Munic Incinerat Dump.	Fort Lauderdale.
910	03	PA	Westline Site	Westline.
911	04	KY	Maxey Flats Nuclear Disposal.	Hillsboro.
912	04	NC	Benfield Industries, Inc.	Hazelwood.
913	08	MT	Mount Industries	Columbus.
914	05	MI	J&L Landfill	Rochester Hills.
915	02	NY	Claremont Polychemical	Old Bethpage.
916	05	OH	Powell Road Landfill.	Dayton.
917	03	PA	Croydon TCE	Croydon.
918	04	SC	Medley Farm Drum Dump.	Gaffney.
919	04	SC	Elmore Waste Disposal.	Greer.
920	07	IA	Vogel Paint & Wax Co.	Orange City.
921	05	MN	Kurt Manufacturing Co.	Fridley.
922	05	OH	Reilly Tar & Chemical (Dover Plnt).	Dover
923	05	MI	Persons Chemical Works, Inc.	Grand Ledge.
924	03	PA	Revere Chemical Co.	Nockamixon Township.
925	05	MI	Ionia City Landfill	Ionia.
926	06	TX	Koppers Co., Inc. (Texarkana Plant).	Texarkana.
927	08	CO	Lincoln Park	Canon City.
928	08	CO	Smuggler Mountain.	Pitkin County.
929	05	IN	Wedzeb Enterprises, Inc.	Lebanon.
930	02	PR	GE Wiring Devices.	Juana Diaz.
931	07	MO	Missouri Electric Works.	Cape Girardeau.
932	05	MI	Avenue "E" Ground Water Contamin.	Traverse City.
933	05	OH	New Lyme Landfill.	New Lyme.
934	02	NJ	Woodland Route 72 Dump.	Woodland Township.
935	02	PR	RCA Del Caribe	Barceloneta.
936	05	MN	Koch Refining Co./N-Ren Corp.	Pine Bend.
937	04	FL	Piper Aircraft/Vero Beach Wts&Swr.	Vero Beach.
938	03	PA	Brodhead Creek	Stroudsburg.
939	05	WI	Fadrowski Drum Disposal.	Franklin.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
940	10	OR	United Chrome Products, Inc.	Corvallis.
941	04	FL	Anodyne, Inc.	North Miami Beach.
942	04	FL	Anaconda Aluminum/Mllgo Electron.	Miami.
943	03	PA	Eastern Diversified Metals.	Hometown.
944	04	MI	Anderson Development Co.	Adrian.
945	05	WI	Hunts Disposal Landfill.	Caledonia.
946	05	MI	Shiawassee River.	Howell.
947	06	OK	Tenth Street Dump/Junkyard.	Oklahoma City.
948	10	AK	Alaska Battery Enterprises.	Fairbanks N Star Bor.
949	03	PA	Taylor Borough Dump.	Taylor Borough.
950	04	TN	Murray-Ohio Mfg (Horseshoe Bend).	Lawrenceburg.
Group 20 (HRS Scores 30.90–29.88)				
951	03	DE	Halby Chemical Co.	New Castle.
952	02	NJ	Higgins Disposal	Kingston.
953	04	AL	Redwing Carriers, Inc. (Saraland).	Saraland.
954	06	OK	Double Eagle Refinery Co.	Oklahoma City.
955	04	GA	Mathis Bros Lf (S Marble Top Rd).	Kensington.
956	03	DE	Harvey & Knott Drum, Inc.	Kirkwood.
957	04	TN	Gallaway Pits	Gallaway.
958	05	OH	Big D Campground.	Kingsville.
959	06	AR	Midland Products	Ola/Birta.
960	02	NY	Robintech, Inc./National Pipe Co.	Town of Vestal.
961	02	NY	BEC Trucking	Town of Vestal.
962	03	PA	Strasburg Landfill	Newlin Township.
963	06	OK	Fourth Street Abandoned Refinery.	Oklahoma City.
964	02	NJ	Witco Chemical Corp. (Oakland Pit).	Oakland.
965	05	WI	Tomah Armory	Tomah.
966	03	DE	Wildcat Landfill	Dover.
967	05	MI	Burrows Sanitation.	Hartford.
968	03	PA	Blosenski Landfill	West Cain Township.
969	03	VA	Rhinehart Tire Fire Dump.	Frederick County.
970	10	WA	Northwest Transformer (S Harkness).	Everson.
971	03	DE	Delaware City PVC Plant.	Delaware City.
972	03	MD	Limestone Road	Cumberland.
973	02	NY	Hooker (102nd Street).	Niagara Falls.
974	02	NJ	Higgins Farm	Franklin Township.
975	10	WA	American Crossarm & Conduit Co.	Chehalis.
976	06	NM	United Nuclear Corp.	Church Rock.
977	03	VA	Rentokil, Inc. (VA Wood Pres Div).	Richmond.
978	06	AR	Industrial Waste Control.	Fort Smith.
979	09	CA	Celtor Chemical Works.	Hoopa.
980	01	MA	Haverhill Municipal Landfill.	Haverhill.
981	04	AL	Perdido Ground Water Contamin.	Perdido.
982	02	NY	Marathon Battery Corp.	Cold Springs.
983	02	NY	Colesville Municipal Landfill.	Town of Colesville.
984	04	FL	Yellow Water Road Dump.	Baldwin.
985	04	GA	Marzone Inc./Chevron Chemical Co.	Tifton.
986	05	OH	Skinner Landfill	West Chester.
987	03	VA	First Piedmont Quarry (Route 719).	Pittsylvania County.
988	04	NC	Chemtronics, Inc.	Swannanoa.
989	05	IN	MIDCO II	Gary.
990	05	MI	Cannelton Industries, Inc.	Sault Sainte Marie.
991	06	TX	Sheridan Disposal Services.	Hempstead.
992	07	KS	Pester Refinery Co.	El Dorado.
993	03	MD	Kane & Lombard Street Drums.	Baltimore.
994	07	MO	Shenandoah Stables.	Moscow Mills.
995	04	GA	Firestone Tire (Albany Plant).	Albany.
996	07	IA	Shaw Avenue Dump.	Charles City.
997	03	PA	Berkley Products Co. Dump.	Denver.
998	10	WA	Silver Mountain Mine.	Loomis.
999	06	TX	Petro-Chemical (Turtle Bayou).	Liberty County.
1000	04	NC	Hevi-Duty Electric Co.	Goldsboro.
Group 21 (HRS Scores 29.85–28.80)				
1001	05	OH	Republic Steel Corp. Quarry.	Elyria.
1002	07	MO	Conservation Chemical Co.	Kansas City.
1003	07	MO	Westlake Landfill	Bridgeton.
1004	05	MN	Ritari Post & Pole.	Sebeka.
1005	06	LA	Bayou Bonfouca	Slidell.
1006	09	CA	Intel Corp. (Mountain View Plant).	Mountain View.
1007	09	CA	Raytheon Corp	Mountain View
1008	09	CA	Hewlett-Packard (620–40 Page Mill).	Palo Alto.
1009	05	MN	Agate Lake Scrapyard.	Fairview township.
1010	05	MI	Adam's Plating	Lansing.
1011	06	AR	Jacksonville Municipal Landfill.	Jacksonville.
1012	06	AR	Rogers Road Municipal Landfill.	Jacksonville.
1013	03	VA	Saltville Waste Disposal Ponds.	Saltville.
1014	01	ME	Saco Municipal Landfill.	Saco.
1015	04	SC	Palmetto Recycling, Inc.	Columbia.
1016	01	MA	Shpack Landfill	Norton/Attleboro.
1017	03	PA	Kimberton Site	Kimberton Borough.
1018	04	TN	Mallory Capacitor Co.	Waynesboro.
1019	01	MA	Norwood PCBs	Norwood.
1020	02	NY	Warwick Landfill	Warwick.
1021	02	NY	Sidney Landfill	Sidney.
1022	02	NY	Sealand Restoration, Inc.	Lisbon.
1023	10	WA	Old Inland Pit	Spokane.
1024	10	WA	Pesticide Lab (Yakima).	Yakima.
1025	05	IN	Lemon Lane Landfill.	Bloomington.
1026	05	IN	Tri-State Plating	Columbus.
1027	10	ID	Arcom (Dresder Enterprises).	Rathdrum.
1028	01	NH	Coakley Landfill	North Hampton.
1029	04	NC	Potter's Septic Tank Service Pits.	Maco.
1030	04	KY	Green River Disposal, Inc.	Maceo.
1031	04	NC	ABC One Hour Cleaners.	Jacksonville.
1032	03	PA	Fischer & Porter Co.	Warminster.
1033	03	PA	Elizabethtown Landfill.	Elizabethtown

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
1034	05	IL	Central Illinois Public Serv Co.	Taylorville.
1035	06	AR	Arkwood, Inc	Omaha.
1036	09	CA	Jibboom Junkyard.	Sacramento.
1037	02	NJ	A. O. Polymer	Sparta Township.
1038	05	WI	Wausau Ground Water Contamination.	Wausau.
1039	02	NJ	Dover Municipal Well 4.	Dover Township.
1040	02	NJ	Rockaway Township Wells.	Rockaway.
1041	02	NJ	Pohatcong Valley Ground Water Con.	Warren County.
1042	02	NJ	Garden State Cleaners Co.	Minotola.
1043	03	DE	Sussex County Landfill No. 5.	Laurel.
1044	03	PA	North Penn—Area 12.	Worcester.
1045	03	PA	Dublin TCE Site	Dublin Borough.
1046	05	WI	Delavan Municipal Well #4.	Delavan.
1047	05	WI	Waste Management (Brookfield Lf).	Brookfield.
1048	07	MO	North-U Drive Well Contamination.	Springfield.
1049	07	NE	10th Street Site	Columbus.
1050	09	CA	San Gabriel Valley (Area 3).	Alhambra.
1051	09	CA	San Gabriel Valley (Area 4).	La Puente.
1052	09	CA	Watkins-Johnson Co. (Stewart Div).	Scotts Valley.
1053	09	CA	Intersil Inc./Siemens Components.	Cupertino.
1054	09	CA	Modesto Ground Water Contamin.	Modesto.
1055	10	WA	American Lake Gardens.	Tacoma.
1056	10	WA	Greenacres Landfill.	Spokane County.
1057	10	WA	Northside Landfill.	Spokane.
1058	06	OK	Sand Springs Petrochemical Cmptx.	Sand Springs.
1059	06	TX	Pesses Chemical Co.	Fort Worth.
1060	05	MI	Metal Working Shop.	Lake Ann.
1061	05	MN	East Bethel Demolition Landfill.	East Bethel Township.
1062	06	TX	Triangle Chemical Co.	Bridge City.
1063	02	NJ	PJP Landfill	Jersey City.
1064	03	PA	Craig Farm Drum	Parker.

NATIONAL PRIORITIES LIST (BY RANK)—Continued

[August 1990]

NPL rank	EPA reg.	St	Site name	City/county
1065	05	IL	Belvidere Municipal Landfill.	Belvidere.
1066	07	MO	Bee Cee Manufacturing Co.	Malden.
1067	03	PA	CryoChem, Inc	Warman.
1068	02	NJ	Kauffman & Minteer, Inc.	Jobstown.
1069	03	PA	Lansdowne Radiation Site.	Lansdowne.
1070	02	NY	Forest Glen Mobile Home Subdivis.	Niagara Falls.
1071	02	NY	Radium Chemical Co., Inc.	New York City.
Number of NPL Sites: 1071.				

* State top priority site.

NATIONAL PRIORITIES LIST, FEDERAL SECTION (BY GROUP)

[August 1990]

NPL Gr [1]	St	Site name	City/county
1	WA	Hanford 200-Area (USDOE).	Benton County.
1	WA	Hanford 300-Area (USDOE).	Benton County.
1	CO	Rocky Flats Plants (USDOE).	Golden.
1	CA	Riverbank Army Ammunition Plant.	Riverbank.
1	NM	Cal West Metals (USSSA).	Lemitar.
1	MO	Weldon Spring (USDOE/Army).	St. Charles County.
2	CO	Rocky Mountain Arsenal.	Adams County.
2	TN	Milan Army Ammunition Plant.	Milan.
2	CA	McClellan AFB (Ground Water Cont).	Sacramento.
2	PA	Naval Air Develop Center (8 Areas).	Warminster Township.
2	OH	Wright-Patterson Air Force Base.	Dayton.
3	ID	Mountain Home Air Force Base.	Mountain Home.
3	OH	Feed Materials Prod Cent (USDOE).	Fernald.
3	WA	Bangor Naval Submarine Base.	Silverdale.
3	UT	Tooele Army Depot (North Area).	Tooele.
3	WA	Bonneville Power Adm Ross (USDOE).	Vancouver.
3	MD	Aber Prov Ground-Edgewood Area:	Edgewood.
4	ID	Idaho National Engin Lab (USDOE).	Idaho Falls.
4	AL	Anniston Army Depot (SE Ind Area).	Anniston.
4	GA	Robins AFB (Lndfll #4/Sludge Lag).	Houston County.

NATIONAL PRIORITIES LIST, FEDERAL SECTION (BY GROUP)—Continued

[August 1990]

NPL Gr [1]	St	Site name	City/county
4	TN	Oak Ridge Reservation (USDOE).	Oak Ridge.
4	NE	Cornhusker Army Ammunition Plant.	Hall County.
4	NJ	Naval Air Engineering Center.	Lakehurst.
5	UT	Hill Air Force Base	Ogden.
5	CA	Treasure Island Nav Sta-Hun Pt An.	San Francisco.
5	AK	Eielson Air Force Base.	Fairbanks N Star Bor.
5	SC	Savannah River Site (USDOE).	Aiken.
5	WA	Naval Air Sta, Whid Is (Aulf).	Whidbey Island.
6	NJ	W.R. Grace/Wayne Int Stor (USDOE).	Wayne Township.
6	WA	Hanford 100-Area (USDOE).	Benton County.
6	AK	Standard Steel & Met Sal Yd (USDOT).	Anchorage.
6	MA	Otis Air Nat Guard/Camp Edwards.	Falmouth.
7	AK	Elmendorf Air Force Base.	Greater Anchorage Bor.
7	UT	Ogden Defense Depot.	Ogden.
7	GA	Marine Corps Logistics Base.	Albany.
7	CA	Sacramento Army Depot.	Sacramento.
8	IL	Sangamo/Crab Orchard NWR (USDOI).	Carterville.
8	ME	Brunswick Naval Air Station.	Brunswick.
8	CO	Air Force Plant PJKS.	Waterton.
8	NJ	Picatinny Arsenal	Rockway Township.
8	FL	Homestead Air Force Base.	Homestead.
8	AK	Fort Wainwright	Fairbanks N Star Bor.
8	FL	Pensacola Naval Air Station.	Pensacola.
9	CA	Sharpe Army Depot	Lathrop.
9	MA	Fort Devens	Fort Devens.
9	OK	Tinker AFB (Soldier Cr/Bldg 3001).	Oklahoma City.
9	CA	Lawrence Livermore Lab (USDOE).	Livermore.
9	CA	Fort Ord	Marina.
9	WA	McChord AFB (Wash Rack/Treatment).	Tacoma.
9	IL	Savanna Army Depot Activity.	Savanna.
10	NY	Brookhaven National Lab (USDOE).	Upton.
10	TX	Air Force Plant #4 Gener Dynamics.	Fort Worth.
11	TX	Longhorn Army Ammunition Plant.	Karnack.
11	CA	Norton Air Force Base.	San Bernardino.
11	NJ	Federal Aviation Admin Tech Cent.	Atlantic County.
11	WA	Naval Air Sta, Whid Is (Seaplane).	Whidbey Island.

NATIONAL PRIORITIES LIST, FEDERAL SECTION (BY GROUP)—Continued

[August 1990]

NPL Gr [1]	St	Site name	City/county
11	NH	Pease Air Force Base.	Portsmouth/Newington.
11	NM	Lee Acres Landfill (USDOI).	Farmington.
11	WY	F.E. Warren Air Force Base.	Cheyenne.
12	CA	Castle Air Force Base.	Merced.
12	AZ	Luke Air Force Base	Glendale.
12	AZ	Williams Air Force Base.	Chandler.
12	PA	Tobyhanna Army Depot.	Tobyhanna.
12	CA	Barstow Marine Corps Logist Base.	Barstow.
13	PA	Letterkenny Army Depot (PDO Area).	Franklin County.
13	CA	El Toro Marine Corps Air Station.	El Toro.
13	NJ	Fort Dix (Laridfill Site).	Pemberton Township.
13	CA	Tracy Defense Depot.	Tracy.
13	AL	Alabama Army Ammunition Plant.	Childersburg.
13	CT	New London Submarine Base.	New London.
13	WA	Hanford 1100-Area (USDOE).	Benton County.
13	DE	Dover Air Force Base.	Dover.
[illegible]	UT	Monticello Mill Tailings (USDOE).	Monticello.
[illegible]	MA	Fort Devens-Sudbury Training Ann.	Middlesex County.
14	NY	Seneca Army Depot	Romulus.
14	WA	Fort Lewis Logistics Center.	Tillicum.
15	IL	Joliet Army Ammu Plant (LAP Area).	Joliet.
15	OH	Mound Plant (USDOE).	Miamisburg.

NATIONAL PRIORITIES LIST, FEDERAL SECTION (BY GROUP)—Continued

[August 1990]

NPL Gr [1]	St	Site name	City/county
15	RI	Davisville Naval Constr Batt Cent.	North Kingstown.
15	ME	Loring Air Force Base.	Limestone.
15	PR	Naval Security Group Activity.	Sabana Seca.
16	PA	Letterkenny Army Depot (SE Area).	Chambersburg.
16	NY	Griffiss Air Force Base.	Rome.
16	VA	Defense General Supply Center.	Chesterfield County.
16	KS	Fort Riley	Junction City.
16	WA	Fort Lewis (Landfill No. 5).	Tacoma.
16	CA	Camp Pendleton Marine Corps Base.	San Diego County.
17	MO	Lake City Army Plant (NW Lagoon).	Independence.
17	MN	Twin Cities Air Force (SAR Lndfill).	Minneapolis.
17	CA	Edwards Air Force Base.	Kern County.
17	SD	Ellsworth Air Force Base.	Rapid City.
17	CA	George Air Force Base.	Victorville.
17	WA	Naval Undersea Warf Sta (4 Areas).	Keyport.
17	NC	Camp Lejeune Military Reservation.	Onslow County.
18	RI	Newport Naval Educat/Training Cen.	Newport.
18	AZ	Yuma Marine Corps Air Station.	Yuma.
18	FL	Jacksonville Naval Air Station.	Jacksonville.
18	IL	Joliet Army Ammu Plant (Mfg Area).	Joliet.

NATIONAL PRIORITIES LIST, FEDERAL SECTION (BY GROUP)—Continued

[August 1990]

NPL Gr [1]	St	Site name	City/county
18	FL	Cecil Field Naval Air Station.	Jacksonville.
18	WA	Fairchild Air Force Base (4 Areas).	Spokane County.
19	CA	March Air Force Base.	Riverside.
19	TX	Lone Star Army Ammunition Plant.	Texarkana.
19	CA	Lawrence Livermore Lab-300 (USDOE).	Livermore.
19	OR	Umatilla Army Depot (Lagoons).	Hermiston.
19	MD	Aber Prov Ground-Michaelsville Lf.	Aberdeen.
20	MN	Naval Industrial Reserve Ordnance.	Fridley.
20	WA	Bangor Ordnance Disposal.	Bremerton.
20	NY	Plattsburgh Air Force Base.	Plattsburgh.
20	LA	Louisiana Army Ammunition Plant.	Doyline.
20	MO	Weldon Spring Form Army Ord Works.	St. Charles County.
21	IA	Iowa Army Ammunition Plant.	Middletown.
21	NJ	Naval Weapons Stat Earle (Site A).	Colts Neck.
21	CA	Travis Air Force Base.	Solano County.
21	CA	Moffett Naval Air Station.	Sunnyvale.
22	CA	Mather Air Force Base.	Sacramento.
22	HI	Schofield Barracks	Oahu.

Number of NPL Federal Facility Sites: 116

* State top priority site.

[1]: Sites are placed in groups (Gr) corresponding to groups of 50 on the final NPL.

[FR Doc. 90-20385 Filed 8-29-90; 8:45 am]

BILLING CODE 6560-50-M

100% Recycled 30% PCW

NPL Site Narrative for Allied Paper/Portage Ck/Kalamazoo River

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER
Kalamazoo, Michigan

Federal Register Notice: August 30, 1990

Conditions at proposal (May 5, 1989): The Allied Paper, Inc./Portage Creek/Kalamazoo River Site involves PCB contamination of (1) an Allied Paper, Inc., property in Kalamazoo, Kalamazoo County, Michigan, (2) a 3-mile stretch of Portage Creek from Kalamazoo to where the creek meets the Kalamazoo River, and (3) a 35-mile stretch of the Kalamazoo River.

Allied Paper, Inc., has operated paper mills on a 80-acre property at 2030 Portage Road in Kalamazoo since 1925. The company, a subsidiary of SCM Corp., recycled and deinked paper, including carbonless copy papers, which contained 3.4 percent by weight of PCBs, from 1957 to 1971.

In 1986, the Michigan Department of Natural Resources (MDNR) detected PCBs in several places in the 80-mile stretch of the Kalamazoo River between Kalamazoo and Lake Michigan. Contamination is primarily in the sediments, although the water column and fish are also contaminated. According to MDNR, the contamination begins at the point were Allied's

Exhibit 1000

Bryant Mill Pond discharges to Portage Creek.

MDNR tests conducted in October 1985 also found PCBs (Aroclor 1242 and 1254) in monitoring wells around a landfill on the Allied property, two seeps from a sludge disposal area, and a discharge to Portage Creek. An estimated 142,000 people obtain drinking water from public wells within 3 miles of the site, the nearest 1.1 miles from the site. No alternate unthreatened sources of water are now available.

In 1977, the Michigan Department of Public Health issued an advisory warning against eating fish from the river because they were contaminated with PCBs. In 1984, MDNR began a long-term project to clean up the river after it was listed in the Michigan Environmental Response Act. MDNR has conducted extensive sampling to determine the extent of contamination.

On December 2, 1987, the State filed a complaint under CERCLA Sections 107 and 113, the Resource Conservation and Recovery Act, the Federal Water Pollution Control Act, the Toxic Substances Control Act, and three Michigan laws. The complaint called for Allied Paper and SCM Corp. to stop the release of hazardous substances into the environment and pay cleanup costs. In response, the companies have undertaken studies of the extent of the PCB contamination, the quantities of PCBs in Bryant Mill Pond, and possible remedial actions.

Status (August 30, 1990): MDNR is considering various alternatives for the site.

[The description of the site (release) is based on information available at the time the site was evaulated with the HRS. The description may change as additional information is gathered on the sources and extent of contamination. See 56 FR 5600, February 11, 1991, or subsequent FR notices.]

National Priorities List

Superfund hazardous waste site listed under the
Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended in 1986

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER
Kalamazoo, Michigan

Conditions at listing (May 1989): The Allied Paper, Inc./Portage Creek/Kalamazoo River Site involves PCB contamination of an Allied Paper, Inc., property, in Kalamazoo, Kalamazoo County, Michigan, plus a 3-mile stretch of Portage Creek from Kalamazoo to where the creek meets the Kalamazoo River, and a 35-mile stretch of the Kalamazoo River.

Allied Paper, Inc., has operated paper mills on a 80-acre property at 2030 Portage Road in Kalamazoo since 1925. The company, a subsidiary of SCM Corp., recycled and deinked paper, including carbonless copy papers, which contained 3.4% by weight of Aroclor, a PCB, from 1957 to 1971.

In 1986, the Michigan Department of Natural Resources (MDNR) detected PCBs in several places in the 80-mile stretch of the Kalamazoo River between Kalamazoo and Lake Michigan. Contamination is primarily in the sediments, although the water column and fish are also contaminated. According to MDNR, the contamination begins at the point were Allied's Bryant Mill Pond discharges to Portage Creek.

MDNR tests conducted in October 1985 also found PCBs (Aroclor 1242 and 1254) in monitoring wells around a landfill on the Allied property, two seeps from a sludge disposal area, and a discharge to Portage Creek. An estimated 142,000 people obtain drinking water from public wells within 3 miles of the site, the nearest 1.1 miles from the site. No alternate unthreatened sources of water are now available.

In 1977, the Michigan Department of Public Health issued an advisory warning against eating fish in the river because they were contaminated with PCBs. In 1984, MDNR began a long-term project to clean up the river after it was listed in the Michigan Environmental Response Act. MDNR has conducted extensive sampling to determine the extent of contamination.

On December 2, 1987, the State filed a complaint under CERCLA Sections 107 and 113, the Resource Conservation and Recovery Act, the Federal Water Pollution Control Act, the Toxic Substances Control Act, and three Michigan laws. The complaint called for Allied Paper and SCM Corp. to stop the release of hazardous substances into the environment and pay cleanup costs. In response, the companies have undertaken studies of the extent of the PCB contamination, the quantities of PCBs in Bryant Mill Pond, and possible remedial actions.

Status (May 1990): MDNR is considering various alternatives for the site.

100% Recycled 30% PCW

ALLIED PAPER, INC./ PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE PROGRESS REPORT #6

February 4, 1993

DNR

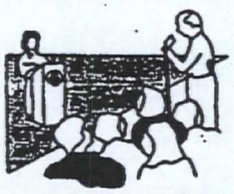
This progress report on the Allied Paper,Inc./PortageCreek/ Kalamazoo River Superfund site (the site) has been prepared by the Superfund Section, Environmental Response Division, as part of the continuing Superfund community relations program for the site. This progress report is the sixth in a series designed to inform residents and other interested individuals, as well as local officials, of the investigation and eventual cleanup efforts at the site. If you would like your name added to our mailing list to receive these reports directly, please contact the Michigan Department of Natural Resources (MDNR) at MDNR-ERD, Superfund Section, PO Box 30028, Lansing, Michigan 48909.

PUBLIC INFORMATION MEETING

Operable Units

February 17, 1993
Wednesday, 7:00 p.m.

City of Kalamazoo
City Council Chambers
241 West South Street
Kalamazoo, Michigan



PUBLIC INFORMATION MEETING

Portage Creek/Kalamazoo River & Remaining Areas

March 3, 1993
Wednesday, 7:00 p.m.

Griswold Auditorium
401 Hubbard Street
Allegan, Michigan

GENERAL SITE INFORMATION

On August 30, 1990, the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site was officially included on the National Priorities List (NPL) pursuant to the Comprehensive Environmental Response, Compensation and Liability Act, 1980 PA 96-510. The site was placed on the NPL because the sediments, soils, water column, and biota within the site are contaminated with polychlorinated biphenyls (PCBs), a hazardous substance and probable human carcinogen.

The purpose of the NPL is to identify releases of hazardous substances that are priorities for further evaluation. The NPL does not describe releases in precise geographical boundaries. The geographical boundaries of all Superfund sites are set by the extent of the contamination. The data clearly indicates that the extent of the PCB contamination at this site has migrated off-site (ie., further downstream past the description in the NPL) and that known sources upstream of the NPL description (i.e., PCB contaminated landfills - Willow Boulevard Landfill, A-site and Kings Highway Landfill owned by the potentially responsible parties [PRPs]) exist and must be included in the site to comply with the Administrative Order by Consent (AOC) and be consistent with the National Oil and Hazardous Substances Contingency Plan (NCP). The AOC and the NCP require that the Remedial Investigation (RI) determine the nature and extent of the contamination.

Site boundaries include Portage Creek, from Cork Street just above the Bryant Mill Pond, in the city of Kalamazoo Michigan, to its confluence with the Kalamazoo River and the Kalamazoo River from the Morrow Dam to the furthest downstream point of the contaminant migration, which may be to the rivers' mouth at Lake Michigan. See map on page 4. The RI will investigate the following to determine the nature and extent of the contamination:

2463

– The entire 80 mile stretch of the Kalamazoo River/Portage Creek which includes the former Bryant Mill Pond, Plainwell Impoundment, Otsego Impoundment, Trowbridge Impoundment, and Lake Allegan.

– The five landfill areas; Allied Paper disposal area, 12th Street Landfill, Willow Boulevard Landfill, A-site, and Kings Highway Landfill.

– The four paper mill properties; King Mill, Georgia-Pacific Kalamazoo Mill, Simpson Plainwell Mill, and the former Allied Paper Mill now Portage Paper Mill.

-- The hundreds of acres of wetlands and floodplains along the Kalamazoo River and Portage Creek.

-- The King Street Storm Sewer.

The MDNR has identified three paper companies as the Potentially Responsible Parties (PRPs). All three paper companies have signed the AOC and agreed to fund and conduct the Remedial Investigation/Feasibility Study (RI/FS). The PRPs are Allied Paper Inc./HM Holdings, Inc., Georgia-Pacific Corporation and Simpson Plainwell Paper Company.

Availability of Draft Work Plans for Public Review

The MDNR is making the final draft RI work plans available for public review. These documents are the result of extensive and numerous technical meetings that took place over the last year to resolve the Dispute Resolution filed in August 1991, by the PRPs. All issues of this dispute have been resolved and the Dispute Resolution was closed in November 1992.

The RI work plans for this site will be made available in two sets of final draft RI work plans. Copies of these work plans will be placed in the six local information repositories for this site. The list of information repository locations is provided at the end of this report.

The first set of RI work plans will be available for public review starting February 5, 1993. This set of RI work plans will deal with the four operable units listed below:

1. Allied Paper Property/Bryant Mill Pond Area in Kalamazoo

2. Georgia-Pacific's Willow Boulevard Site/A-Site in Kalamazoo

3. Georgia-Pacific's King Highway Landfill in Kalamazoo

4. Simpson Plainwell's 12th Street Landfill in Plainwell

The MDNR, the Environmental Protection Agency and the PRPs have agreed to accelerate the remedial process on four operable units within this site. The four areas listed above were selected as operable units because they are all known sources of PCB contamination. Most of the available historical data are from these areas which are located adjacent to the river and upstream. The MDNR intends to remediate these operable units before the downstream areas to eliminate any chance of re-contamination from these areas. The accelerated remediation of these operable units will be accomplished by utilizing the procedural process for Source Control Operable Unit Records of Decision.

The MDNR will hold two Public Informational Meetings to discuss the work plans. The first meeting will be on Wednesday, February 17, 1993, at 7:00 pm in the City of Kalamazoo. For more information see the Public Meeting information box on the front page of this progress report.

The first set of documents being released for public review is briefly described below.

1. Operable Unit RI/FS Work Plans (Vol. 1) & Field Sampling Plans (Vol. 2)

These two volumes contain the details of all the work that will be conducted on the four Operable Units. These documents specify the matrix to be sampled (ie., air, soil, sediments, and groundwater), the sampling locations, the number of samples to be collected and the sam-

KZ-KRSG-002869

pling methods to be used at the four operable units.

2. Quality Assurance Project Plan

This document contains the details concerning all the Standard Operating Procedures (SOP) for the collection and laboratory analysis of the samples for all the RI work to be conducted on the entire site.

3. Health and Safety Plan

This document contains details concerning personnel training, protection equipment, and procedures on how the work will be conducted on the entire site.

4. Quality Assurance/Quality Control Review of Historical Studies and Data Plan

This document contains the details on how the historical data will be screened for determining if the data can be used in the RI.

5. Data Management Plan

This document describes how all the data from the RI will be documented, tracked and organized.

6. Plan for Satisfaction of Permitting Requirements

This document contains the details on how the project will meet any permit requirements that may be required for work at the site.

The Department is interested in receiving any comments regarding the work plans listed above. A 30-day public comment period will begin with the release of each set of work plans. The MDNR will finalize and make available to the public the first set of work plans (the Operable Unit work plans) after March 8, 1993. If you are interested in commenting on these documents, please send your comments to Mr. Scott Cornelius at the address above, no later than March 8, 1993.

The RI/FS work on the four Operable Units will commence upon approval of the work plans by the MDNR.

The second set of work plans (Portage Creek/Kalamazoo River and the remaining site area) will be available for public review in the six local information repositories on February 17, 1993. This second set of work plans deals with the RI for the remainder of the site which includes the 80 miles of Kalamazoo River and Portage Creek, hundreds of acres of floodplain/wetlands, the King Street storm sewer, and the four mill properties. The MDNR intends to finalize this set of work plans, after the public comments are received, on March 18, 1993.

The second meeting will be on Wednesday, March 3, 1993, at 7:00 pm in the City of Allegans' Griswold Auditorium. For more information see the Public Meeting information box on the first page of this progress report.

The Department is interested in receiving any comments regarding the work plans for the remainder of the site. The MDNR plans to finalize these work plans after March 18, 1993. **If you are interested in commenting on these work plans, please send your comments to Mr. Scott Cornelius at the address provided on this page, by March 18, 1993.**

MDNR Project Managers

Mr. Scott Cornelius
517-373-7367
Ms. Mary Gelka
517-373-8832
Michigan Department of
Natural Resources
Environmental Response Division
P.O. Box 30028
Lansing, Michigan 48909

The RI/FS work on the remainder of the site will commence upon approval of the work plans by the MDNR.

The information repositories are located at the following libraries;

Kalamazoo Public Library
Charles Ransom Library
Allegan Public Library
Otsego District Library
Comstock Township Library
Waldo Library

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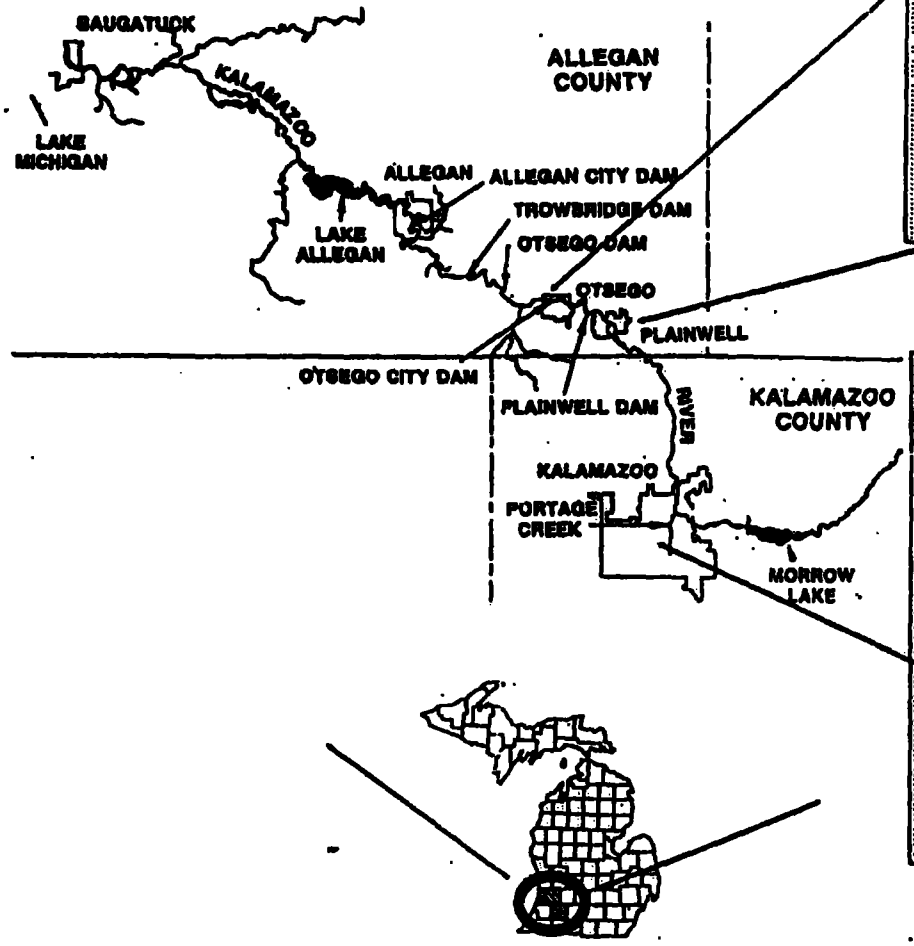
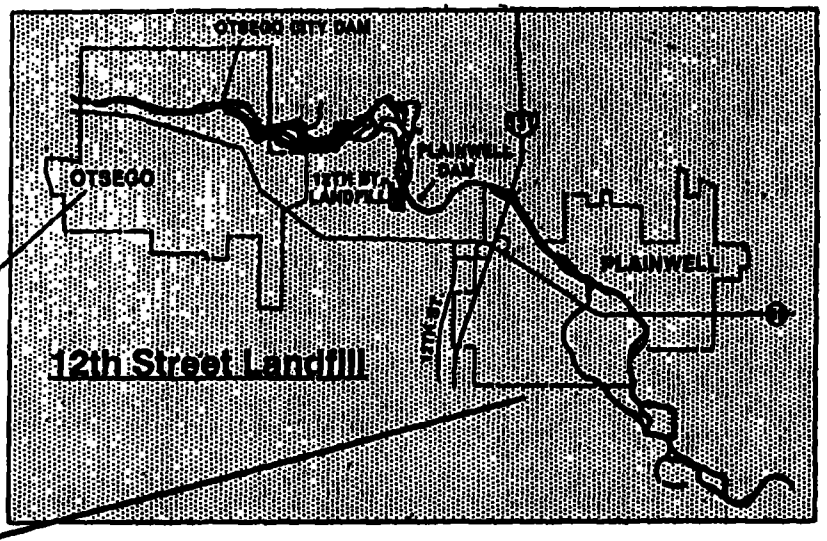
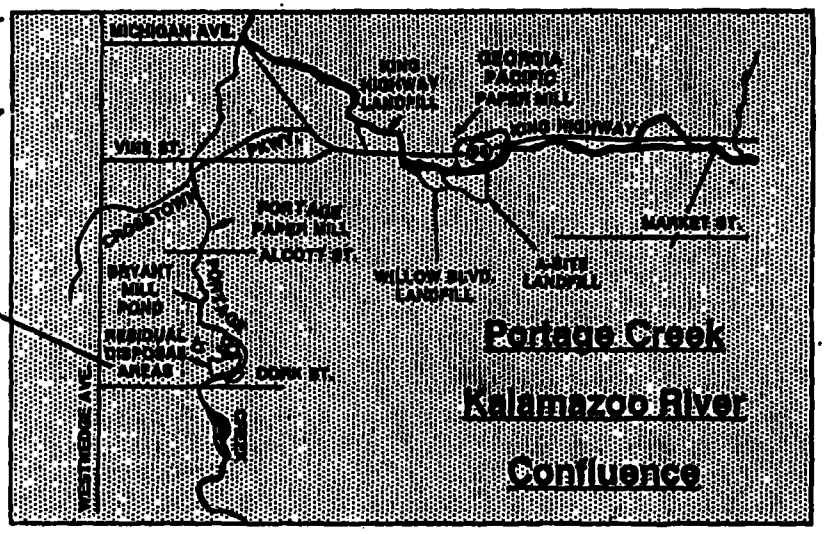
KALAMAZOO RIVER BASIN







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EPA United States Environmental Protection Agency

Superfund

Introduction to the Hazard Ranking System (HRS)

The Hazard Ranking System (HRS) is the principal mechanism EPA uses to place uncontrolled waste sites on the National Priorities List (NPL). It is a numerically based screening system that uses information from initial, limited investigations - the preliminary assessment and the site inspection - to assess the relative potential of sites to pose a threat to human health or the environment. Any person or organization can petition EPA to conduct a preliminary assessment using the Preliminary Assessment Petition (PDF) (4 pp, 425 K, About PDF)

HRS scores do not determine the priority in funding EPA remedial response actions, because the information collected to develop HRS scores is not sufficient to determine either the extent of contamination or the appropriate response for a particular site. The sites with the highest scores do not necessarily come to the EPA's attention first - this would require stopping work at sites where response actions were already underway. EPA relies on more detailed studies in the remedial investigation/feasibility study which typically follows listing.

The HRS uses a structured analysis approach to scoring sites. This approach assigns numerical values to factors that relate to risk based on conditions at the site. The factors are grouped into three categories:

- likelihood that a site has released or has the potential to release hazardous substances into the environment;
- characteristics of the waste (e.g. toxicity and waste quantity); and
- people or sensitive environments (targets) affected by the release.

Four pathways can be scored under the HRS:

- ground water migration (drinking water);
- surface water migration (drinking water, human food chain, sensitive environments);
- soil exposure (resident population, nearby population, sensitive environments); and
- air migration (population, sensitive environments).

After scores are calculated for one or more pathways, they are combined using a root-mean-square equation to determine the overall site score.

The electronic scoring tool Quickscore can be used to do the scoring calculations. If all pathway scores are low, the site score is low. However, the site score can be relatively high even if only one pathway score is high. This is an important requirement for HRS scoring, because some extremely dangerous sites pose threats through only one pathway.

The HRS Training Course is available but limited to EPA regional, state, tribal, and contractor personnel who support EPA in the Superfund site assessment/NPL Listing process. The training course is intended to enable staff to prepare HRS packages for the NPL and to plan PAs and SIs to address future HRS scoring issues.

For more information, please consult the EPA publications, *The Hazard Ranking System Guidance Manual; Interim Final*, November 1992, (NTIS PB92-963377, EPA 9345.1-07) and the December 14, 1990 *Federal Register*, Hazard Ranking System; Final Rule (55 FR 51532).

Superfund Help: Acronyms | Topics | Frequent Questions | Publications | Sitemap

Last updated on 02/15/2012

http://www.epa.gov/superfund/sites/npl/npl_hrs.htm
Last updated on 03/01/2012

National Priorities List (NPL)

You are here: EPA Home Superfund Sites National Priorities List (NPL) Basic Information

Basic Information

Sites are listed on the National Priorities List (NPL) upon completion of Hazard Ranking System (HRS) screening, public solicitation of comments about the proposed site, and after all comments have been addressed. More information about these steps in the process can be found here:

- Introduction to the HRS
- How Sites are Placed on the NPL
- Public Comment Process
- How Sites are Deleted from the NPL
- Notice of Policy Change for Partial Deletion from the NPL

The NPL primarily serves as an information and management tool. It is a part of the Superfund cleanup process. The NPL is updated periodically. The Federal Register Notices for NPL Updates page provides a list of Federal Register Notices for proposed and final NPL Updates. The list is ordered by year and provides the rule type, rule date, FR citation, and a short content description for each FR.

Section 105(a)(8)(B) of CERCLA (CERCLA Overview) as amended, requires that the statutory criteria provided by the HRS be used to prepare a list of national priorities among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States. This list, which is Appendix B of the National Contingency Plan, is the NPL.

The identification of a site for the NPL is intended primarily to guide EPA in:

- determining which sites warrant further investigation to assess the nature and extent of the human health and environmental risks associated with a site;
- identifying what CERCLA-financed remedial actions may be appropriate;
- notifying the public of sites EPA believes warrant further investigation; and
- serving notice to potentially responsible parties that EPA may initiate CERCLA-financed remedial action.

Inclusion of a site on the NPL does not in itself reflect a judgment of the activities of its owner or operator, it does not require those persons to undertake any action, nor does it assign liability to any person. The NPL serves primarily informational purposes, identifying for the States and the public those sites or other releases that appear to warrant remedial actions.

Visit the HRS Toolbox page for guidance documents that are used to determine if a site is a candidate for inclusion on the NPL.

EPA United States Environmental Protection Agency

Superfund

How Sites are Placed on the NPL

Sites are first proposed to the National Priorities List (NPL) in the *Federal Register*. EPA then accepts public comments on the sites, responds to the comments, and places on the NPL those sites that continue to meet the requirements for listing.

Section 300.425(c) of the NCP, the Federal regulation by which CERCLA is implemented (55 FR 8845, March 8, 1990), provides three mechanisms for placing sites on the NPL:

- The first mechanism is EPA's Hazard Ranking System (HRS).
- The second mechanism for placing sites on the NPL allows States or Territories to designate one top-priority site regardless of score.
- The third mechanism allows listing a site if it meets all three of these requirements:
  1. the Agency for Toxic Substances and Disease Registry (ATSDR) of the U.S. Public Health Service has issued a health advisory that recommends removing people from the site;
  2. EPA determines the site poses a significant threat to public health; and
  3. EPA anticipates it will be more cost-effective to use its remedial authority (available only at NPL sites) than to use its emergency removal authority to respond to the site.

Superfund Help: Acronyms | Topics | Frequent Questions | Publications | Sitemap

Last updated on 02/15/2012

100% Recycled 30% PCW

NATURAL RESOURCES COMMISSION
THOMAS J. ANDERSON
MARLENE J. FLUHARTY
GORDON E. GUYER
KERRY KAMMER
C. STEWART MYERS
DAVID D. OLSON
RAYMOND POUPORE

STATE OF MICHIGAN

165918 0003099

JAMES J. BLANCHARD, Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T. MASON BUILDING
BOX 30028
LANSING, MI 48909

XXXXXXXXXXXXXXXX
Gordon E. Guyer, Director

November 19, 1986

Mr. R. Richard Eaton, P.E./C.P.E.
Allied Paper, Inc.
2030 Portage Road
Kalamazoo, Michigan 49001

RECEIVED
NOV 21 1986
R. R. EATON

Dear Mr. Eaton:

Enclosed are the Site Inspection Report and Hazardous Ranking System Packet which we sent to EPA concerning the Allied Paper - Portage Creek - Kalamazoo River site. Also enclosed are the instructions for completing the report and packet. Our main goal is for this site to be included on the National Priority List (superfund). Sorry for the delay in providing you with this information.

Sincerely,

Cheryl R. Wallace

Cheryl R. Wallace
Michigan Dept. of Natural Resources
Groundwater Quality Division
Remedial Action Section
517-373-4800

cc: George Carpenter, SAU

2464

NCRKZOO0025951

SITE DESCRIPTION/EXECUTIVE SUMMARY

Site Name and Location

Allied Paper/Portage Creek/
Kalamazoo River

County: Kalamazoo/Allegan
Michigan Code Number:
DNR Dist.: Plainwell
EPA ID Number:

SAS Score/Screen No.:

Allied Paper Inc., a manufacturer of specialty papers, has operated paper mills in Kalamazoo, Michigan since 1925. Allied's milling facilities are located on Portage Creek, a tributary of the Kalamazoo River, in Kalamazoo Township.

In the past, polychlorinated biphenyls (PCBs) were used in the paper industry in the manufacturing of carbon tissue, carbonless copy paper, and as plasticizers in printing inks. PCBs are the primary contaminant of concern in the Portage Creek and Kalamazoo River system. Portage Creek sediment is heavily contaminated with PCBs. The release of PCB from contaminated sediments are a continuing source of contamination to the down stream water resource. Kalamazoo River sediment is contaminated with PCBs from Portage Creek to Lake Michigan at Saugatuck, approximately 80 river miles.

The presence of PCBs in river sediment, and the re-solution of PCB contaminated sediments are thought to be the cause of PCB levels in fish which are above both the Food and Drug Administration and the State of Michigan food consumption level of 2ppm (parts per million). This has resulted in a fish consumption advisory on the Kalamazoo River being issued by the Michigan Department of Public Health.

The PCB contamination of Portage Creek and the Kalamazoo River has been documented since 1971 and the PCB contamination of fish in the Kalamazoo River System appears to be a continuing problem. The PCB levels in fish have not declined and have been documented in concentrations of up to 47 mg/kg. The Kalamazoo River is also one of the major sources of PCBs entering Lake Michigan.

PCB contamination has not only limited fish consumption, but has also delayed the Michigan Department of Natural Resources' plans to restore the Kalamazoo fishery, at one time considered to be one of the finest bass fishing streams in the State. In the past decade, it is estimated over $500 million have been spent to improve water quality in the Kalamazoo River watershed. The Department of Natural Resources, however, is not committing resources to develop the fishery until the PCB problem is addressed. Due to the loss of the Kalamazoo fishery, an estimated $8 million annually is lost from angler fees and related resources.

PCBs have been determined to be hazardous to human health, and are a documented carcinogen. Bans on PCB usage have been enacted both at State and Federal levels and it remains a strictly regulated chemical to minimize human exposure and to protect human health. The presence of large amounts of uncontained, PCB-

contaminated sediments along Portage Creek and the Kalamazoo River, together with the PCB contamination of the water column and fish, serve to increase human exposure to this substance.

The major historical source of PCBs in the Kalamazoo River appear to be wastewater discharges from paper industries. From present knowledge and past data, it is believed that Allied Paper was the sole source of PCB discharges into Portage Creek.

Date of Previous Summary:
Previous Author:

Current Date: 10/30/86
Author: J. Rodin/
C. Wallace

Site Assessment Unit
Groundwater Quality Division
Michigan Dept. of Natural Resources

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 1 - SITE LOCATION AND INSPECTION INFORMATION

I. IDENTIFICATION
01 STATE: 26
02 SITE NUMBER:

II. SITE NAME AND LOCATION

01 SITE NAME: Allied Paper - Portage Creek - Kalamazoo River
02 STREET, ROUTE NO., OR SPECIFIC LOCATION IDENTIFIER:
03 CITY: Kalamazoo to Saugatuck
04 STATE: Mi
05 ZIP CODE:
06 COUNTY(S): Kalamazoo + Allegan
07 COUNTY CODE: 077
08 CONG. DIST: 05
09 COORDINATES: LATITUDE ___ ___ ___.___ LONGITUDE ___ ___ ___.___
10 TYPE OF OWNERSHIP (Check one): ☒ A. PRIVATE ☐ B. FEDERAL ☐ C. STATE ☐ D. COUNTY ☐ E. MUNICIPAL ☐ F. OTHER ☐ G. UNKNOWN

III. INSPECTION INFORMATION

01 DATE OF INSPECTION: 10 / 28 / 86 (MONTH DAY YEAR)
02 SITE STATUS: ☒ ACTIVE ☐ INACTIVE
03 YEARS OF OPERATION: 1925 / Present (BEGINNING YEAR / ENDING YEAR) ___ UNKNOWN
04 AGENCY PERFORMING INSPECTION (Check all that apply): ☐ A. EPA ☐ B. EPA CONTRACTOR ☐ C. MUNICIPAL ☐ D. MUNICIPAL CONTRACTOR ☒ E. STATE ☐ F. STATE CONTRACTOR ☐ G. OTHER

05 CHIEF INSPECTOR	06 TITLE	07 ORGANIZATION	08 TELEPHONE NO.
George Carpenter	Environmental Quality Analyst	MDNR	(517) 373-4800

09 OTHER INSPECTORS	10 TITLE	11 ORGANIZATION	12 TELEPHONE NO.
Cheryl Wallace	Environmental Quality Analyst	MDNR	(517) 373-4800
			( )
			( )
			( )
			( )

13 SITE REPRESENTATIVES INTERVIEWED	14 TITLE	15 ADDRESS	16 TELEPHONE NO.
R. Richard Eaton	Manager	Kalamazoo, MI	(616) 345-7131
Martin Smith, Jr.	Manager	Kalamazoo, MI	(616) 345-7131
Jon DeWitt	Attorney At Law	Grand Rapids, MI	(616) 459-4186
Gregory Peterson	Consultant	Ann Arbor, MI	(313) 973-8300
			( )
			( )

17 ACCESS GAINED BY (Check one): ☒ PERMISSION ☐ WARRANT
18 TIME OF INSPECTION: 2:00 pm
19 WEATHER CONDITIONS: 63°, Sunny

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Organization)	03 TELEPHONE NO.
Galen Kilmer	MDNR / GQD / Plainwell	(616) 685-9886

04 PERSON RESPONSIBLE FOR SITE INSPECTION FORM	05 AGENCY	06 ORGANIZATION	07 TELEPHONE NO.	08 DATE
George Carpenter / Cheryl Wallace	GQD	MDNR	517-373-4800	10 / 28 / 86 (MONTH DAY YEAR)

EPA FORM 2070-13 (7-81)

NCRKZOO002F

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 2 - WASTE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
26	

II. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

- ☐ A. SOLID
- ☐ B. POWDER, FINES
- ☒ C. SLUDGE
- ☐ D. OTHER Custom. Sediments (Specify)
- ☐ E. SLURRY
- ☐ F. LIQUID
- ☐ G. GAS

02 WASTE QUANTITY AT SITE (Measures of waste quantities must be independent)

TONS ≈114

CUBIC YARDS 7952

NO. OF DRUMS

03 WASTE CHARACTERISTICS (Check all that apply)

- ☒ A. TOXIC
- ☐ B. CORROSIVE
- ☐ C. RADIOACTIVE
- ☒ D. PERSISTENT
- ☐ E. SOLUBLE
- ☐ F. INFECTIOUS
- ☐ G. FLAMMABLE
- ☐ H. IGNITABLE
- ☐ I. HIGHLY VOLATILE
- ☐ J. EXPLOSIVE
- ☐ K. REACTIVE
- ☐ L. INCOMPATIBLE
- ☐ M. NOT APPLICABLE

III. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT OF MEASURE	03 COMMENTS
SLU	SLUDGE	7952	yds3	at Allied's LandFill
OLW	OILY WASTE			
SOL	SOLVENTS			
PSD	PESTICIDES			
OCC	OTHER ORGANIC CHEMICALS	≈114	tons	Found in River, Creek, + Bryant Mill
IOC	INORGANIC CHEMICALS			Pond sediments
ACD	ACIDS			
BAS	BASES			
MES	HEAVY METALS			

IV. HAZARDOUS SUBSTANCES (See Appendix for most frequently cited CAS Numbers)

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STORAGE/DISPOSAL METHOD	05 CONCENTRATION	06 MEASURE OF CONCENTRATION
OCC	PCBs	1336-36-3	Sediments	0.33-500	ppm
OCC	PCBs	1336-36-3	LandFill monitoring wells	0.07-0.62	ppb
SLU	Paper Sludge Waste		LandFilled		

V. FEEDSTOCKS (See Appendix for CAS Numbers)

CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER	CATEGORY	01 FEEDSTOCK NAME	02 CAS NUMBER
FDS	N/A		FDS		
FDS			FDS		
FDS			FDS		
FDS			FDS		

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

MDNR Files - Groundwater + Surface Water Divisions

EPA FORM 2070-13 (7-81)

NCRKZOO0025955

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: MI | 02 SITE NUMBER:

II. HAZARDOUS CONDITIONS AND INCIDENTS

01 ☒ A. GROUNDWATER CONTAMINATION — 02 ☒ OBSERVED (DATE: 3/27/86) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 117,879 — 04 NARRATIVE DESCRIPTION
Samples taken from monitoring wells around landfill show PCBs in groundwater. Municipal wells potentially affected (See G)

01 ☒ B. SURFACE WATER CONTAMINATION — 02 ☒ OBSERVED (DATE: 1985) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ≈132,035 — 04 NARRATIVE DESCRIPTION
Bryant Mill Pond (drawn down), Portage Creek, + Kalamazoo River water + sediments contaminated with PCBs. Portage Creek + Kalamazoo River are used for recreational purposes.

01 ☐ C. CONTAMINATION OF AIR — 02 ☐ OBSERVED (DATE:) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: — 04 NARRATIVE DESCRIPTION
N/A

01 ☐ D. FIRE/EXPLOSIVE CONDITIONS — 02 ☐ OBSERVED (DATE:) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: — 04 NARRATIVE DESCRIPTION
N/A

01 ☒ E. DIRECT CONTACT — 02 ☒ OBSERVED (DATE: 1985) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ≈132,035 — 04 NARRATIVE DESCRIPTION
Kalamazoo River + Portage Creek travel through densely populated area of Michigan. Both are used for swimming, fishing, etc.

01 ☐ F. CONTAMINATION OF SOIL — 02 ☐ OBSERVED (DATE:) ☐ POTENTIAL ☐ ALLEGED
03 AREA POTENTIALLY AFFECTED: (acres) — 04 NARRATIVE DESCRIPTION
N/A

01 ☒ G. DRINKING WATER CONTAMINATION — 02 ☐ OBSERVED (DATE:) ☒ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: 117,879 — 04 NARRATIVE DESCRIPTION
Potential from migration of contaminated groundwater to municipal wells of cities of Kalamazoo + Portage

01 ☐ H. WORKER EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE:) ☐ POTENTIAL ☐ ALLEGED
03 WORKERS POTENTIALLY AFFECTED: — 04 NARRATIVE DESCRIPTION
N/A

01 ☒ I. POPULATION EXPOSURE/INJURY — 02 ☐ OBSERVED (DATE:) ☒ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ≈132,035 — 04 NARRATIVE DESCRIPTION
Potential from contact with contaminated surface waters + sediments and consuming contaminated fish as well as consuming contaminated groundwater

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION
01 STATE: 26 | 02 SITE NUMBER:

II. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
N/A

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION (Include name(s) of species)
N/A

01 ☒ L. CONTAMINATION OF FOOD CHAIN — 02 ☒ OBSERVED (DATE: 1986) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
Fish advisory placed on Kalamazoo River. PCBs detected in carp + bass in Kalamazoo River.

01 ☒ M. UNSTABLE CONTAINMENT OF WASTES (Spills/Runoff/Standing liquids, Leaking drums) — 02 ☒ OBSERVED (DATE: 11-85) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: ≈132,035 — 04 NARRATIVE DESCRIPTION
Contaminated sediments in Bryant Mill Pond + Kalamazoo River are loosely consolidated and appear highly erodible

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
N/A

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
N/A

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION
N/A

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS
Upstream bank + dry impoundment sediments continue to be eroded into the river system. Evidence to date indicates that much of the continuing contamination of the Kalamazoo River is originating from sediment deposits in Bryant Mill Pond + Portage Creek.

III. TOTAL POPULATION POTENTIALLY AFFECTED: ≈132,035

IV. COMMENTS
Bryant Mill Pond has been drawn since 1976 + dewatered contaminated sediments are exposed on the banks of the creek.

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)
MDNR Files - Groundwater + Surface Water Divisions
Site Inspection 10/23/86

EPA FORM 2070-13 (7-81)

NCRKZOO0025957

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION
PART 4 - PERMIT AND DESCRIPTIVE INFORMATION

I. IDENTIFICATION

01 STATE	02 SITE NUMBER
26	

II. PERMIT INFORMATION

01 TYPE OF PERMIT ISSUED (Check all that apply)	02 PERMIT NUMBER	03 DATE ISSUED	04 EXPIRATION DATE	05 COMMENTS
■ A. NPDES	MI0000779	2/85	2/90	
☐ B. UIC				
☐ C. AIR				
☐ D. RCRA				
☐ E. RCRA INTERIM STATUS				
☐ F. SPCC PLAN				
☐ G. STATE (Specify)				
☐ H. LOCAL (Specify)				
☐ I. OTHER (Specify)				
☐ J. NONE				

III. SITE DESCRIPTION

01 STORAGE/DISPOSAL (Check all that apply)	02 AMOUNT	03 UNIT OF MEASURE
☐ A. SURFACE IMPOUNDMENT		
☐ B. PILES		
☐ C. DRUMS, ABOVE GROUND		
☐ D. TANK, ABOVE GROUND		
☐ E. TANK, BELOW GROUND		
■ F. LANDFILL	7552	yds³
☐ G. LANDFARM		
☐ H. OPEN DUMP		
■ I. OTHER Contam. Sediment (Specify)	≈114	tons

04 TREATMENT (Check all that apply)
- ☐ A. INCENERATION
- ☐ B. UNDERGROUND INJECTION
- ☐ C. CHEMICAL/PHYSICAL
- ☐ D. BIOLOGICAL
- ☐ E. WASTE OIL PROCESSING
- ☐ F. SOLVENT RECOVERY
- ☐ G. OTHER RECYCLING/RECOVERY
- ☐ H. OTHER (Specify)

05 OTHER
- ■ A. BUILDINGS ON SITE: Numerous

06 AREA OF SITE: ≈6400 (Acres)

07 COMMENTS

$$80\ \text{miles}\left(\frac{5280\ \text{Ft}}{\text{mile}}\right)(660\ \text{Ft})\left(\frac{0.000022957\ \text{acres}}{\text{Ft}^2}\right) = 6400\ \text{acres}$$

80 miles = from city of Kalamazoo to Saugatuck

IV. CONTAINMENT

01 CONTAINMENT OF WASTES (Check one)

☐ A. ADEQUATE, SECURE ☐ B. MODERATE ☐ C. INADEQUATE, POOR ■ D. INSECURE, UNSOUND, DANGEROUS

02 DESCRIPTION OF DRUMS, DIKES, LINERS, BARRIERS, ETC.

V. ACCESSIBILITY

01 WASTE EASILY ACCESSIBLE: ■ YES ☐ NO

02 COMMENTS

Landfill waste not easily accessible. River + Creek easily accessible

VI. SOURCES OF INFORMATION (Cite specific references, e.g. state files, sample analysis, reports)

MDNR Files - Groundwater + Surface Water Divisions

Site Inspection - 10/28/86

EPA FORM 2070-13 (7-81)

NCRKZOO0025958

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION
01 STATE: 26 | 02 SITE NUMBER:

II. DRINKING WATER SUPPLY

01 TYPE OF DRINKING SUPPLY (Check all applicable)

	SURFACE	WELL
COMMUNITY	A. ☐	B. ☒
NON-COMMUNITY	C. ☐	D. ☒

02 STATUS

ENDANGERED	AFFECTED	MONITORED
A. ☒	B. ☐	C. ☐
D. ☒	E. ☐	F. ☐

03 DISTANCE TO SITE
A. ≈2000 (mi) Ft
B. 2 (mi)

III. GROUNDWATER

01 GROUNDWATER USE IN VICINITY (Check one)
☐ A. ONLY SOURCE FOR DRINKING ☒ B. DRINKING (Other sources available) COMMERCIAL, INDUSTRIAL, IRRIGATION (No other water sources available) ☐ C. COMMERCIAL, INDUSTRIAL, IRRIGATION (Limited other sources available) ☐ D. NOT USED, UNUSEABLE

02 POPULATION SERVED BY GROUND WATER 117,879
03 DISTANCE TO NEAREST DRINKING WATER WELL ≈2000 (mi) Ft

04 DEPTH TO GROUNDWATER	05 DIRECTION OF GROUNDWATER FLOW	06 DEPTH TO AQUIFER OF CONCERN	07 POTENTIAL YIELD OF AQUIFER	08 SOLE SOURCE AQUIFER
≈ 17 (ft)	Northwest	300 (ft)	Unk (gpm)	☐ YES ☒ NO

09 DESCRIPTION OF WELLS (Including storage, treatment, and facilities related to production and distribution)
Depth to aquifer is from lands surface to 300 ft in the city of Kalamazoo. The municipal wells serve the entire city of Kalamazoo.

10 RECHARGE AREA
☐ YES ☒ NO
COMMENTS

11 DISCHARGE AREA
☒ YES ☐ NO
COMMENTS Groundwater probably discharges to Kalamazoo River & Portage Creek

IV. SURFACE WATER

01 SURFACE WATER USE (Check one)
☐ A. RESERVOIR, RECREATION DRINKING WATER SOURCE ☒ B. IRRIGATION, ECONOMICALLY IMPORTANT RESOURCES ☐ C. COMMERCIAL, INDUSTRIAL ☐ D. NOT CURRENTLY USED

02 AFFECTED/POTENTIALLY AFFECTED BODIES OF WATER

NAME:	AFFECTED	DISTANCE TO SITE
Portage Creek	☒	on-site (mi)
Kalamazoo River	☒	on-site (mi)
	☐	(mi)

V. DEMOGRAPHIC AND PROPERTY INFORMATION

01 TOTAL POPULATION WITHIN

ONE (1) MILE OF SITE	TWO (2) MILES OF SITE	THREE (3) MILES OF SITE
A. ≈ 4165 NO. OF PERSONS	B. ≈ 52,483 NO. OF PERSONS	C. ≈ 117,879 NO. OF PERSONS

02 DISTANCE TO NEAREST POPULATION
200 Ft (mi)

03 NUMBER OF BUILDINGS WITHIN TWO (2) MILES OF SITE
Numerous

04 DISTANCE TO NEAREST OFF-SITE BUILDING
200 Ft (mi)

05 POPULATION WITHIN VICINITY OF SITE (Provide narrative description of nature of population within vicinity of site, e.g., rural, village, densely populated urban area)
The site extends from the city of Kalamazoo to Saugatuck (30 miles). Population ranges from rural areas to densely populated urban areas.

EPA FORM 2070-13 (7-81)

NCRKZOO0025959

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 5 - WATER, DEMOGRAPHIC, AND ENVIRONMENTAL DATA

I. IDENTIFICATION
01 STATE: 26 | 02 SITE NUMBER:

VI. ENVIRONMENTAL INFORMATION

01 PERMEABILITY OF UNSATURATED ZONE (Check one)

☐ A. $10^{-6} - 10^{-8}$ cm/sec ☐ B. $10^{-4} - 10^{-6}$ cm/sec ☒ C. $10^{-4} - 10^{-3}$ cm/sec ☐ D. GREATER THAN 10^{-3} cm/sec

Sand with clay

02 PERMEABILITY OF BEDROCK (Check one)

☐ A. IMPERMEABLE (Less than 10^{-6} cm/sec) ☒ B. RELATIVELY IMPERMEABLE ($10^{-4} - 10^{-6}$ cm/sec) ☐ C. RELATIVELY PERMEABLE ($10^{-2} - 10^{-4}$ cm/sec) ☐ D. VERY PERMEABLE (Greater than 10^{-2} cm/sec)

03 DEPTH TO BEDROCK	04 DEPTH OF CONTAMINATED SOIL ZONE	05 SOIL pH
150-300 (ft)	N/A (ft)	N/A

06 NET PRECIPITATION	07 ONE YEAR 24 HOUR RAINFALL	08 SLOPE: SITE SLOPE	DIRECTION OF SITE SLOPE	TERRAIN AVERAGE SLOPE
1.75-3.76 (in)	2 (in)	< 3 %	Northwest	< 3 %

09 FLOOD POTENTIAL: River + Creek SITE IS IN 100 YEAR FLOODPLAIN

10 ☐ SITE IS ON BARRIER ISLAND, COASTAL HIGH HAZARD AREA, RIVERINE FLOODWAY N/A

11 DISTANCE TO WETLANDS (5 acre minimum)

ESTUARINE: A. N/A (mi) OTHER: B. adjacent (mi)

12 DISTANCE TO CRITICAL HABITAT (of endangered species): N/A (mi)

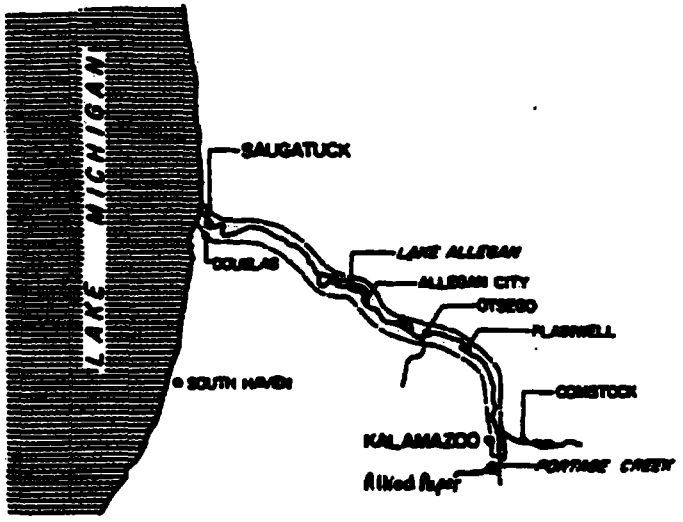
ENDANGERED SPECIES: no endangered species

13 LAND USE IN VICINITY

DISTANCE TO:

COMMERCIAL/INDUSTRIAL	RESIDENTIAL AREAS; NATIONAL/STATE PARKS, FORESTS, OR WILDLIFE RESERVES	AGRICULTURAL LANDS: PRIME AG LAND	AG LAND
A. ~1000 (mi) Ft	B. ~400 (mi) Ft	C. N/A (mi)	D. N/A (mi)

14 DESCRIPTION OF SITE IN RELATION TO SURROUNDING TOPOGRAPHY



- See attachment for more detailed description.

VII. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

MDNR Files - Groundwater + Surface Water Division
Hydrogeologic Investigation For Allied Paper, Inc.
U.S. Geological Survey

EPA FORM 2070-13 (7-81)

NCRKZOO0025960

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 6 - SAMPLE AND FIELD INFORMATION

I. IDENTIFICATION
01 STATE: 36
02 SITE NUMBER:

II. SAMPLES TAKEN

SAMPLE TYPE	01 NUMBER OF SAMPLES TAKEN	02 SAMPLES SENT TO	03 ESTIMATED DATE RESULTS AVAILABLE
GROUNDWATER			
SURFACE WATER			
WASTE			
AIR		No Sample Taken	
RUNOFF			
SPILL		During Inspection	
SOIL			
VEGETATION			
OTHER			

III. FIELD MEASUREMENTS TAKEN

01 TYPE	02 COMMENTS
	N/A

IV. PHOTOGRAPHS AND MAPS

01 TYPE ☐ GROUND ☒ AERIAL

02 IN CUSTODY OF MDNR
(Name of organization or individual)

03 MAPS ☒ YES ☐ NO

04 LOCATION OF MAPS MDNR

V. OTHER FIELD DATA COLLECTED (Provide narrative description)

N/A

VI. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

MDNR Files

EPA FORM 2070-13 (7-81)

NCRKZOO0025961

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 7 - OWNER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
26	

II. CURRENT OWNER(S)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
Allied Paper, Inc.		2030 Portage	2621	Kalamazoo	MI	49001
Public Access Lands						

PARENT COMPANY (if applicable)

08 NAME	09 D+B NUMBER	10 STREET ADDRESS (P.O. Box, RFD #, etc.)	11 SIC CODE	12 CITY	13 STATE	14 ZIP CODE
SCM Corporation		409 Easton Rd.		Willow Grove	PA	19090

III. PREVIOUS OWNER(S) (List most recent first)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
N/A						

IV. REALTY OWNER(S) (if applicable; list most recent first)

01 NAME	02 D+B NUMBER	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	05 CITY	06 STATE	07 ZIP CODE
N/A						

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

MDNR Files
Site Inspection 10/28/86

EPA FORM 2070-13 (7-81)

NCRKZOO0025962

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 8 - OPERATOR INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
26	

II. CURRENT OPERATOR (Provide if different from owner)				OPERATOR'S PARENT COMPANY (If applicable)			
01 NAME		02 D+B NUMBER		10 NAME		11 D+B NUMBER	
Allied Paper, Inc.				SCM Corporation			
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE		12 STREET ADDRESS (P.O. Box, RFD #, etc.)		13 SIC CODE	
2030 Portage				409 Easton Rd			
05 CITY	06 STATE	07 ZIP CODE		14 CITY	15 STATE	16 ZIP CODE	
Kalamazoo	MI	49001		Willow Grove	PA	19090	
08 YEARS OF OPERATION	09 NAME OF OWNER						

III. PREVIOUS OPERATOR(S) (List most recent first; provide only if different from owner)				PREVIOUS OPERATORS' PARENT COMPANIES (If applicable)			
01 NAME		02 D+B NUMBER		10 NAME		11 D+B NUMBER	
N/A				N/A			
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE		12 STREET ADDRESS (P.O. Box, RFD #, etc.)		13 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE		14 CITY	15 STATE	16 ZIP CODE	
08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD						
01 NAME		02 D+B NUMBER		10 NAME		11 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE		12 STREET ADDRESS (P.O. Box, RFD #, etc.)		13 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE		14 CITY	15 STATE	16 ZIP CODE	
08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD						
01 NAME		02 D+B NUMBER		10 NAME		11 D+B NUMBER	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)		04 SIC CODE		12 STREET ADDRESS (P.O. Box, RFD #, etc.)		13 SIC CODE	
05 CITY	06 STATE	07 ZIP CODE		14 CITY	15 STATE	16 ZIP CODE	
08 YEARS OF OPERATION	09 NAME OF OWNER DURING THIS PERIOD						

IV. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

MDNR Files

Site Inspection 10/28/86

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 9 - GENERATOR/TRANSPORTER INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
26	

II. ON-SITE GENERATOR

01 NAME	02 D+B NUMBER
N/A	
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE

III. OFF-SITE GENERATOR(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
N/A			
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE
01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE

IV. TRANSPORTER(S)

01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
N/A			
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE
01 NAME	02 D+B NUMBER	01 NAME	02 D+B NUMBER
03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE	03 STREET ADDRESS (P.O. Box, RFD #, etc.)	04 SIC CODE
05 CITY	06 STATE / 07 ZIP CODE	05 CITY	06 STATE / 07 ZIP CODE

V. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION
01 STATE 02 SITE NUMBER
26

II. PAST RESPONSE ACTIVITIES

01 ☐ A. WATER SUPPLY CLOSED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ B. TEMPORARY WATER SUPPLY PROVIDED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ C. PERMANENT WATER SUPPLY PROVIDED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ D. SPILLED MATERIAL REMOVED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ E. CONTAMINATED SOIL REMOVED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ F. WASTE REPACKAGED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ G. WASTE DISPOSED ELSEWHERE — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ H. ON SITE BURIAL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ I. IN SITU CHEMICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ J. IN SITU BIOLOGICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ K. IN SITU PHYSICAL TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ L. ENCAPSULATION — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ M. EMERGENCY WASTE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ N. CUTOFF WALLS — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ O. EMERGENCY DIKING/SURFACE WATER DIVERSION — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ P. CUTOFF TRENCHES/SUMP — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ Q. SUBSURFACE CUTOFF WALL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 10 - PAST RESPONSE ACTIVITIES

I. IDENTIFICATION
01 STATE | 02 SITE NUMBER
26

II PAST RESPONSE ACTIVITIES (Continued)

01 ☐ R. BARRIER WALLS CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ S. CAPPING/COVERING — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ T. BULK TANKAGE REPAIRED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ U. GROUT CURTAIN CONSTRUCTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ V. BOTTOM SEALED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ W. GAS CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ X. FIRE CONTROL — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ Y. LEACHATE TREATMENT — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ Z. AREA EVACUATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ 1. ACCESS TO SITE RESTRICTED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ 2. POPULATION RELOCATED — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

01 ☐ 3. OTHER REMEDIAL ACTIVITIES — 02 DATE _____ — 03 AGENCY _____
04 DESCRIPTION
N/A

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

MDNR Files
Site Inspection 10/25/86

EPA FORM 2070-13 (7-81)

EPA

POTENTIAL HAZARDOUS WASTE SITE
SITE INSPECTION REPORT
PART 11 - ENFORCEMENT INFORMATION

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER
MO	

II. ENFORCEMENT INFORMATION

01 PAST REGULATORY/ENFORCEMENT ACTION ☒ YES ☐ NO

02 DESCRIPTION OF FEDERAL, STATE, LOCAL REGULATORY/ENFORCEMENT ACTION

Allied Paper, Inc. required to prepare a Program for Effective Residuals Management in the existing NPDES permit.

III. SOURCES OF INFORMATION (Cite specific references, e.g., state files, sample analysis, reports)

MDNR Files
Site Interview 10/28/86

EPA FORM 2070-13 (7-81)

Facility name: Allied Paper - Portage Creek - Kalamazoo River

Location: Kalamazoo, Mich.

EPA Region: V

Person(s) in charge of the facility: R. Richard Eaton (Allied Paper Inc. - Manager)

Name of Reviewer: C. Wallace (MDNR) Date: 10/30/86

General description of the facility:

(For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of the facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

Allied Paper Inc. has operated paper mills in Kalamazoo, Michigan since 1925. In the past, PCBs were used in the manufacture of carbon tissue, carbonless copy paper, and plasticizers in printing inks. PCBs are the primary contaminant of concern in the Portage Creek + Kalamazoo River system. The release of PCB from contaminated sediments is a continuing source of contamination to the downstream water resource. Kalamazoo River sediment is contaminated from Portage Creek to Lake Michigan (≅ 80 river miles)

Scores: $S_M = 50.6$ ($S_{gw} = 83.7$ $S_{sw} = 25.5$ $S_a = 0$)

$S_{FE} = 0$

$S_{DC} = 62.5$

FIGURE 1
HRS COVER SHEET

Ground Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 (45)	1	45	45	3.1
If observed release is given a score of 45, proceed to line 4. If observed release is given a score of 0, proceed to line 2.					
2 Route Characteristics					3.2
Depth to Aquifer of Concern	0 1 2 3	2		6	
Net Precipitation	0 1 2 3	1		3	
Permeability of the Unsaturated Zone	0 1 2 3	1		3	
Physical State	0 1 2 3	1		3	
Total Route Characteristics Score				15	
3 Containment	0 1 2 3	1		3	3.3
4 Waste Characteristics					3.4
Toxicity/Persistence	0 3 6 9 12 15 (18)	1	18	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 (8)	1	8	8	
Total Waste Characteristics Score			26	26	
5 Targets					3.5
Ground Water Use	0 1 (2) 3	3	6	9	
Distance to Nearest Well/Population Served	0 4 6 8 10 / 12 16 18 20 / 24 30 32 (35) 40	1	35	40	
Total Targets Score			41	49	
6 If line 1 is 45, multiply 1 x 4 x 5 / If line 1 is 0, multiply 2 x 3 x 4 x 5			47970	57,330	
7 Divide line 6 by 57,330 and multiply by 100			S_{gw} = 83.7		

FIGURE 2
GROUND WATER ROUTE WORK SHEET

Surface Water Route Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multi-plier	Score	Max. Score	Ref. (Section)
1 Observed Release	0 45	1	45	45	4.1
If observed release is given a value of 45, proceed to line 4. If observed release is given a value of 0, proceed to line 2.					
2 Route Characteristics					4.2
Facility Slope and Intervening Terrain	0 1 2 3	1		3	
1-yr. 24-hr. Rainfall	0 1 2 3	1		3	
Distance to Nearest Surface Water	0 1 2 3	2		6	
Physical State	0 1 2 3	1		3	
Total Route Characteristics Score				15	
3 Containment	0 1 2 3	1		3	4.3
4 Waste Characteristics					4.4
Toxicity/Persistence	0 3 6 9 12 15 18	1	18	18	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1	8	8	
Total Waste Characteristics Score			26	26	
5 Targets					4.5
Surface Water Use	0 1 2 3	3	6	9	
Distance to a Sensitive Environment	0 1 2 3	2	0	6	
Population Served/Distance to Water Intake Downstream	0 4 6 8 10 12 16 18 20 24 30 32 35 40	1	8	40	
Total Targets Score			14	55	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			16386	64,350	
7 Divide line 6 by 64,350 and multiply by 100			S_{sw} = 25.5		

FIGURE 7
SURFACE WATER ROUTE WORK SHEET

	S	S^2
Groundwater Route Score (S_{gw})	83.7	7005.7
Surface Water Route Score (S_{sw})	25.5	650.3
Air Route Score (S_a)	0	0
$S_{gw}^2 + S_{sw}^2 + S_a^2$		7656.0
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2}$		87.5
$\sqrt{S_{gw}^2 + S_{sw}^2 + S_a^2} / 1.73 = S_M =$		50.6

FIGURE 10
WORKSHEET FOR COMPUTING S_M

Direct Contact Work Sheet					
Rating Factor	Assigned Value (Circle One)	Multiplier	Score	Max. Score	Ref. (Section)
1 Observed Incident	0 45	1	45	45	8.1
If line 1 is 45, proceed to line 4 If line 1 is 0, proceed to line 2					
2 Accessibility	0 1 2 3	1		3	8.2
3 Containment	0 15	1		15	8.3
4 Waste Characteristics Toxicity	0 1 2 3	5	15	15	8.4
5 Targets					8.5
Population Within a 1-Mile Radius	0 1 2 3 4 5	4	20	20	
Distance to a Critical Habitat	0 1 2 3	4	0	12	
	Total Targets Score		20	32	
6 If line 1 is 45, multiply 1 x 4 x 5 If line 1 is 0, multiply 2 x 3 x 4 x 5			13500	21,600	
7 Divide line 6 by 21,600 and multiply by 100			SDC = 62.5		

FIGURE 12
DIRECT CONTACT WORK SHEET

June 28, 1982

DOCUMENTATION RECORDS
FOR
HAZARD RANKING SYSTEM

INSTRUCTIONS: The purpose of these records is to provide a convenient way to prepare an auditable record of the data and documentation used to apply the Hazard Ranking System to a given facility. As briefly as possible summarize the information you used to assign the score for each factor (e.g., "Waste quantity = 4,230 drums plus 800 cubic yards of sludges"). The source of information should be provided for each entry and should be a bibliographic-type reference that will make the document used for a given data point easier to find. Include the location of the document and consider appending a copy of the relevant page(s) for ease in review.

FACILITY NAME: Allied Paper - Kalamazoo River - Portage Creek

LOCATION: Kalamazoo, Mich.

NCRKZOO0025973

GROUND WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected (5 maximum):

PCBs (Aroclor 1242 + 1254)

Ref. 1

Rationale for attributing the contaminants to the facility:

Contaminants Found in monitoring wells around landfill

Ref. 1

* * *

2 ROUTE CHARACTERISTICS

Depth to Aquifer of Concern

Name/description of aquifers(s) of concern:

N/A

Depth(s) from the ground surface to the highest seasonal level of the saturated zone [water table(s)] of the aquifer of concern:

N/A

Depth from the ground surface to the lowest point of waste disposal/ storage:

N/A

NCRKZOO0025974

Net Precipitation

Mean annual or seasonal precipitation (list months for seasonal):

N/A

Mean annual lake or seasonal evaporation (list months for seasonal):

N/A

Net precipitation (subtract the above figures):

N/A

Permeability of Unsaturated Zone

Soil type in unsaturated zone:

N/A

Permeability associated with soil type:

N/A

Physical State

Physical state of substances at time of disposal (or at present time for generated gases):

N/A

* * *

NCRKZOO0025975

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

N/A

Method with highest score:

N/A

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

PCBs

Ref. 1

Compound with highest score:

PCBs · Toxicity = 3 + Persistance = 3

Ref. 2

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

a. 7952.35 yds^3 of paper sludge waste p. 1 (1985 Paper Waste Residue

- and -

b. ≈ 114 tons PCBs in river sediment p. 2

Ref 3 + 4

Basis of estimating and/or computing waste quantity:

a. Waste quantity calculated in Allied's PERM Report by Wilkens + Wheaton Testing Laboratory, Inc. Ref. 3 p. 1

b. Tonage calculated in Kalamazoo River PCB Project Ref. 4 p. 2

NCRKZOO0025976

5 TARGETS

Ground Water Use

Use(s) of aquifer(s) of concern within a 3-mile radius of the facility:

Drinking water, with municipal water from alternate unthreatened sources presently available. All wells are in a glacial drift aquifer

Ref. 5+6

Distance to Nearest Well

Location of nearest well drawing from aquifer of concern or occupied building not served by a public water supply:

Nearest well (municipal well) is ½-mile away. There are no private wells in the target area (none within City of Kalamazoo), therefore, municipal wells were used in scoring because they are within the target area + may be affected.

Distance to above well or building:

≈ ½-mile

Ref. 3 p. 2-3

Population Served by Ground Water Wells Within a 3-Mile Radius

Identified water-supply well(s) drawing from acuifer(s) of concern within a 3-mile radius and populations served by each:

14 municipal wells in the cities of Kalamazoo + Portage are within the 3-mile radius. Therefore, population is greater than 10,000. Ref. 3, 5

Computation of land area irrigated by supply well(s) drawing from acuifer(s) of concern within a 3-mile radius, and conversion to population (1.5 people per acre):

0

Total population served by ground water within a 3-mile radius:

> 10,000

Ref. 5

NCRKZOO0025977

SURFACE WATER ROUTE

1 OBSERVED RELEASE

Contaminants detected in surface water at the facility or downhill from it (5 maximum):

PCBs

Ref. 4 pp. 3-8

Rationale for attributing the contaminants to the facility:

Sampling of several areas of the creek + river show various concentrations of PCB

Ref. 4 pp. 3-8 * * *

2 ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain

Average slope of facility in percent:

N/A

Name/description of nearest downslope surface water:

N/A

Average slope of terrain between facility and above-cited surface water body in percent:

N/A

Is the facility located either totally or partially in surface water?

N/A

NCRKZOO0025978

Is the facility completely surrounded by areas of higher elevation?

N/A

1-Year 24-Hour Rainfall in Inches

N/A

Distance to Nearest Downslope Surface Water

N/A

Physical State of Waste

N/A

* * *

3 CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

N/A

Method with highest score:

N/A

4 WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated	Toxicity	Persistence
PCBs	3	3

Ref. 4

Compound with highest score:

PCB

Ref. 2

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

a. 7952.35 yds^3 paper sludge waste (1985 Paper Waste Residue

b. 114 tons PCBs in River Sediment

Ref. 3+4

Basis of estimating and/or computing waste quantity:

a. Waste quantity calculated in Allied's PERM Report by Wilkens + Wheaton Testing Laboratory, Inc.

b. Tonage calculated in Kalamazoo River PCB Project

Ref. 3+4

5 TARGETS

Surface Water Use

Use(s) of surface water within 3 miles downstream of the hazardous substance:

Recreational

Ref. 7

NCRKZOO0025980

Is there tidal influence?

NO

Ref. 7

Distance to a Sensitive Environment

Distance to 5-acre (minimum) coastal wetland, if 2 miles or less:

> 2 miles

Ref. 7

Distance to 5-acre (minimum) fresh-water wetland, if 1 mile or less:

> 1 mile

Ref. 7

Distance to critical habitat of an endangered species or national wildlife refuge, if 1 mile or less:

> 1 mile

Ref. 7

Population Served by Surface Water

Location(s) of water-supply intake(s) within 3 miles (free-flowing bodies) or 1 mile (static water bodies) downstream of the hazardous substance and population served by each intake:

Surface water used for irrigation (Kalamazoo River)

338.7 acres

Ref. 8

NCRKZOO0025981

Computation of land area irrigated by above-cited intake(s) and conversion to population (1.5 people per acre):

333.7 acres x 1.5 people/acre = 500.55 people

Ref. 8

Total population served:

500.55 people

Ref. 8

Name/description of nearest of above water bodies:

Portage Creek

Kalamazoo River

Ref. 7

Distance to above-cited intakes, measured in stream miles. Ref. 7

80 miles

NCRKZOO0025982

DIRECT CONTACT

1 OBSERVED INCIDENT

Date, location, and pertinent details of incident:

1986 Fish Advisory - Kalamazoo River

Ref. 7

* * *

2 ACCESSIBILITY

Describe type of barrier(s):

N/A

* * *

3 CONTAINMENT

Type of containment, if applicable:

N/A

* * *

4 WASTE CHARACTERISTICS

<u>Toxicity</u>

Compounds evaluated:

PCBs

Ref. 4 pp. 9-14

Compound with highest score:

PCBs

Ref. 2

* * *

NCRKZOO0025983

5 TARGETS

Population within one-mile radius

> 10,000 Ref. 7

Distance to critical habitat (of endangered species)

No endangered species

NCRKZOO0025984

NCRKZO0002598 6

HRS Documentation Log Sheet

Ref. 1 - MDNR sample Results of monitoring wells around Allied Paper's landfill, seven (7) pages

Ref. 2 - Sax, N.I., Dangerous Properties of Industrial Materials Van Nostrand Reinhold Co., New York, 4th ed., 1975.

Ref. 3 - Program for Effective Residuals Management (PERM) for the Allied Paper, Inc. Solid Waste Disposal Facility for Residuals Disposal prepared by Wilkins + Wheaton Testing Laboratory, Inc., Feb.

Ref. 4 - Kalamazoo River PCB Project Kalamazoo and Allegan Counties Michigan, State of Michigan Contract Number 1611, NUS Project Number 7339, prepared by NUS Corporation, March 1986

Ref. 5 - Municipal Water Withdrawals in Michigan, Douglas J. Bedell. Water Management Division, Michigan Department of Natural Resources, 1982

Ref. 6 - Hydrogeologic Atlas of Michigan, Western Michigan University Percentage of Wells in Bedrock, 1981; two (2) pages

Ref. 7 - Topo. Maps

U.S.G.S Kalamazoo Quad., 7.5 Minute series, 1967
U.S.G.S Otsego Quad., 7.5 " " , 1967
U.S.G.S. Millgrove Quad. " " , 1981
" Hamilton " " " " , 1981
" Fennville " " " " 1981

NCRKZOO002598 6

USGS Saugatuck Quad 7.5 Minute series, 1981
" Merson " " " " , 1981
" Allegan " " " " , 1981
Kalamazoo NE " " " " , 1967

Ref. 8 Telephone conversation with ASCS concerning land irrigation using surface water

Ref. 9 Fish advisory, Michigan Fishing Guide 1986

Ref. 1

11784 MICHIGAN DEPT OF NATURAL RESOURCES ENVIRONMENTAL LABORATORY YES / NO - INFO ON BACK
MATRIX = WATER ANALYSIS REQUEST SHEET ***** SAFETY WARNING *****

LAB LOGN 7966 PROJ CODE ____ COST CENTER 90175 PR TT RECEIVED AT LAB ___ DATE TIME 3/27/86 9:20 AM PM

LOCATION SAMPLED Allied Bend Fill, Kalamazoo COLLECTED BY Bello TRANSFERED TO Babins/Kilmale

SAMPLE REMARKS Low level PCB's only if 3 Pack called by Bill Creal SEND RESULTS TO (NAME & SECTION) Bello, GQD, Compliance #1, Plainwell

LAB USE ONLY	#	FIELD ID OR DESCRIPTION	SAMPLE INFORMATION	YY/MM/DD	HH:MM
57158	01	MW #1 (discontinuing)	MW received but not field filtered: Special request for	86/03/25	9:00 A
57159	02	MW #2 (approximately using Bryant Mill Pond)	low detection limit (10 ppt) on PCB		10:00 A
57160	03	MW #3 "	extra vial that looks like MW-5 - Thrown out		11:00 A
57161	04	MW #5 "	3 vials		10:30 A
57162	05	Portage-Upstream			12:00 P
57163	06	Portage-Downstream			12:30 P
	07				
	08				
	09				
	10				

RECEIVED APR 18 1986 GQD Plainwell

ORGANIC

P01 01 HALOCARBONS....1 2 3 4 5 6 7 8 9 10
P02 02 AROMATIC HC....1 2 3 4 5 6 7 8 9 10
OSN 03 CL HC&PES (&PCB) 1 2 3 4 5 6 7 8 9 10
06 PHTHALATES.....1 2 3 4 5 6 7 8 9 10
07 PNA.....1 2 3 4 5 6 7 8 9 10
.....1 2 3 4 5 6 7 8 9 10
.....1 2 3 4 5 6 7 8 9 10
1 2 3 4 5 6 7 8 9 10
OA 08 PHENOLS.....1 2 3 4 5 6 7 8 9 10
OG OIL & GREASE-IR....1 2 3 4 5 6 7 8 9 10
OIL & GREASE-GRAV..1 2 3 4 5 6 7 8 9 10
1 2 3 4 5 6 7 8 9 10
.....1 2 3 4 5 6 7 8 9 10
1 2 3 4 5 6 7 8 9 10
.....1 2 3 4 5 6 7 8 9 10
1 2 3 4 5 6 7 8 9 10
.....1 2 3 4 5 6 7 8 9 10
1 2 3 4 5 6 7 8 9 10

INORGANIC

MAD FIELD FILTER+PRES..1 2 3 4 5 6 7 8 9 10
MD LAB FILTRATION.....1 2 3 4 5 6 7 8 9 10
MA CA MG NA K.....1 2 3 4 5 6 7 8 9 10
CD CR CU NI PB ZN.1 2 3 4 5 6 7 8 9 10
HG MERCURY.....1 2 3 4 5 6 7 8 9 10
AS ARSENIC.....1 2 3 4 5 6 7 8 9 10
SE SELENIUM.....1 2 3 4 5 6 7 8 9 10
SB ANTIMONY.....1 2 3 4 5 6 7 8 9 10
OTHERS (CIRCLE)
AG AL BA BE CO FE 1 2 3 4 5 6 7 8 9 10
LI MN MO TI V.....1 2 3 4 5 6 7 8 9 10
FURNACE- CD.....1 2 3 4 5 6 7 8 9 10
* CR CU NI PB.....1 2 3 4 5 6 7 8 9 10
MN PH, CONDUCTANCE....1 2 3 4 5 6 7 8 9 10
CL SO4 TOTAL ALK...1 2 3 4 5 6 7 8 9 10
FLUORIDE.....1 2 3 4 5 6 7 8 9 10
CR+6.....1 2 3 4 5 6 7 8 9 10
HCO3- CO3=.....1 2 3 4 5 6 7 8 9 10
CA MG NA K -DISS.1 2 3 4 5 6 7 8 9 10
MD BRINE (CIRCLE)
* CL SO4 BR 1 2 3 4 5 6 7 8 9 10
* ALK HCO3- CO3=..1 2 3 4 5 6 7 8 9 10

GENERAL CHEMISTRY

DO DISS OXYGEN....1 2 3 4 5 6 7 8 9 10
GN O-PHOS NO2-....1 2 3 4 5 6 7 8 9 10
RES-NF (SS)....1 2 3 4 5 6 7 8 9 10
RES-TF (TDS)...1 2 3 4 5 6 7 8 9 10
1 2 3 4 5 6 7 8 9 10
BOD TOT 5 DAY.1 2 3 4 5 6 7 8 9 10
BOD CARB 5 DAY.1 2 3 4 5 6 7 8 9 10
1 2 3 4 5 6 7 8 9 10
GA COD.....1 2 3 4 5 6 7 8 9 10
TOC.....1 2 3 4 5 6 7 8 9 10
NO3+NO2 NAS...1 2 3 4 5 6 7 8 9 10
KJEL N, TOT P..1 2 3 4 5 6 7 8 9 10
PHENOLICS.....1 2 3 4 5 6 7 8 9 10
1 2 3 4 5 6 7 8 9 10
GB TOTAL CN.....1 2 3 4 5 6 7 8 9 10
FREE CN.....1 2 3 4 5 6 7 8 9 10
BC FECAL COLI.....1 2 3 4 5 6 7 8 9 10
TOTAL COLI.....1 2 3 4 5 6 7 8 9 10
1 2 3 4 5 6 7 8 9 10
CA CHLOROPHYLL....1 2 3 4 5 6 7 8 9 10

MICH DNR ENVIRONMENTAL LAB
ORGANIC RESULTS FOR LAB LOG #7966

LAB# 57158 REC# 4500	ug/L	ppb	SCAN 1	COMMENTS
		1.000	Detection limit	
LAB# 57158 REC# 4501	ug/L	ppb	SCAN 2	COMMENTS
		5.000	Detection limit	
LAB# 57158 REC# 4877	ug/L	ppb	SCAN 3 (PCBs only)	COMMENTS
			AROCLOR 1242	INT K.1
			AROCLOR 1260	INT K.1
			AROCLOR 1254	INT K.1
		.010	Detection limit	
LAB# 57159 REC# 4502	ug/L	ppb	SCAN 1	COMMENTS
		1.000	Dgtection limit	
LAB# 57159 REC# 4503	ug/L	ppb	SCAN 2	COMMENTS
		5.000	Detection limit	
LAB# 57159 REC# 4878	ug/L	ppb	SCAN 3 (PCBs only)	COMMENTS
			AROCLOR 1254	INT K.1
			AROCLOR 1242	INT K.1
			AROCLOR 1260	INT K.1
		.010	Detection limit	
LAB# 57160 REC# 4504	ug/L	ppb	SCAN 1	COMMENTS
		1.000	Detection limit	

LAB LOG #7966 cont.

LAB# 57160 REC# 4505	ug/L	ppb	SCAN 2	COMMENTS
		5.000	Detection limit	
LAB# 57160 REC# 4879	ug/L	ppb	SCAN 3 (PCBs only)	COMMENTS
		.520	AROCLOR 1242 AROCLOR 1254	* * * * INT K.2
		.010	Detection limit	
LAB# 57161 REC# 4506	ug/L	ppb	SCAN 1	COMMENTS
		1.000	Detection limit	
LAB# 57161 REC# 4507	ug/L	ppb	SCAN 2	COMMENTS
		5.000	Detection limit	
LAB# 57161 REC# 4880	ug/L	ppb	SCAN 3 (PCBs only)	COMMENTS
		.490	AROCLOR 1242	* * * *
		.067	AROCLOR 1254	* * * *
		.050	Detection limit	
LAB# 57162 REC# 4508	ug/L	ppb	SCAN 1	COMMENTS
		1.000	Detection limit	
LAB# 57162 REC# 4509	ug/L	ppb	SCAN 2	COMMENTS
		5.000	Detection limit	

LAB LOG #7966 cont.

LAB# 57163 REC# 4510	ug/L	ppb	SCAN 1	COMMENTS
	1.000		Detection limit	
LAB# 57163 REC# 4511	ug/L	ppb	SCAN 2	COMMENTS
	5.000		Detection limit	

Unless noted above under COMMENTS, analyses were performed for the compounds on attached scan list. Concentrations are rounded to 3 significant figures.

Approved _____

APR 16 1988

ORGANIC SCAN LIST
MATRIX: WATER
JANUARY 1985

SCAN 1 - Purgeable Halocarbons

Bromodichloromethane
Bromoform
Carbon tetrachloride
Chlorobenzene
Chloroform
Dibromochloromethane
1,1-Dichloroethane
1,2-Dichloroethane
1,1-Dichloroethene
1,2-Dichloroethene (cis & trans)
1,2-Dichloropropane
1,3-Dichloropropene (cis & trans)
Methylene chloride (request only)
1,1,2,2-Tetrachloroethane
Tetrachloroethene
1,1,1-Trichloroethane
1,1,2-Trichloroethane
Trichloroethene

SCAN 2 - Purgeable Aromatic Hydrocarbons

Benzene
Ethylbenzene
Styrene
Toluene
Xylene isomers (o, m, and p)

SCAN 3 - Chlorinated Hydrocarbons, PCBs & Organochlorine Pesticides

Aldrin
*Aroclor 1016
*Aroclor 1221
*Aroclor 1232
Aroclor 1242
*Aroclor 1248
Aroclor 1254
Aroclor 1260
*Aroclor 1262
*Aroclor 1268
g-BHC (lindane)
BP-6 (PBB)
a-Chlordane
g-Chlordane
2-Chloronaphthalene
4,4'-DDD
4,4'-DDE
1,4'-DDT
4,4'-DDT
1,2-Dichlorobenzene
1,3-Dichlorobenzene
1,4-Dichlorobenzene
Heptachlor
Heptachlor epoxide
Hexabromobenzene
Hexachlorobenzene
Hexachlorobutadiene
Hexachlorocyclopentadiene
Hexachloroethane
Methoxychlor
Mirex
Pentachloronitrobenzene
*Toxaphene
1,2,4-Trichlorobenzene

SCAN 6 - Phthalate Esters & Polar Pesticides

Bis (2-ethylhexyl) phthalate
Butyl benzyl phthalate
Di-n-butyl phthalate
Diethyl phthalate
Dimethyl phthalate
Di-n-octyl phthalate
Dieldrin
Endosulfan I
Endrin

MICHIGAN DEPARTMENT OF NATURAL RESOURCES	PROCEDURE ENVIRONMENTAL LABORATORY	NO.: DATE:	PD-13 Appendix A 9/23/85

SUBJECT: Laboratory Result Remark Codes Most Commonly Used by Organic Lab

EFFECTIVE DATE: September 23, 1985

Below are the remark codes most frequently used when reporting data from the Organic Laboratory. A complete list of all available codes can be found in the Bureau's QA Manual as Appendix 1.C.-9.

The following single-letter STORET remark codes shall be used when reporting applicable laboratory results. The code appears in the comment column and should be included with values that are entered into the STORET system. Because only one STORET remark code can be stored at a time, the most pertinent must be used when more than one applies.

J Estimated value; value may not be accurate.

K Actual value is less than the value given. (Substance, if present, is below this level.)

M Presence of material verified but not quantified.

The following double-letter laboratory remark codes may also appear as comments. They are used to indicate why the laboratory has less confidence in a particular reported value. When more than one code is applicable, the more pertinent should be used. These codes are not compatible with STORET.

BK Reported value has been corrected for a laboratory blank which was greater than half of the detection limit but less than half of the reported value.

DL Sample was not analyzed using an optimum dilution.

DM Sample was diluted to reduce possible matrix interference.

DR High sample dilution was required to bring value into the analytical working range.

HT The recommended maximum laboratory holding time was exceeded before analysis.

LH Quality control indicated possible low recovery. The actual level may have been higher than the reported value.

LL Quality control indicated possible high recovery. The actual level may have been lower than the reported value.

LP Quality control indicated that the precision of the result may have been less than normal.

MM Analytical methodology has not been approved for the submitted sample matrix.

NA Analytical method has not yet been approved by laboratory.

PS Possible interference may have affected the accuracy of the laboratory result.

PT Recommended laboratory preservation technique not used.

SC Recommended laboratory sample container not used.

UC No attempt has been made to confirm the identity of the reported compound by a second independent technique due to equipment or sample problems.

The following triple-letter laboratory remark codes shall be used when no value is obtainable and STORET remark codes are inapplicable. These codes should not be stored in the STORET system. When more than one code is applicable, the more pertinent should be used.

ACC Laboratory accident resulted in no obtainable value.

BLK No value reported because the laboratory blank was greater than half of the detection limit and greater than half of the quantified value.

INT Interference encountered during analysis resulted in no obtainable value.

LSC Lack of proper sample container resulted in no sample suitable for analysis.

NAV Requested analysis not avaialble (lack of method or equipment, long-term equipment failure, etc.).

NOS No sample received suitable for analysis requested.

QNS Quantity not sufficient to perform requested analysis.

XHT No analysis performed or value reported because maximum recommended laboratory holding time was exceeded by a large margin.

APPROVED BY: John Peck
John Peck Organic Unit Supervisor

Ref. 2

TABLE 4
WASTE CHARACTERISTICS VALUES
FOR SOME COMMON CHEMICALS

CHEMICAL/COMPOUND	[illegible]	[illegible]	[illegible]	[illegible]
Acetaldehyde	3	0	3	2
Acetic Acid	3	0	2	1
Acetone	2	0	3	0
Aldrin	3	3	1	0
Ammonia, Anhydrous	3	0	1	0
Aniline	3	1	2	0
Benzene	3	1	3	0
Carbon Tetrachloride	3	3	0	0
Chlordane	3	3	0[c]	0[c]
Chlorobenzene	3	2	3	0
Chloroform	3	3	0	0
Cresol-O	3	1	2	0
Cresol-MP	3	1	1	0
Cyclohexane	2	2	3	0
Dieldrin	3	3	1	0
Ethyl Benzene	2	1	3	0
Formaldehyde	3	0	2	0
Formic Acid	3	0	2	0
Hydrochloric Acid	3	0	0	0
Isopropyl Ether	3	1	3	1
Lindane	3	3	1	0
Methane	1	1	3	0
Methyl Ethyl Ketone	2	0	3	0
Methyl Parathion in Xylene Solution	3	0[A]	3	1
Naphthalene	2	1	2	0
Nitric Acid	3	0	0	0
Parathion	3	0[A]	1	2
PCB	3	3	0[A]	0[A]
Petroleum, Kerosene (Fuel Oil No. 1)	3	1	2	0
Phenol	3	1	2	0
Sulfuric Acid	3	0	0	2
Toluene	2	1	3	0
Trichlorobenzene	2	3	1	0
m-Trichloroethane	2	2	1	0
Xylene	2	1	3	0

[1] Sax, N. I., Dangerous Properties of Industrial Materials, Fox Reinhold Reinhold Co., New York, 4th ed., 1979. The highest rating listed under each chemical is used.

[2] TRW Associates, Inc., Methodology for Rating the Hazard Potential of Waste Disposal Sites, May 3, 1980.

[3] National Fire Protection Association, National Fire Codes, Vol. 13, No. 49, 1977.

[C] Professional judgment based on information contained in the U.S. Coast Guard CHRIS Hazardous Chemical Data, 1978.

[A] Professional judgment based on existing literature.

NCRKZOO0025994

Ref. 3

PROGRAM FOR EFFECTIVE RESIDUALS MANAGEMENT FOR THE ALLIED PAPER, INC. SOLID WASTE DISPOSAL FACILITY FOR RESIDUALS DISPOSAL KALAMAZOO, MICHIGAN

February, 1986

Prepared by:

WILKINS & WHEATON TESTING LABORATORY, INC.
Kalamazoo, Michigan

NCRKZOO0025995

III. INVENTORY OF PAPER WASTE RESIDUALS

Table 1 is a one-year inventory of residuals production at the Allied Paper facility. The period covered is from January through December of 1985, and includes the daily average for each month and the monthly total.

Table 1
1985 PAPER WASTE RESIDUALS PRODUCTION/DISPOSAL

	Daily Average	Monthly Total
January	43,500 lbs/day	1,350,000 lbs.
February	43,000	1,199,000
March	36,500	1,136,000
April	38,500	961,000
May	35,000	837,000
June	32,500	982,000
July	38,000	1,069,000
August	34,500	1,077,000
September	32,000	970,000
October	45,000	1,403,000
November	36,000	1,091,000
December	46,500	1,444,000
ANNUAL	38,417 lbs/day	13,519,000 lbs. = 7952.35 yd.^{3}

As listed, Allied produced approximately 13.5 million pounds of sludge in 1985, which equates to approximately 8,000 cubic yards. Based on the system of operations, the inventory of residuals for production, storage, and disposal is one and the same.

NCRKZOO0025996

MUNICIPAL WATER AND SEWER SERVICES

The residential areas, commercial areas, and industrial operations in the vicinity of the Allied Paper, Inc. Landfill site are served by the Kalamazoo municipal water system and municipal sanitary sewer system. Because of the industrial nature of the area and the intensity of development, these water and sewer services have been in operation for a considerable portion of the area's urban history. Figure 2 identifies municipal wells in the project area, with the closest one being approximately 1/2 mile to the southeast on the other side of Portage Creek.

As previously addressed, Allied Paper utilizes both municipal water and water from Portage Creek for their processing and sanitary needs. All sanitary wastewater and a portion of the processing water is discharged to the municipal sanitary sewer system. The remainder of processing wastewater is discharged to Portage Creek, as regulated by NPDES Permit No. MI-0000779. The intent of the attached PERM and hydrogeologic investigation is mandated through the NPDES Permit Program.

An extensive storm sewer system also exists in the area. Figure 3 identifies the storm sewer network which discharges into Portage Creek in the project area. As illustrated, the Creek receives a large amount of storm water, which is likely to affect surface water quality (see Portage Creek section of this report).

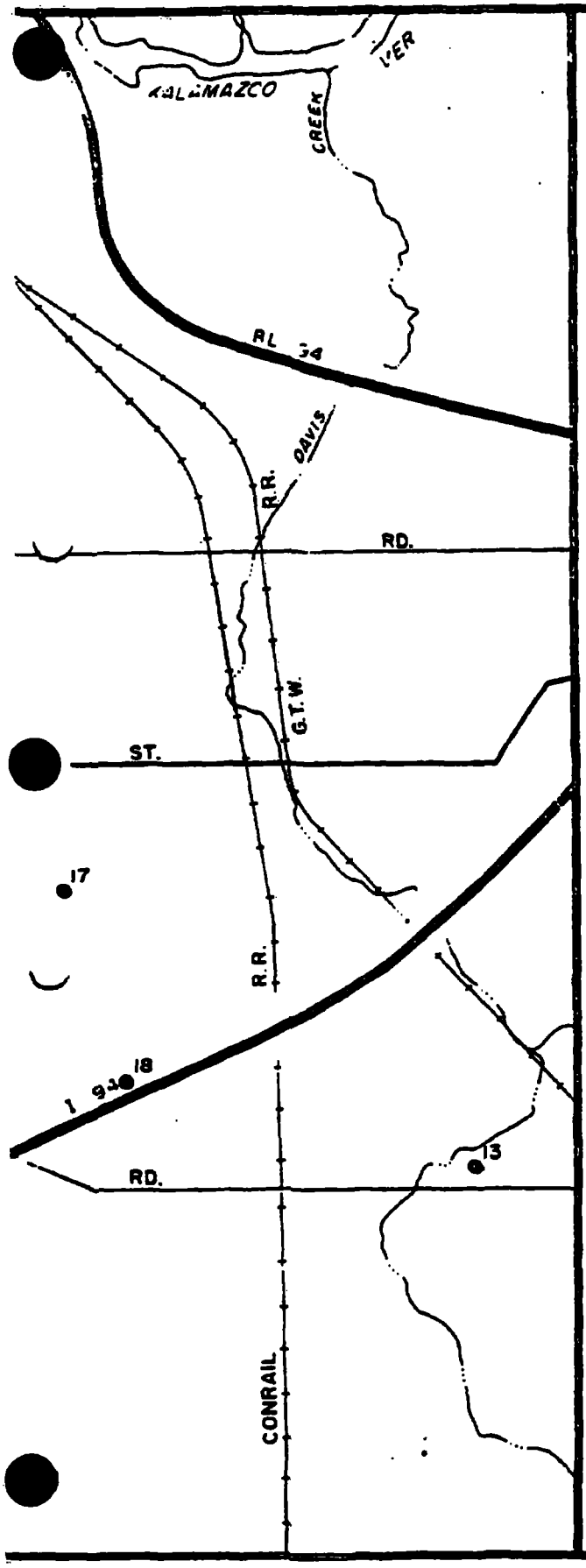


FIGURE 2

N
W E
S

ALLIED PAPER, INCORPORATED
KALAMAZOO, MICHIGAN

SOLID WASTE DISPOSAL FACILITY
FOR
RESIDUALS DISPOSAL

CITY WELL FIELDS
LOCATION MAP

LEGEND

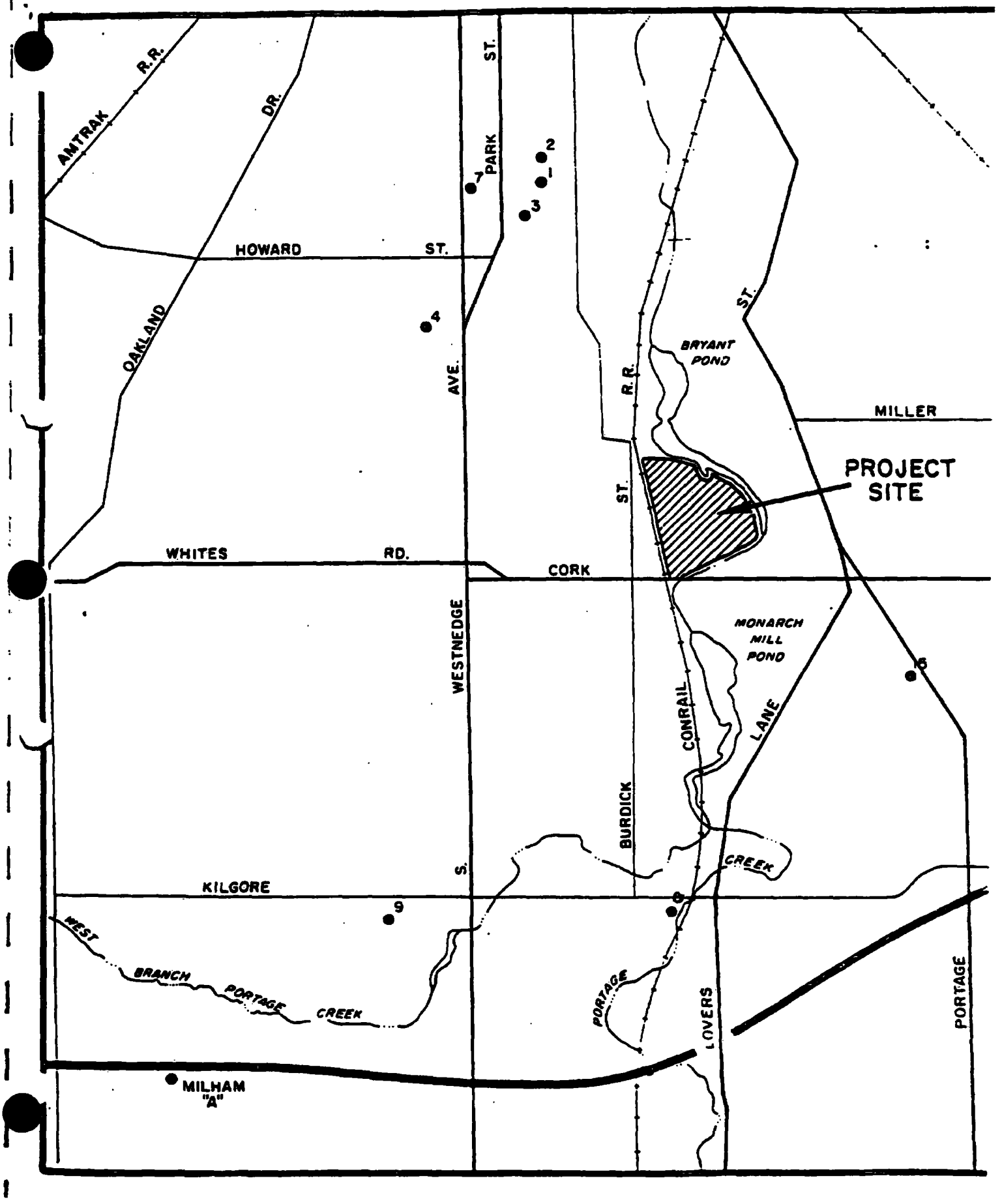
3 — WELL NUMBER

WELL LOCATION
(APPROXIMATE)

0 2,000' 4,000' 6,000'

SCALE: 1" = 2,000'

WILKINS & WHEATON TESTING LAB, INC.



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Ref. 4

D-33-11-5-8
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FEASIBILITY STUDY OF ALTERNATIVES

VOLUME I

KALAMAZOO RIVER PCB PROJECT
KALAMAZOO AND ALLEGAN COUNTIES, MICHIGAN

STATE OF MICHIGAN CONTRACT NUMBER 1611

NUS PROJECT NUMBER 7339

MARCH 1986

NUS CORPORATION

NCRKZOO0026000

1.0 INTRODUCTION

1.1 Problem Description

Approximately 80 miles of the Kalamazoo River, between the City of Kalamazoo and the City of Saugatuck (Lake Michigan), are contaminated with polychlorinated biphenyls, or PCBs (see Figure 1-1). The PCB contamination is predominantly found in the sediments of the Kalamazoo River and Portage Creek, although elevated levels of PCBs are also found in the water column and fish due to physical, chemical, and biological interactions with the contaminated sediments. PCBs have been determined to be hazardous to human health, and bans on PCB usage have been enacted at both State and Federal levels. PCBs remain a strictly regulated chemical to minimize human exposure and to protect human health. The presence of large amounts of uncontained PCB-contaminated sediments at various locations along the Kalamazoo River and Portage Creek, together with the concomitant PCB contamination of the water column and fish, serve to increase human exposure to this substance.

PCB contamination of the river has been documented since a 1971 fish survey showed high concentrations of PCB in the flesh of the Kalamazoo River fish population. The Michigan Department of Public Health subsequently issued a fish consumption advisory for this section of the river. The contamination is also delaying Michigan Department of Natural Resources (MDNR) plans to restore the Kalamazoo River fishery. Over $500 million has been spent to improve water quality in the Kalamazoo River, and expectations are for an improved fishery to develop; however, the MDNR is not committing resources to further develop the fishery until the PCB problem is addressed. Other potential activities such as the renovation and retrofitting of dams for low-head hydropower development are reportedly also being affected by the PCB contamination.

The major historical sources of PCBs in the Kalamazoo River appear to be the wastewater discharges from paper industries. The present problem is principally

due to uncontained PCB-contaminated sediments, where an estimated 200,000 pounds of PCBs reside. The evidence to date indicates that much of the continuing contamination of the Kalamazoo River is originating from sediment deposits in a major tributary, Portage Creek.

On the Kalamazoo River, there are additional large quantities of contaminated sediments behind hydroelectric and water-diversion dams, three of which have been drawn down. At the drawn down dams, the Plainwell, Otsego, and Trowbridge Dams, the contaminated sediments exist above the water level, but continual sloughing and bank erosion and periodic inundation reintroduce the sediments into the aquatic ecosystem. These sediments are a factor in decisions regarding renovation or modification of these dams. In the remaining impoundments, the sediments are either in contact with the water or can be easily eroded from depositional areas during precipitation or flood events.

1.2 River Description

The study area for this investigation consists of approximately 80 miles of the Kalamazoo River, between the city of Kalamazoo, and the city of Saugatuck, where the river flows into Lake Michigan; and approximately 3 miles of a major tributary, Portage Creek, between Cork Street and the confluence of Portage Creek and the Kalamazoo River in the city of Kalamazoo (see Figure 1-1). This stretch of the Kalamazoo River is characterized by a series of six dams. Three dams are currently impounded, and three are permanently drawn down. Some sections of river are erosional zones, whereas others are depositional zones. Extensive areas are characterized by wetlands.

For purposes of the study, the river was divided into 10 sections, called reaches. The reaches are numbered 1 through 10, and follow in chronological order from upstream to downstream. Each reach has certain distinguishing features and characteristics, which are pointed out in the following discussion. The limits of each reach and important features of the Kalamazoo River and Portage Creek are highlighted on Drawing 7339-01 (page 1-7).

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TABLE 2-1

AVERAGE PCB CONCENTRATIONS (ppm)
FOUND IN SURFACE SAMPLES (0-4")

Year	Bryant Mill Ponds	#1 Portage Creek	#2 Portage Creek Confluence to Main Street, Plainwell	#3 Main Street, Plainwell to Plainwell Dam	#4 Plainwell Dam to Otsego City Dam	#5 Otsego City Dam to Otsego Dam
1971	116.0 (2)					
1972	131.9 (5)	117.6 (1)				
1976		36.8 (3)	9.0 (5)	5.1 (2)		66.6 (1)
1982		85.0 (1)	36.2 (4)	8.8 (2)		27.0 (1)
1983	191.4 (9)	12.6 (4)		19.9 (5)		
1984	226.8 (4)		13.0 (1)			
1985	183.0 (6)				16.5 (2)	

3
2-5

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TABLE 2-1
AVERAGE PCB CONCENTRATIONS (ppm)
FOUND IN SURFACE SAMPLES (0-4")
PAGE TWO

Year	#6 Otsego Dam to Trowbridge Dam	#7 Trowbridge Dam to City Line of Allegan	#8 City Line of Allegan to Allegan City Dam	#9 Lake Allegan	#10 Allegan Dam to Saugatuck
1971					
1972					
1976		0.0 (1)	24.7 (1)	10.8 (3)	
1982					0.23 (11)
1983	28.9 (7)			16.8 (5)	
1984					
1985			5.0 (2)		0.32 (21)

Note: Number in ( ) indicates the number of samples analyzed.
Note: For Bryant Mill Ponds, Reach #3, Reach #5 and Reach #6, only river bank samples were used for averages.

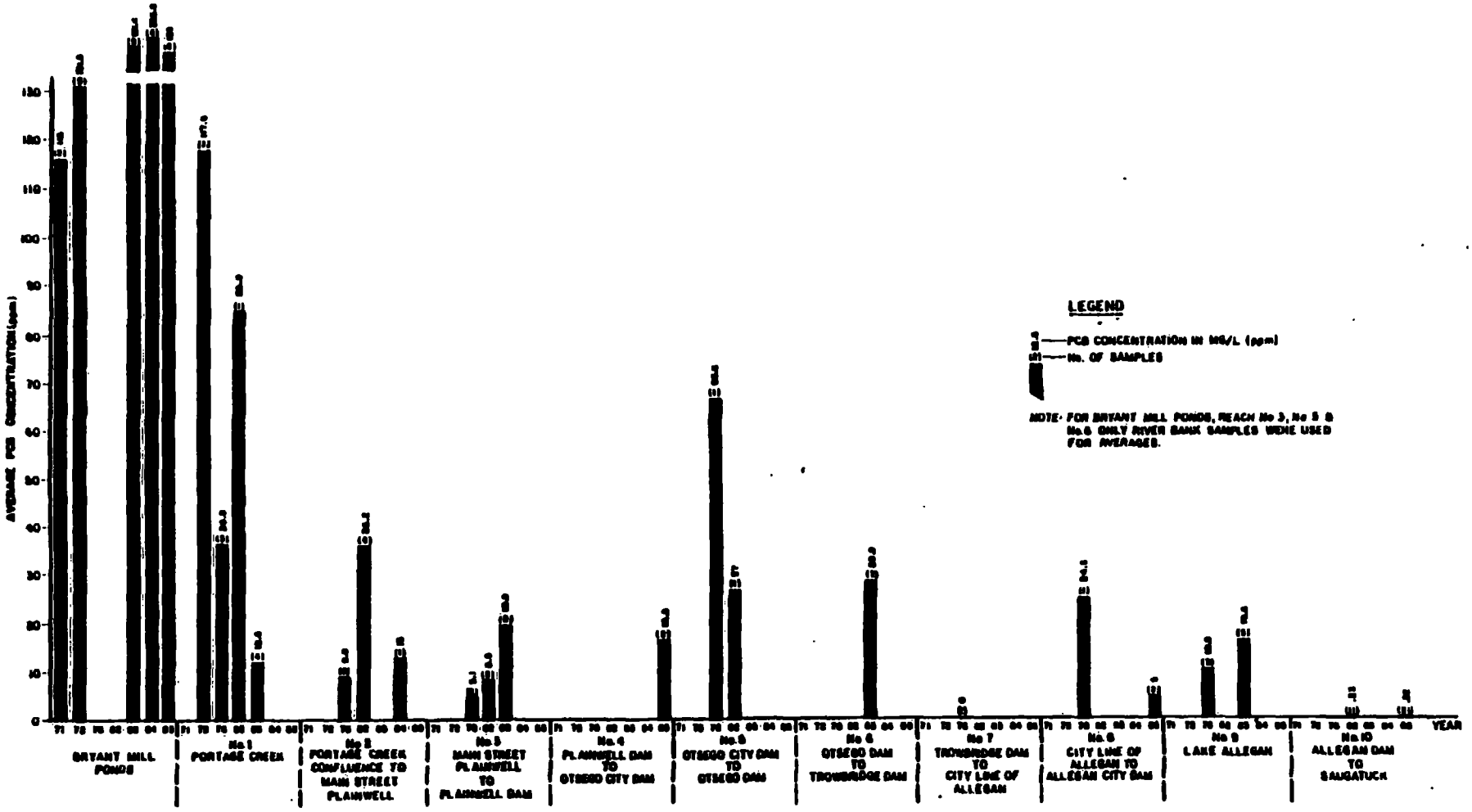

TABLE 2-2
PCB CONCENTRATIONS IN SURFACE SAMPLES (0-4")
KALAMAZOO RIVER STUDY AREA

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TABLE 2-5

SEDIMENT SAMPLES EXCEEDING
ACTION LEVELS OF 50 ppm

	Bryant Mill Ponds	Reach #1	Reach #2	Reach #3	Reach #4	Reach #5	Reach #6	Reach #7	Reach #8	Reach #9	Reach #10	Total
Number of Samples >50 ppm	20	3	2	1	1	1	3	0	1	0	0	32
Total Number of Samples	50	8	11	43	7	18	42	1	15	13	34	242
Percent >50 ppm	40%	38%	18%	2%	14%	5%	7%	0%	6%	0%	0%	13%

Reach 1: Portage Creek
Reach 2: Portage Creek confluence to Main Street, Plainwell
Reach 3: Main Street, Plainwell to Plainwell Dam
Reach 4: Plainwell Dam to Otsego City Dam
Reach 5: Otsego City Dam to Otsego Dam
Reach 6: Otsego Dam to Trowbridge Dam
Reach 7: Trowbridge Dam to City Line of Allegan
Reach 8: City Line of Allegan to Allegan City Dam
Reach 9: Lake Allegan
Reach 10: Allegan Dam to Saugatuck

NCRKZOO0026006

- "A Survey of PCBs in the Kalamazoo River and Portage Creek Sediments, Kalamazoo to Lake Allegan," (November 1983) by Creal (MDNR).

  - PCB-contaminated sediments were found at all four sampling locations: instream sediment concentrations averaged 37 ppm in Lower Bryant Mill Pond; 25.6 ppm in the Plainwell impoundment; 10.8 ppm in the Trowbridge reach; and 15.7 ppm in Lake Allegan.

  - In the Lower Bryant Mill Pond, Plainwell, and Trowbridge areas, the exposed shoreline sediments had average PCB concentrations of 135.0, 22.6, and 26.0, respectively.

  - The exposed sediments in the above three areas appeared loosely consolidated and easily erodible.

  - PCB contamination of apparently recent stream bank deposits in Portage Creek indicated the continued downstream transport of PCBs.

  - The estimated mass of PCBs in the four areas, plus the Otsego Dam impoundment, was 227,910 pounds. More than half of this mass (132,000 pounds) was contained in the exposed sediments in the Lower Bryant Mill Pond, Plainwell, Otsego, and Trowbridge impoundments. The greatest in-stream mass of PCBs was found in Lake Allegan, approximately 75,000 pounds.

- "PCBs in Fish, Sediments and Water of the Lower Kalamazoo River and Nearby Lake Michigan," (January 1984) by Horvath.

  - PCBs found in significant concentrations in the Lower Kalamazoo River ecosystem. Fish flesh exceeded the FDA "action level" of 5 ppm [since lowered to 2 ppm]. Sediment concentrations were low but widespread throughout the study area.

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TABLE 2-6

SUMMARY TABLE
PCB CONCENTRATIONS IN WATER
(parts per trillion (ppt))

Sample Number	Sample Location		Average PCB Concentration (ppt)	Year	Reference
	• Portage Creek				
1	Cork Street	Upstream of Bryant Mill Ponds (background)	10	1985	MDNR
2	Bryant Mill Ponds	Standing water in Bryant Mill Ponds	580	1985	MDNR
3	Alcott Street	Reach 1 at Bryant Dam	181	1985	MDNR
	• Kalamazoo River				
4	River Street	Below Morrow Dam in Comstock (background)	20	1985	MDNR
5	10th Street	Reach 3 above Plainwell Dam	67	1985	MDNR
6	Plainwell Dam	Reach 4 below Plainwell Dam	55	1985	MDNR
7	Farmer Street	Reach 5 below Otsego City Dam	60	1985	MDNR
8	Otsego Dam	Reach 6 below Otsego Dam	76	1985	MDNR
9	26th Street	Reach 7 below Trowbridge Dam	86	1985	MDNR
10	Williams Road	Reach 8 above Allegan City Dam	100	1985	MDNR
11	Route M-118	Reach 9 below Allegan City Dam	110	1985	MDNR
12	Allegan Dam	Reach 10 below Allegan Dam	111	1985	MDNR
13	New Richmond	Reach 10 town of New Richmond	61	1982	Horvath
14	U.S. 31 Bridge	Reach 10 town of Douglas	96	1982	Horvath
15	Old U.S. 131 Bridge	Reach 10 town of Douglas	53	1985	MDNR
16	Saugatuck	Reach 10 river mouth	54	1982	Horvath
17	Saugatuck	Reach 10 river mouth	40 + 23	1984	Marti

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TABLE 2-7

SUMMARY OF AVERAGE PCB CONCENTRATIONS FOR CARP IN THE KALAMAZOO RIVER STUDY AREA

Year	Morrow Pond	Portage Creek	Mosel Avenue	Downstream Plainwell Dam	Lake Allegan	Saugatuck
1971	5.07 (1)	--------	164.50 (1)	20.53 (2)	7.32 (1)	45.43 (1)
	3.40 (1)		7.92 (1)	11.28 (2)	10.76 (1)	21.63 (1)
1976	2.10 (1)	--------	8.00 (1)	12.90 (1)	7.40 (1)	--------
	5.25 (1)		3.08 (1)	1.95 (1)	9.25 (1)	
1978	--------	--------	--------	--------	--------	37.00 (1)
						2.91 (1)
1981	1.71 (9)	--------	2.34 (18)	3.14 (6)	8.01 (20)	7.24 (2)
	0.95 (9)		1.14 (18)	2.82 (6)	2.04 (20)	
1983	--------	--------	3.50 (11)	5.50 (11)	2.80 (3)	8.50 (11)
			1.52 (11)	1.96 (11)	3.50 (3)	1.52 (11)
1985	1.80 (20)	0.80 (10)	3.34 (19)	1.95 (12)	2.97 (19)	2.10 (20)
	1.11 (20)	1.33 (10)	1.74 (19)	0.64 (12)	1.88 (19)	0.38 (20)

Notes: (1) Number in parentheses represents number of fish sampled.

(A) PCB Concentration / Fat Normalized PCB Concentration

(B) All PCB concentrations are in mg/l (ppm).

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TABLE 2-8

SUMMARY OF AVERAGE PCB CONCENTRATIONS FOR
BASS IN THE KALAMAZOO RIVER STUDY AREA

Year	Morrow Pond	Portage Creek	Mosel Avenue	Downstream Plainwell Dam	Lake Allegan	Saugatuck
1976	0.20 (1)	--------	--------	--------	2.40 (1)	--------
	0.29 (1)				6.00 (1)	
1981	0.34 (23)	--------	1.08 (4)	0.47 (1)	1.09 (9)	5.63 (4)
	0.91 (23)		1.07 (4)	3.36 (1)	2.65 (9)	
1985	1.00 (7)	--------	1.42 (2)	2.00 (1)	2.20 (10)	0.78 (10)
	1.19 (7)		8.35 (2)	1.67 (1)	2.43 (10)	0.98 (10)

Notes: (1) Number in parentheses represents number of fish sampled.

(A) PCB Concentration / Fat Normalized PCB Concentration

(B) All PCB concentrations are in mg/l (ppm).

10
2-23

NCRKZOO0026010

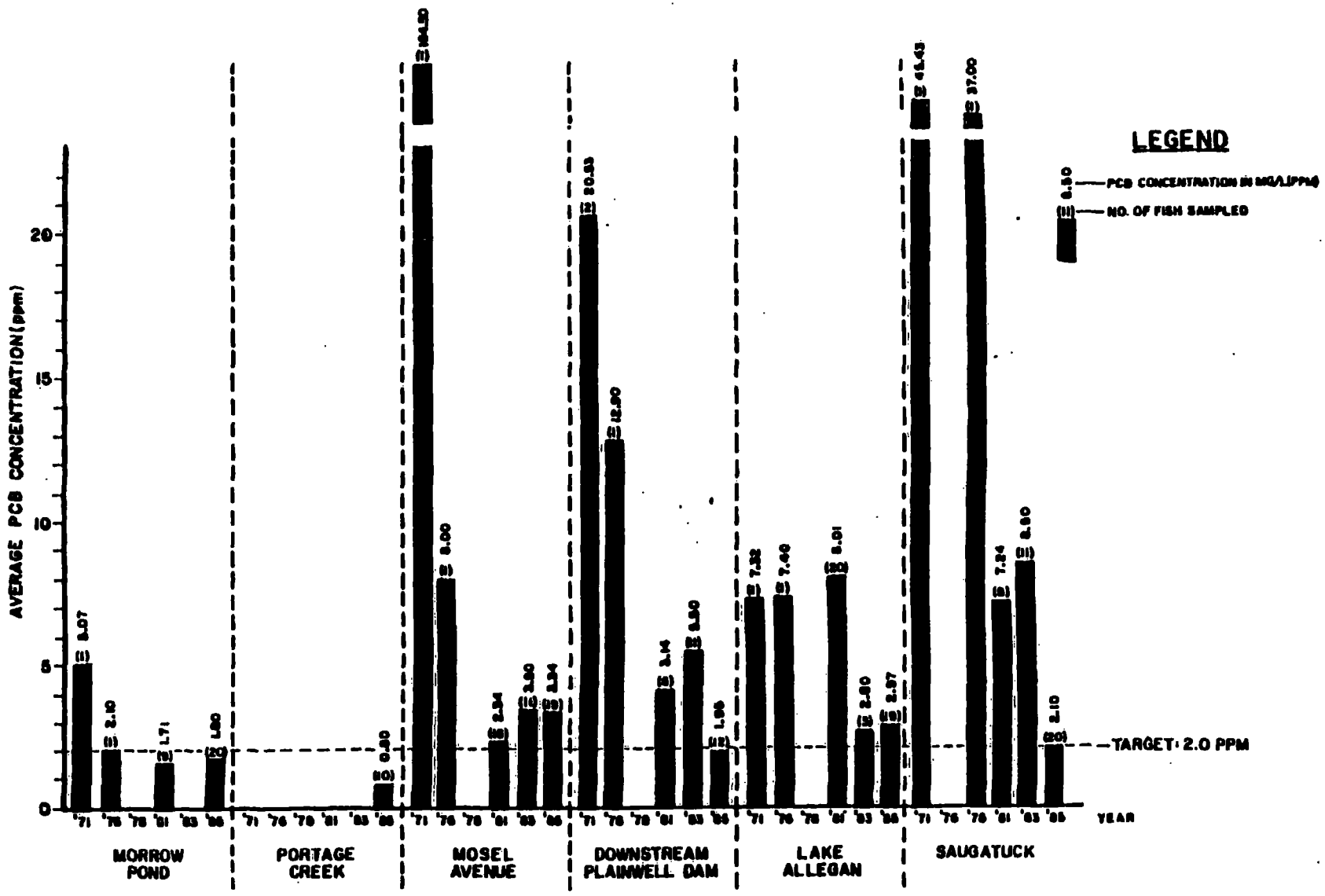


TABLE 2-9
AVERAGE PCB CONCENTRATIONS IN CARP
KALAMAZOO RIVER STUDY AREA

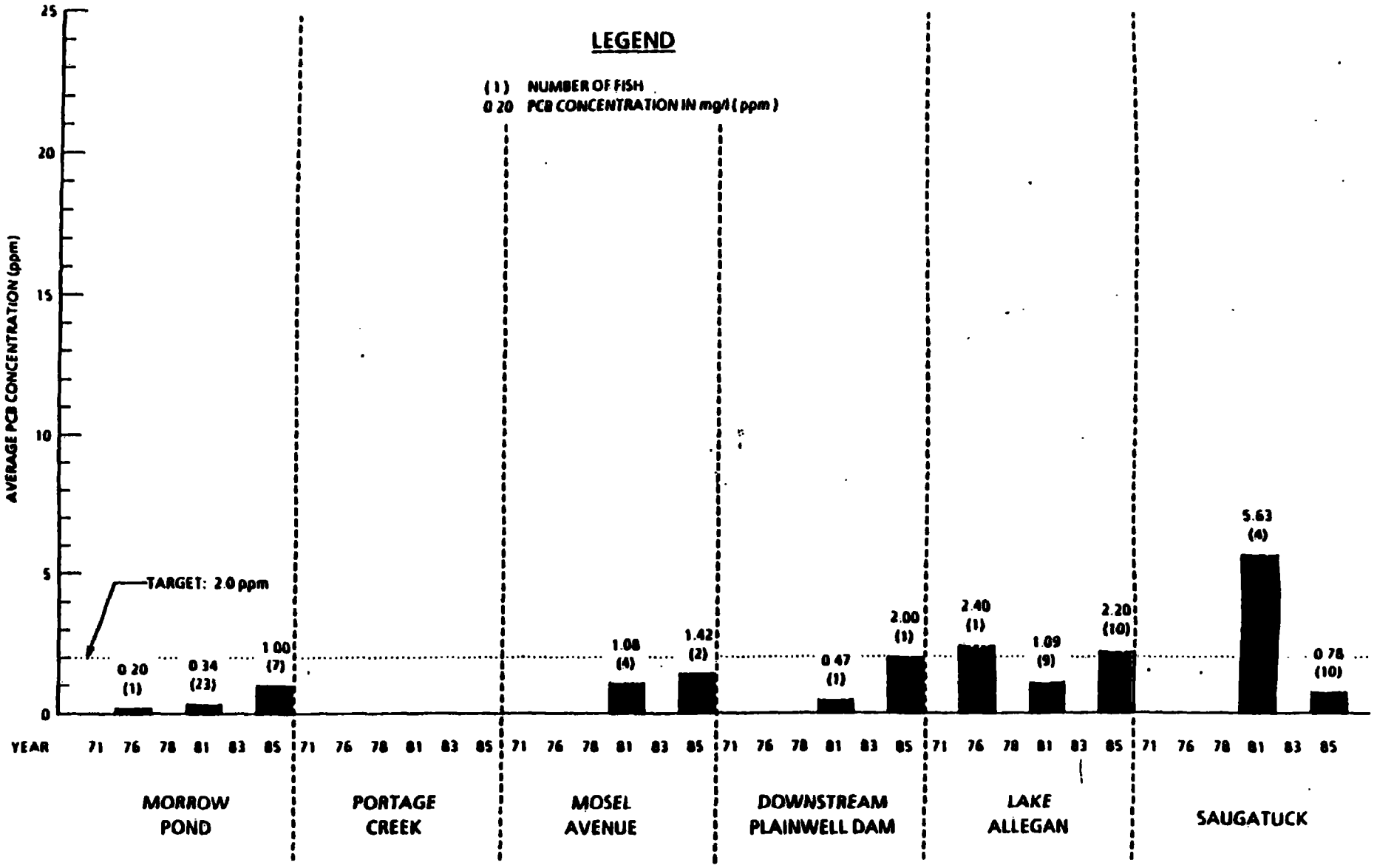
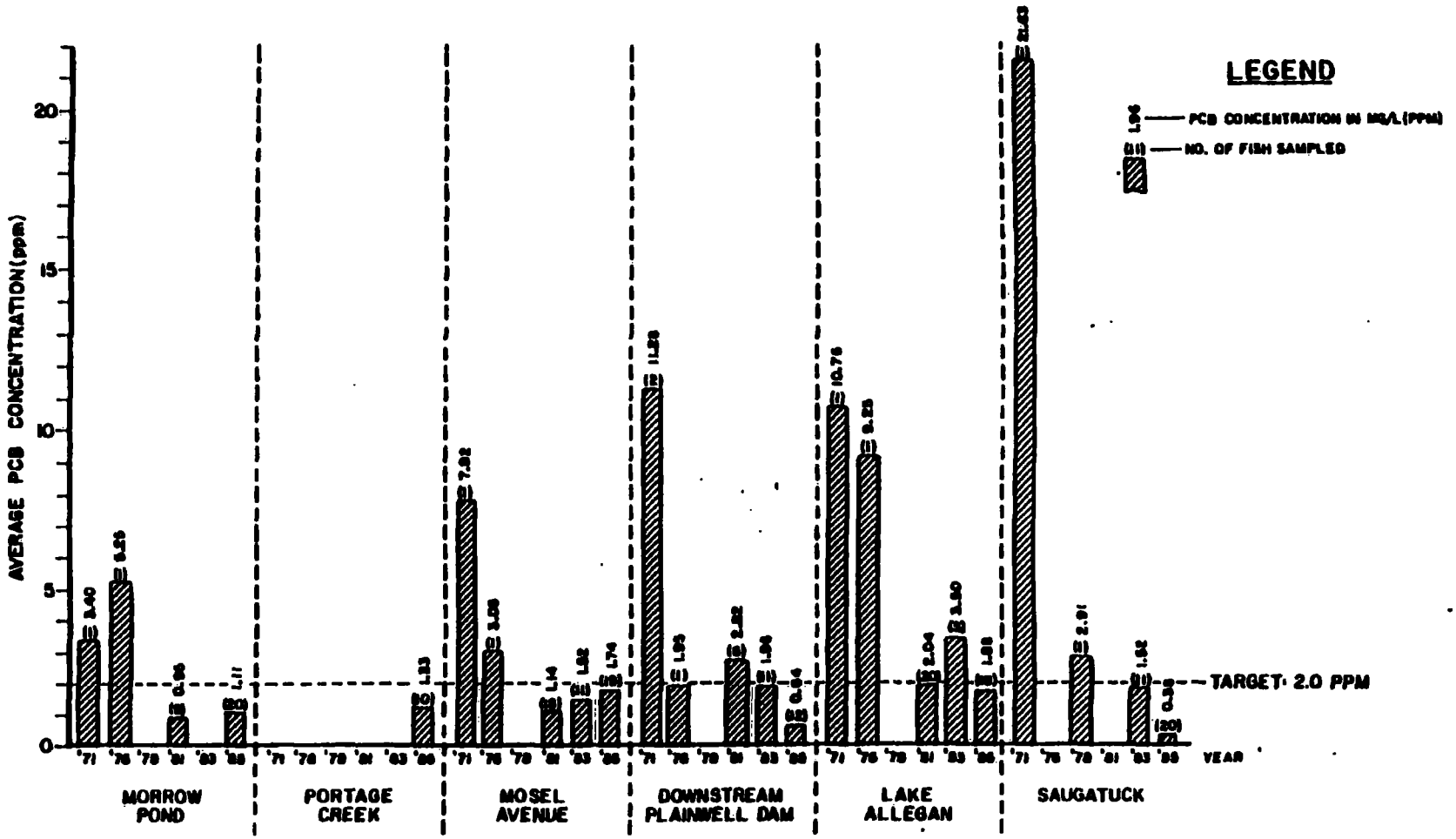


TABLE 2 - 10
AVERAGE PCB CONCENTRATIONS IN BASS
KALAMAZOO RIVER STUDY AREA

NCRKZOO0026012



13
2-26

TABLE 2-11
AVERAGE FAT NORMALIZED PCB CONCENTRATIONS IN CARP
KALAMAZOO RIVER STUDY AREA

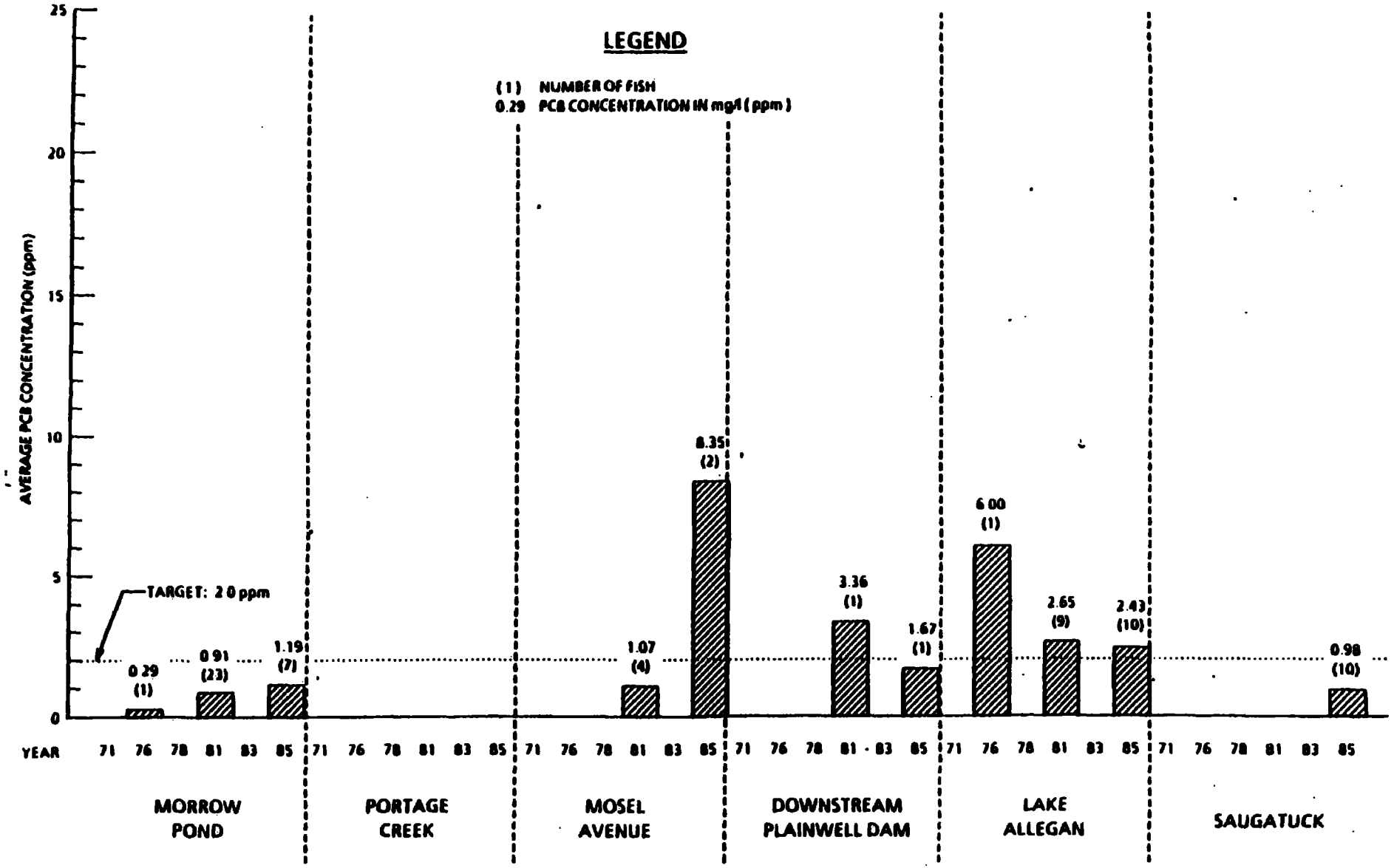


TABLE 2 - 12
AVERAGE FAT NORMALIZED PCB CONCENTRATIONS IN BASS
KALAMAZOO RIVER STUDY AREA

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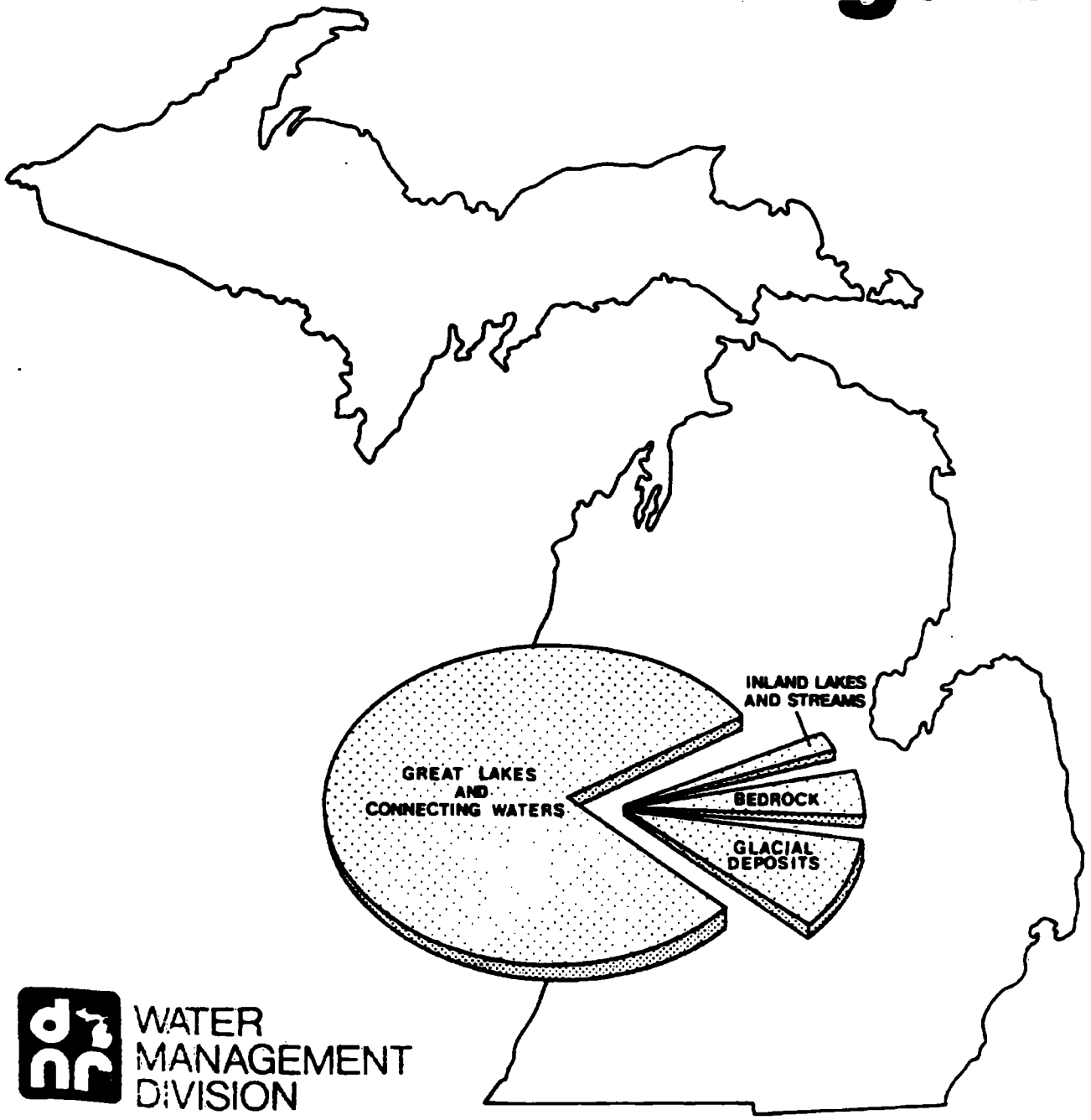
Ref. 5

municipal water withdrawals in michigan



WATER MANAGEMENT DIVISION

PREPARED IN COOPERATION WITH THE UNITED STATES GEOLOGICAL SURVEY

NCRKZOO0026015

MUNICIPAL WATER WITHDRAWALS IN MICHIGAN

by

Douglas J. Bedell

Water Management Division
Michigan Department of Natural Resources

1982

Prepared in cooperation with the U. S. Geological Survey

NCRKZOO0026016

Table 2. Municipal water withdrawal (continued)

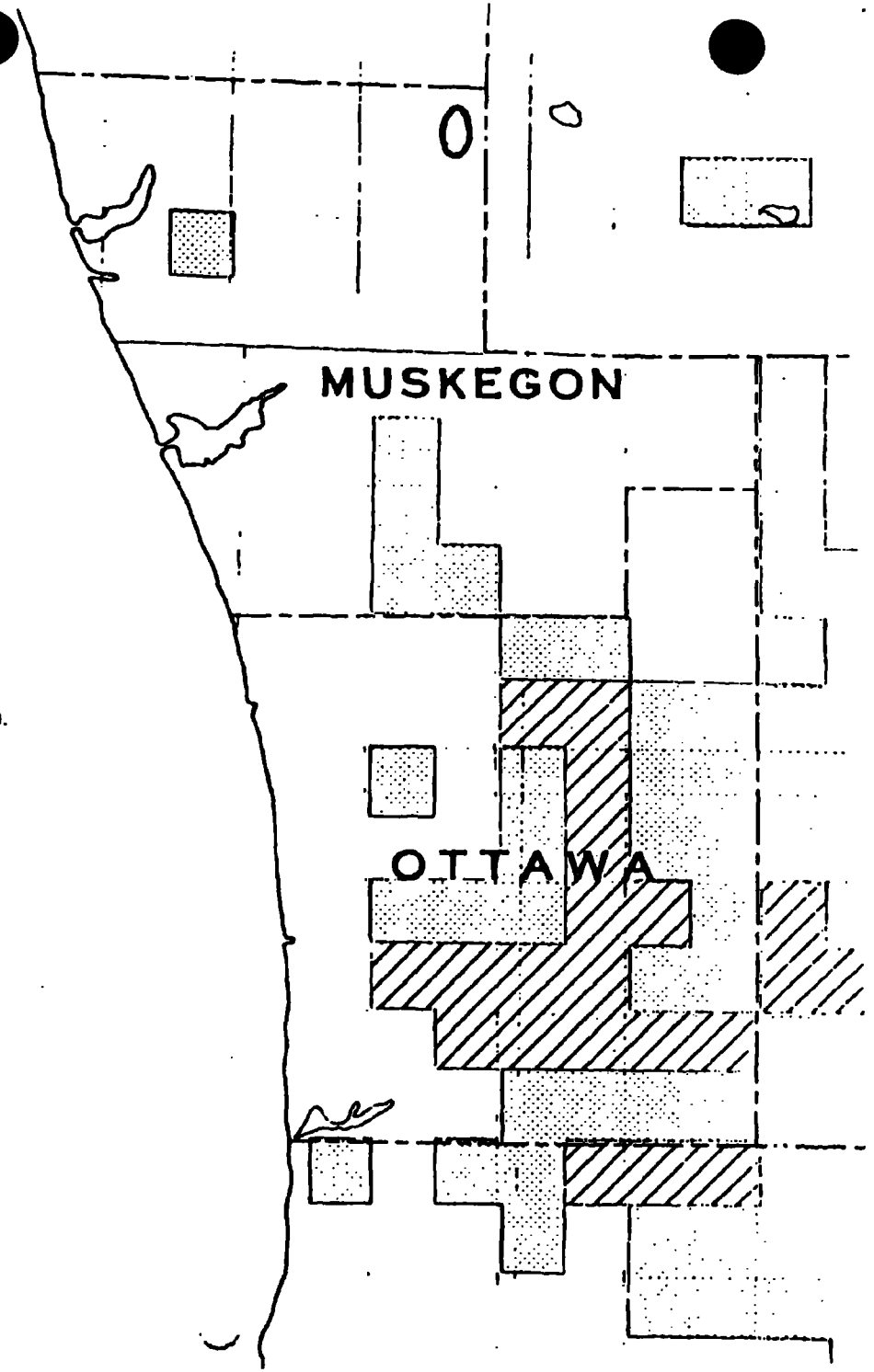
WSSN	MUNICIPALITY	CO	BASIN	TREATMENT SLCPFZIDON	POPULATION SERVED	GPCD	MAXIMUM DAY	MAXIMUM USE	SOURCE CO	SOURCE BASIN	SOURCE NAME
1575	Comstock Twp	077	04050003	C F	1,000				077	04050003	Kalamazoo - 3520
1605	Cooper Twp	077	04050003	C F	200				077	04050003	Kalamazoo - 3520
2530	Galesburg	077	04050003	C F	1,729	126	203	0.51	077	04050003	Glacial deposit
3520	Kalamazoo	077	04050003	CPF	104,777	170	226	36.55	077	04050003	Glacial deposit
3540	Kalamazoo Twp	077	04050003	C F	21,214				077	04050003	Kalamazoo - 3520
5045	Oshtemo Twp	077	04050003	C F	1,474				077	04050003	Kalamazoo - 3520
5200	Parchment	077	04050003	C F I	1,859	153	203	1.04	077	04050003	Glacial deposit
5520	Savage	077	04050003	CPF	[illegible]	63	252	6.53	077	04050003	Glacial deposit
5970	Schoolcraft	077	04050001	CPF	1,343	157	152	0.42	077	04050001	Glacial deposit
6800	Vicksburg	077	04050001	F	2,207	157	200	0.77	077	04050001	Glacial deposit
3560	Kalkaska	079	04060105	C	3,228	153	218	0.63	079	04060105	Glacial deposit
0190	Alpine Twp	081	04050006	C F	8,780				081	04050006	Plainfield Twp-5370
1185	Cascade Twp	081	04050006	C F	9,966				081	04050006	Grand Rapids - 2790
1260	Cedar Springs	081	04050006	CPF	2,453	165	227	0.72	081	04050006	Glacial deposit
1960	East Grand Rapids	081	04050006	C F	11,244	114	197	3.37	081	04050006	Grand Rapids - 2790
2790	Grand Rapids	081	04050006	SLCPF	245,294	160			139	04060200	Lake Michigan
									081	04050006	Grand River
											Total
2800	Grand Rapids Twp	081	04050006	C F	8,800				081	04050006	Grand Rapids - 2790
2820	Grandville	081	04050006	C F	12,082	138		3.88	081	04050006	Wyoming - 7220
3620	Kentwood	081	04050006	C F	28,412	63		4.66	081	04050006	Wyoming - 7220
3950	Lowell	081	04050006	SLCPF	3,580	161	153	0.95	081	04050006	Glacial deposit
5370	Plainfield Twp	081	04050006	SLCPF	18,780	80	198	2.94	081	04050006	Glacial deposit
5730	Rockford	081	04050006	SLCPF	3,145	142	150	1.13	081	04050006	Rogue River
6200	Sparta	081	04050006	CPFZ	3,317	113	250	0.76	081	04050006	Glacial deposit
6860	Walker	081	04050006	C F	14,898				081	04050006	Grand Rapids - 2790
7220	Wyoming	081	04050006	S C F	126,834	146	198	43.39	139	04060200	Lake Michigan
0050	Ahmeek	083	04020103	B					083	04020103	N Mich Water Co-4800
1920	Eagle Harbor Twp	083	04020103	C			258	0.04	083	04020300	Lake Superior
1930	Eagle River	083	04020103	C			212	0.02	083	04020103	Bedrock
2590	Gay	083	04020103	C					083	04020300	Lake Superior
0350	Baldwin	085	04060101	B	662	225		0.31	085	04060101	Glacial deposit
0150	Almont	087	04090003	C F	1,812				087	04090003	Detroit - 1800
1460	Clifford	087	04080204	C	419	132	225	0.11	087	04080204	Bedrock
1570	Columbiaville	087	04080204	C	949	146			087	04080204	Bedrock
1870	Dryden	087	04090001	B	651	63			087	04090001	Glacial deposit
3340	Imlay City	087	04090001	C F	2,392				087	04090001	Detroit - 1800
3780	Lapeer	087	04080204	C F	6,243	20		0.19	087	04080204	Detroit - 1800
4312	Metamora	087	04080204	B	300	47			087	04080204	Glacial deposit
4770	North Branch	087	04080204	B	903	107	202	0.22	087	04080204	Bedrock
2130	Empire	089	04060104	B	354	127			089	04060104	Glacial deposit
4810	Northport	089	04060105	B	608	207	196	0.28	089	04060105	Glacial deposit
6500	Suttons Bay	089	04060105	B	508	138		0.16	089	04060105	Glacial deposit
0030	Addison	091	04100006	C I	643	171	230	0.25	091	04100006	Glacial deposit
0040	Adrian	091	04100002	SLCPF B	21,025	182	249	6.45	091	04100002	Glacial deposit
									091	04100002	S Br River Raisin
											Total
0750	Blissfield	091	04100002	SLCPF B	3,036	120	251	0.74	091	04100002	River Raisin
0890	Britton	091	04100002	CP B	594	49	151	0.09	091	04100002	Glacial deposit
1470	Clinton	091	04100002	CP	2,209	133			091	04100002	Glacial deposit
1770	Deerfield	091	04100002	S C	932	83			091	04100002	River Raisin
3280	Hudson	091	04100006	C	2,560	138	178	0.74	091	04100006	Glacial deposit
4490	Morenci	091	04100006	I	2,114	134	023	0.54	091	04100006	Glacial deposit
5020	Onsted	091	04100002	C I	647	177	200	0.24	091	04100002	Glacial deposit
6560	Tecumseh	091	04100002	CPF	7,280	144	201	2.19	091	04100002	Glacial deposit
0860	Brighton	093	04090005	C F I	3,906	243	211	1.27	093	04090005	Glacial deposit
0875	Brighton Twp	093	04090005		10,154				093	04090005	
2400	Fowlerville	093	04050004	F	1,978	207	254	0.60	093	04050004	Bedrock
3250	Howell	093	04080203	FZI	6,976	171	202	1.78	093	04080203	Bedrock
6145	SE Livingston WSA	093							093		

NCRKZOO0026017

PERCENTAGE OF WELLS
IN BEDROCK (%)

- Greater than 10
- Less than 10
- All wells in the glacial drift
- No well records
- Glacial drift thickness greater than or equal to 600 feet

Refer to reverse side of Sheet 1 for further explanation.



"Hydrogeologic Atlas of Michigan", Western Michigan University, 1981.

PLATE #21

NCRKZOO0026018

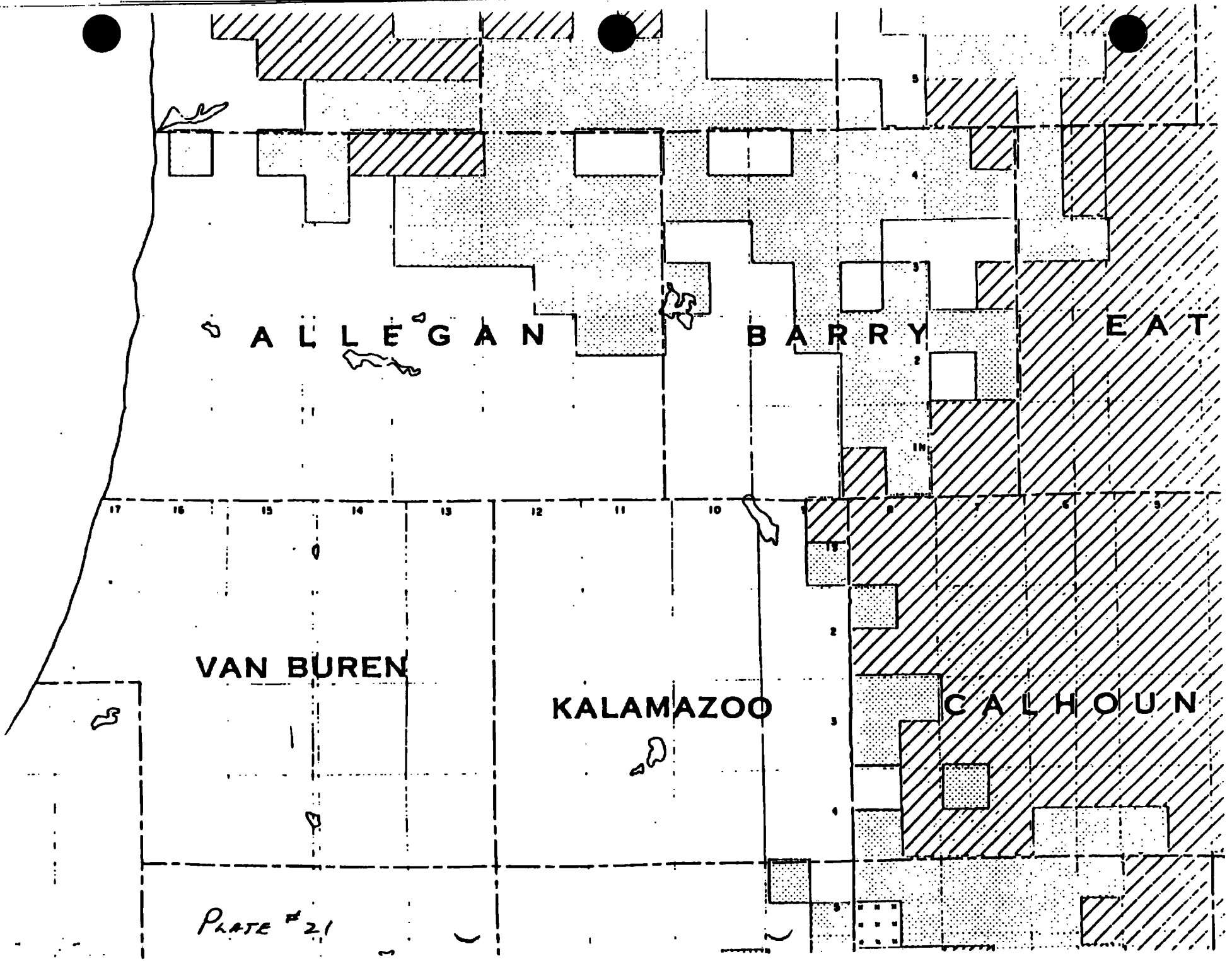


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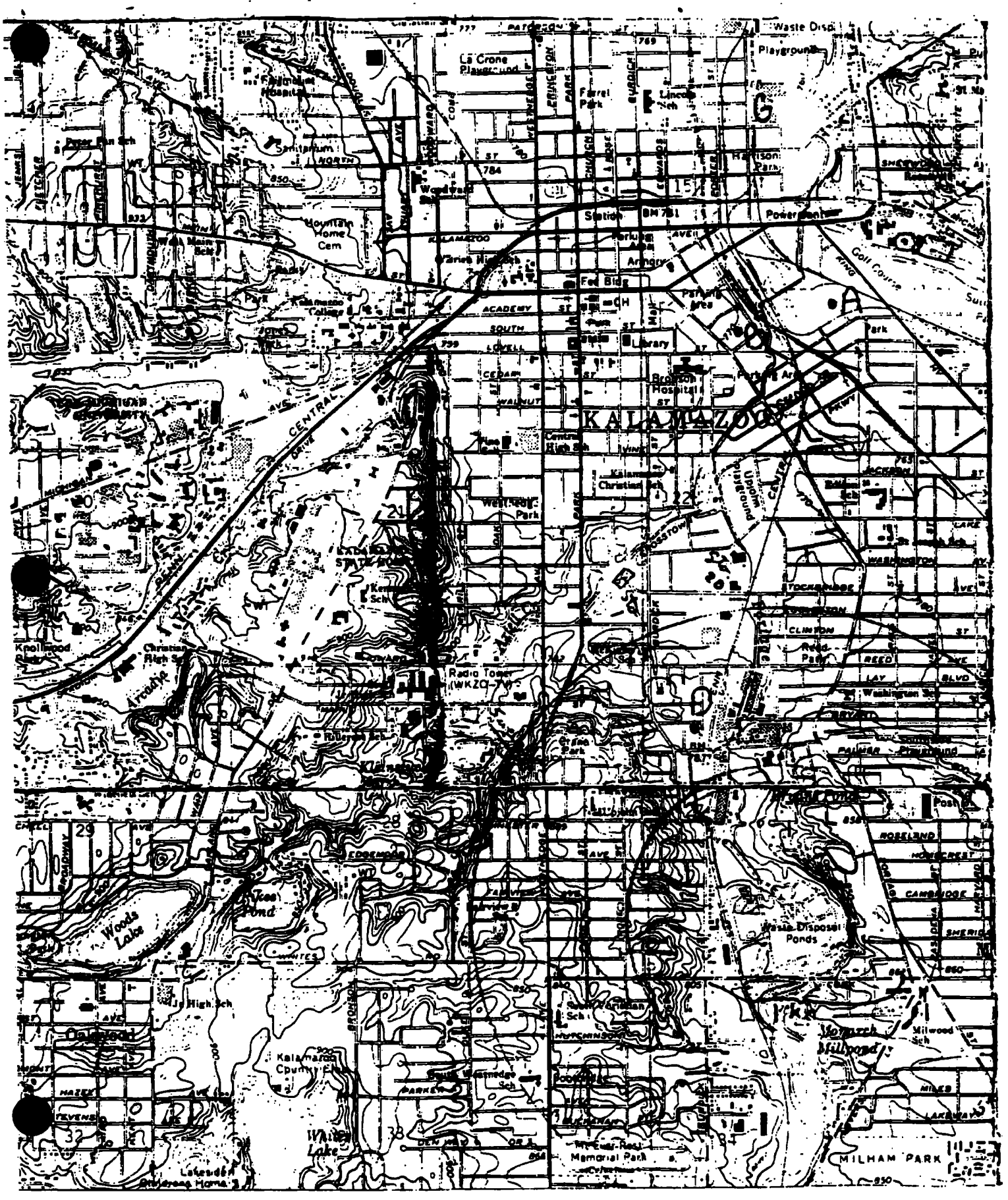
Table 5. Number of Wells by County

NUMBER OF WELLS BY COUNTY			
Alcona	1,133	Lake	1,050
Alger	698	Lenawee	3,385
Allegan	3,116	Leelanau	1,848
Alpena	797	Lapeer	2,824
Antrim	1,670	Livingston	8,423
Arenac	852	Luce	426
Baraga	657	Mackinac	1,155
Barry	1,652	Macomb	2,580
Bay	1,485	Manistee	1,585
Benzie	1,073	Marquette	2,413
Berrien	4,515	Mason	1,189
Branch	2,239	Mecosta	1,917
Calhoun	3,917	Menominee	1,688
Cass	2,421	Midland	3,406
Charlevoix	1,276	Missaukee	491
Cheboygan	2,448	Monroe	6,721
Chippewa	2,790	Montcalm	2,196
Clare	3,908	Muskegon	5,025
Clinton	3,706	Montmorency	912
Crawford	1,015	Newaygo	2,293
Dickinson	1,052	Oakland	16,942
Delta	1,639	Oceana	1,947
Eaton	4,477	Ogemaw	2,342
Emmet	1,445	Ontonagon	693
Genesee	13,187	Osceola	1,259
Gladwin	1,830	Oscoda	740
Gogebic	671	Otsego	1,529
Grand Traverse	3,668	Ottawa	3,199
Gratiot	1,353	Roscommon	2,621
Hillsdale	3,670	Presque Isle	1,072
Houghton	1,189	Saginaw	2,325
Huron	1,420	Sanilac	1,715
Ingham	5,492	St. Clair	1,536
Ionia	2,014	St. Joseph	1,631
Iosco	1,911	Shiawassee	2,614
Iron	374	Schoolcraft	746
Isabella	1,849	Tuscola	2,324
Jackson	4,292	Van Buren	2,606
Kalamazoo	3,473	Washtenaw	5,689
Kalkaska	631	Wayne	588
Kent	11,511	Wexford	1,405

RANK ORDER OF COUNTIES BASED ON NUMBER OF WELLS			
1	Oakland	43	Gladwin
2	Genesee	44	Sanilac
3	Kent	45	Menominee
4	Livingston	46	Antrim
5	Monroe	47	Barry
6	Washtenaw	48	Delta
7	Ingham	49	St. Joseph
8	Muskegon	50	Manistee
9	Berrien	51	St. Clair
10	Eaton	52	Otsego
11	Jackson	53	Bay
12	Calhoun	54	Emmet
13	Clare	55	Huron
14	Clinton	56	Wexford
15	Hillsdale	57	Gratiot
16	Grand Traverse	58	Charlevoix
17	Kalamazoo	59	Osceola
18	Midland	60	Houghton
19	Lenawee	61	Mason
20	Ottawa	62	Mackinac
21	Allegan	63	Alcona
22	Lapeer	64	Benzie
23	Chippewa	65	Presque Isle
24	Roscommon	66	Dickinson
25	Shiawassee	67	Lake
26	Van Buren	68	Crawford
27	Macomb	69	Montmorency
28	Cheboygan	70	Arenac
29	Cass	71	Alpena
30	Marquette	72	Schoolcraft
31	Ogemaw	73	Oscoda
32	Saginaw	74	Alger
33	Tuscola	75	Ontonagon
34	Newaygo	76	Gogebic
35	Branch	77	Baraga
36	Montcalm	78	Kalkaska
37	Ionia	79	Wayne
38	Oceana	80	Missaukee
39	Mecosta	81	Luce
40	Iosco	82	Iron
41	Isabella	83	Keweenaw

Plate #20

Ref. 7



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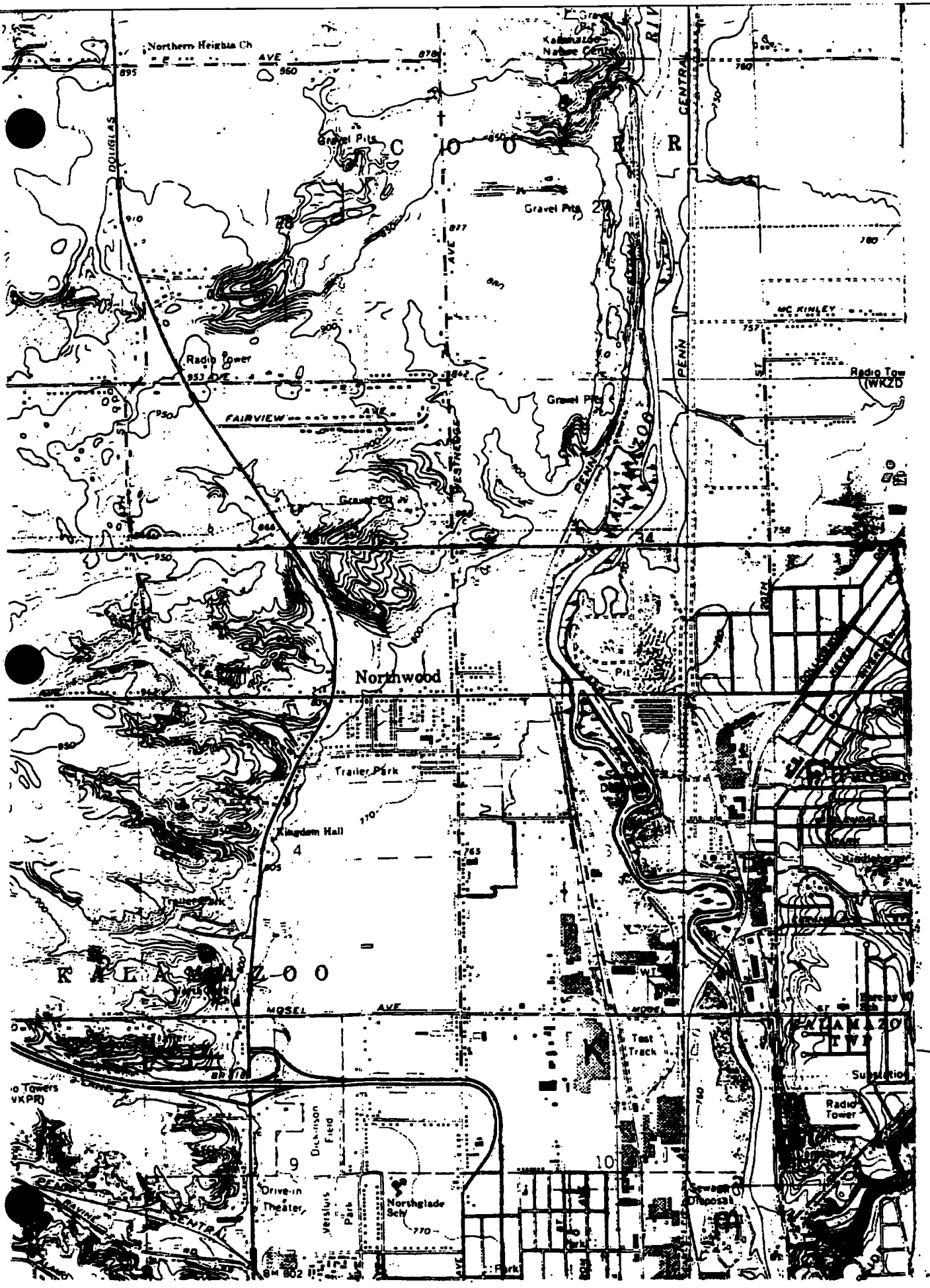

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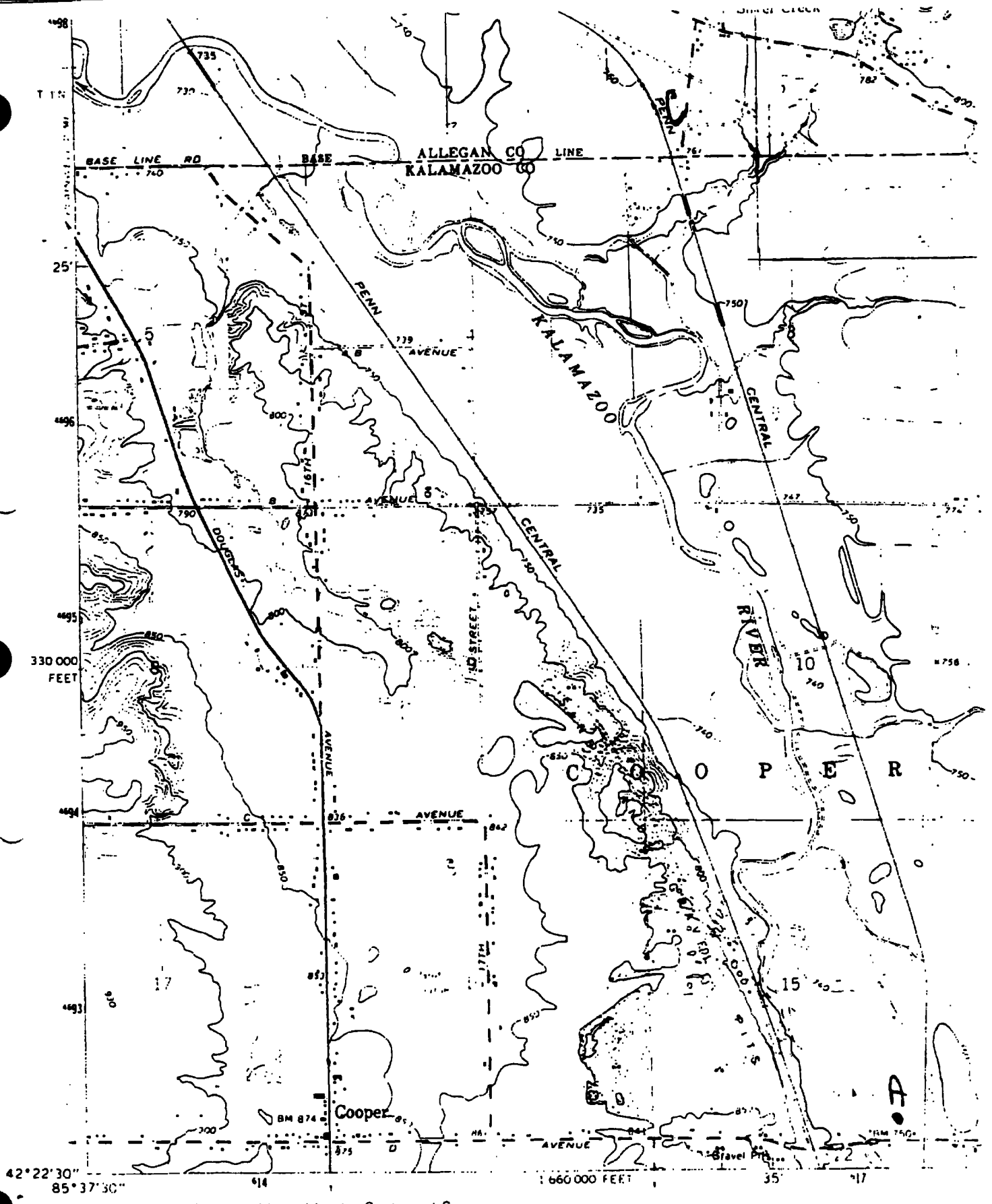


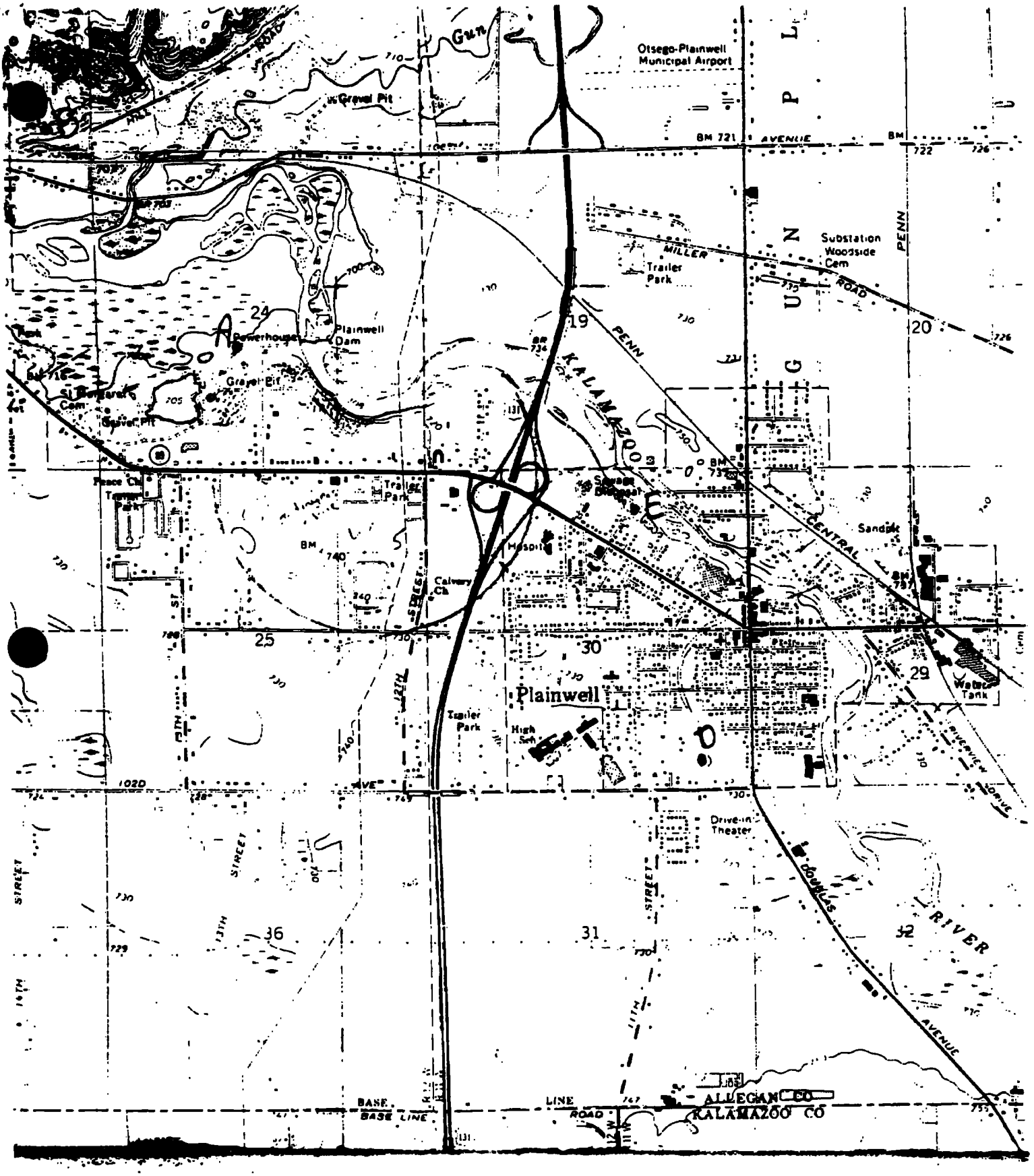
Mapped, edited and published by the Geological Survey in cooperation with State of Michigan agencies

Control by USGS and USC&GS

Topography by photogrammetric methods from aerial photographs taken 1966. Field check 1967

KALAMAZOO SW
3868 I SW

NCRKZOO0026023



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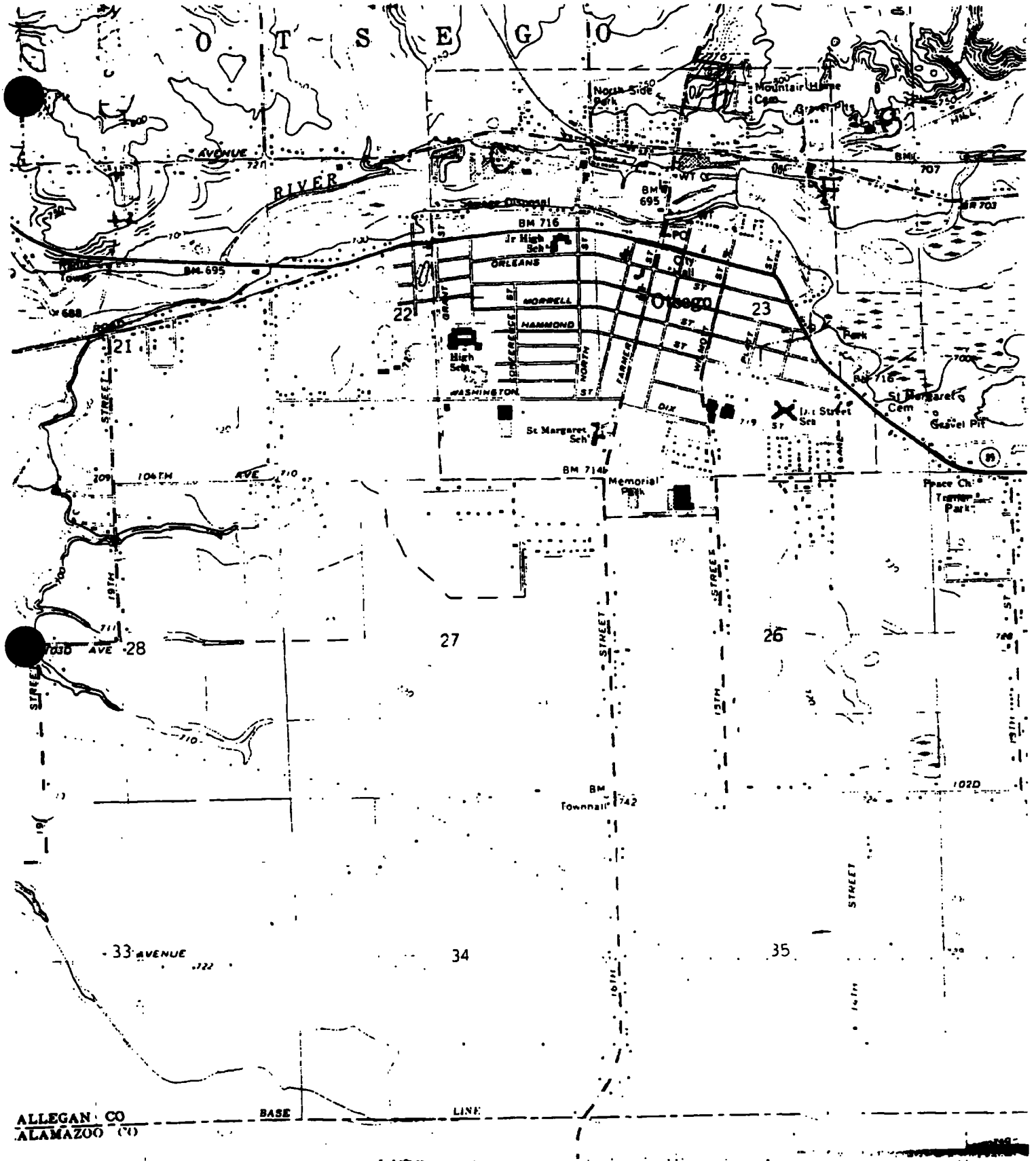

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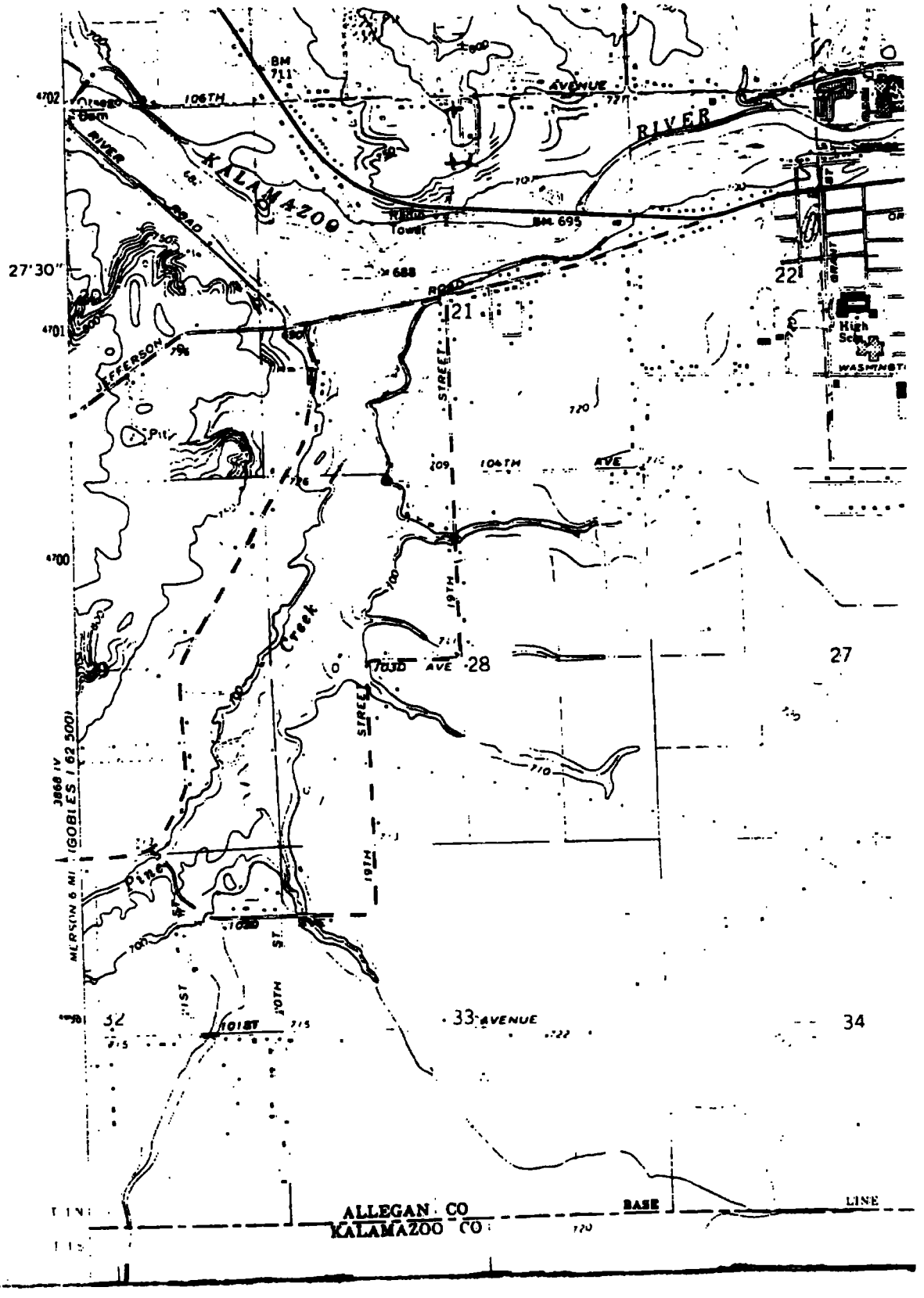
Otsego City wells X



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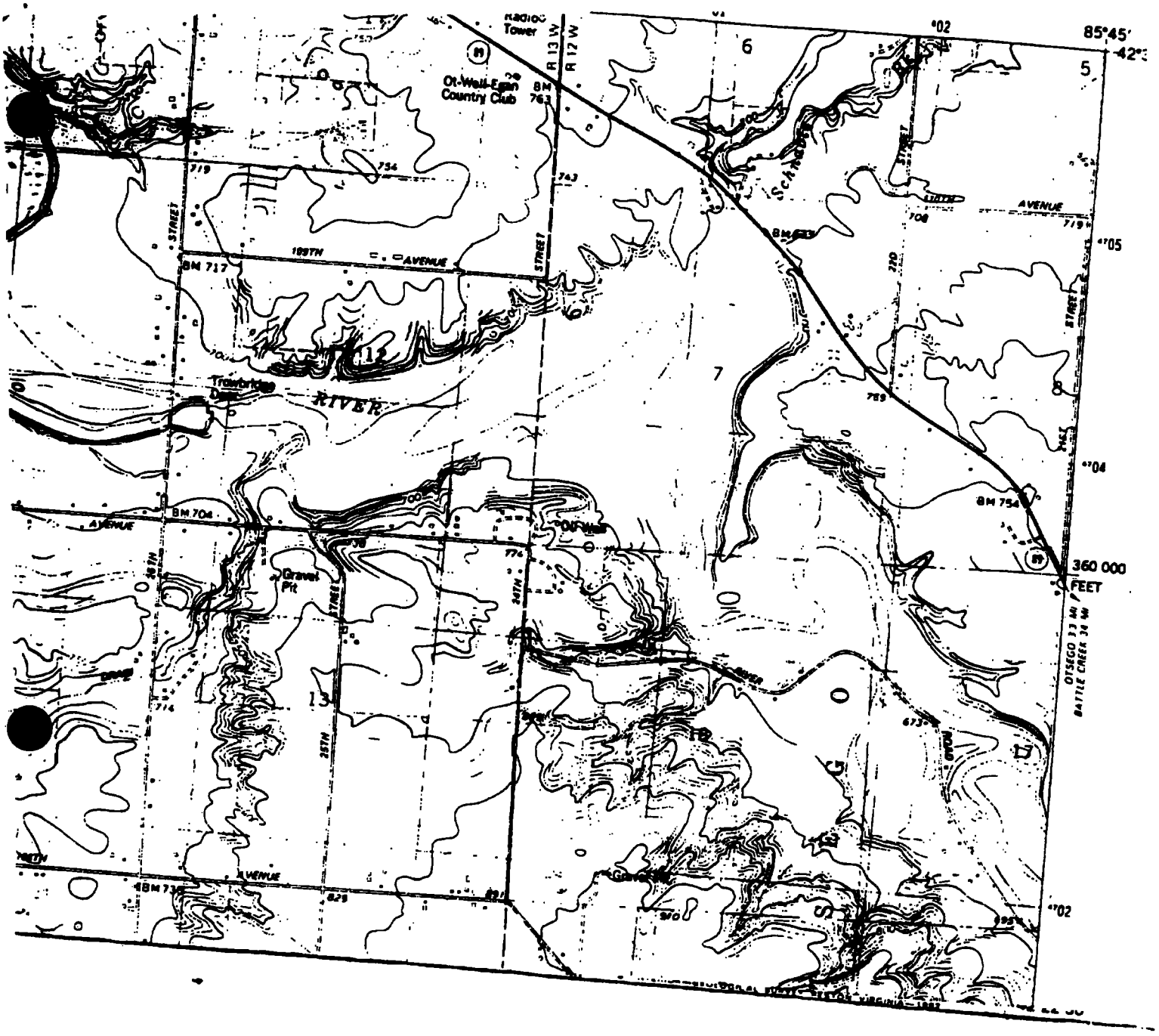

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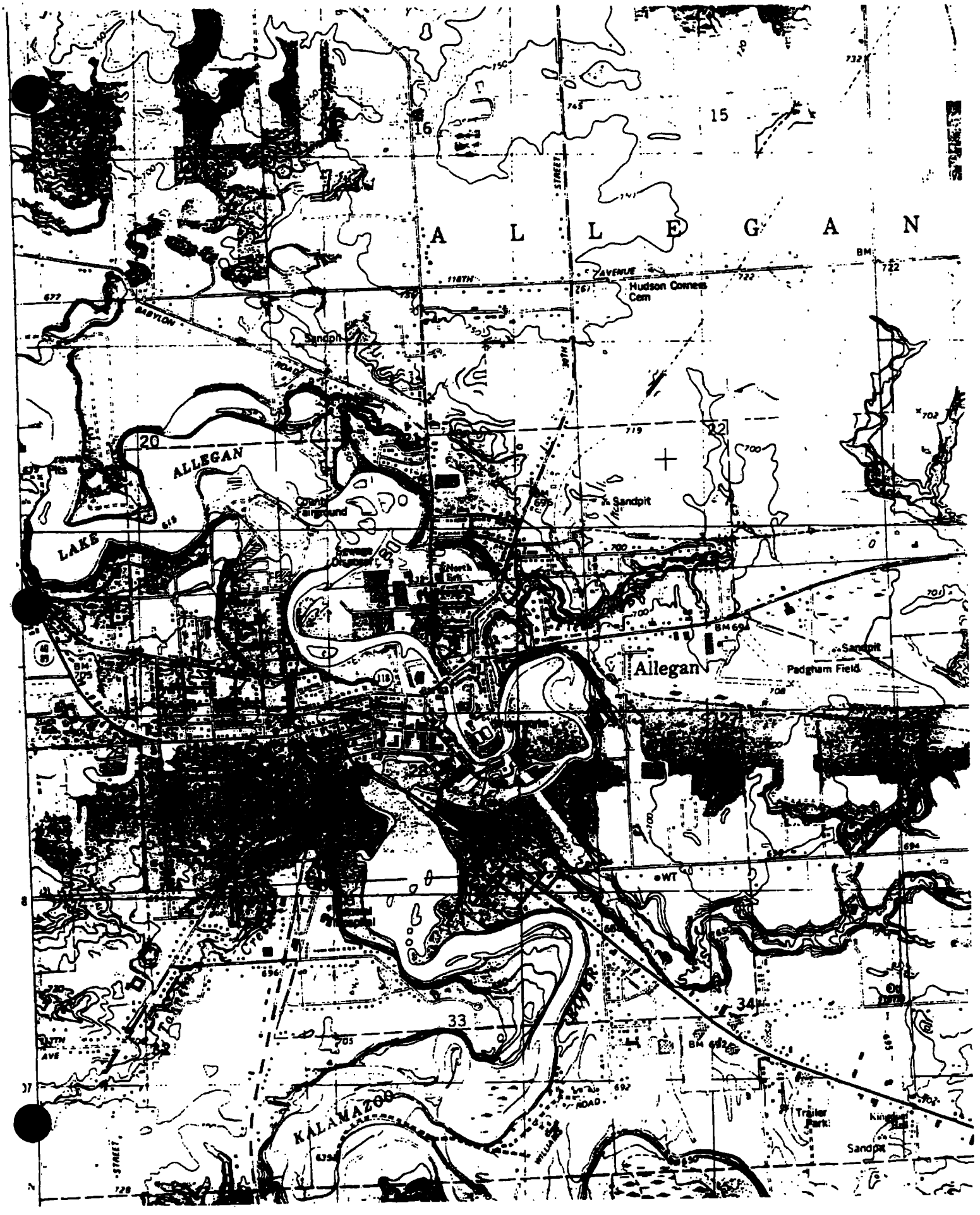

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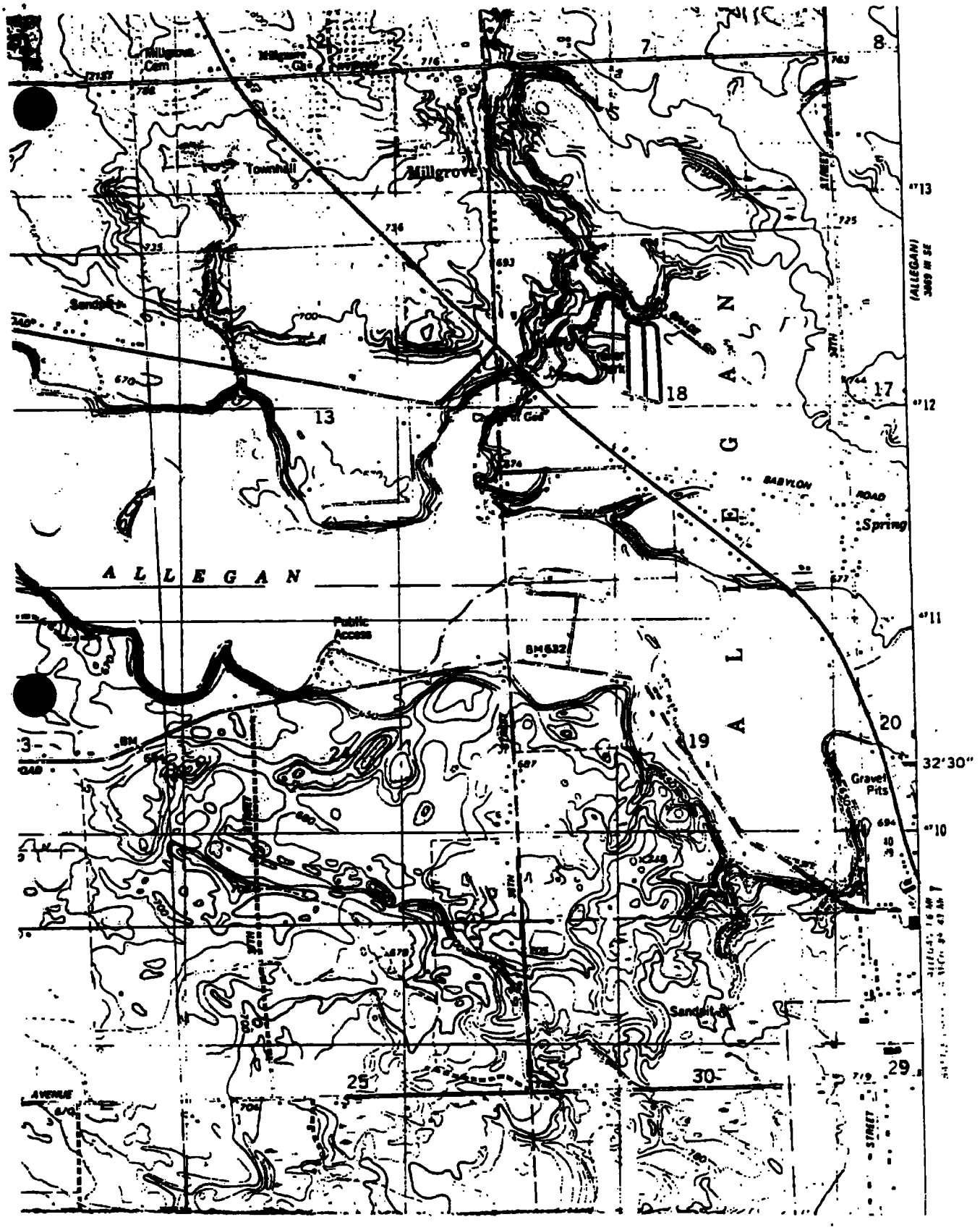

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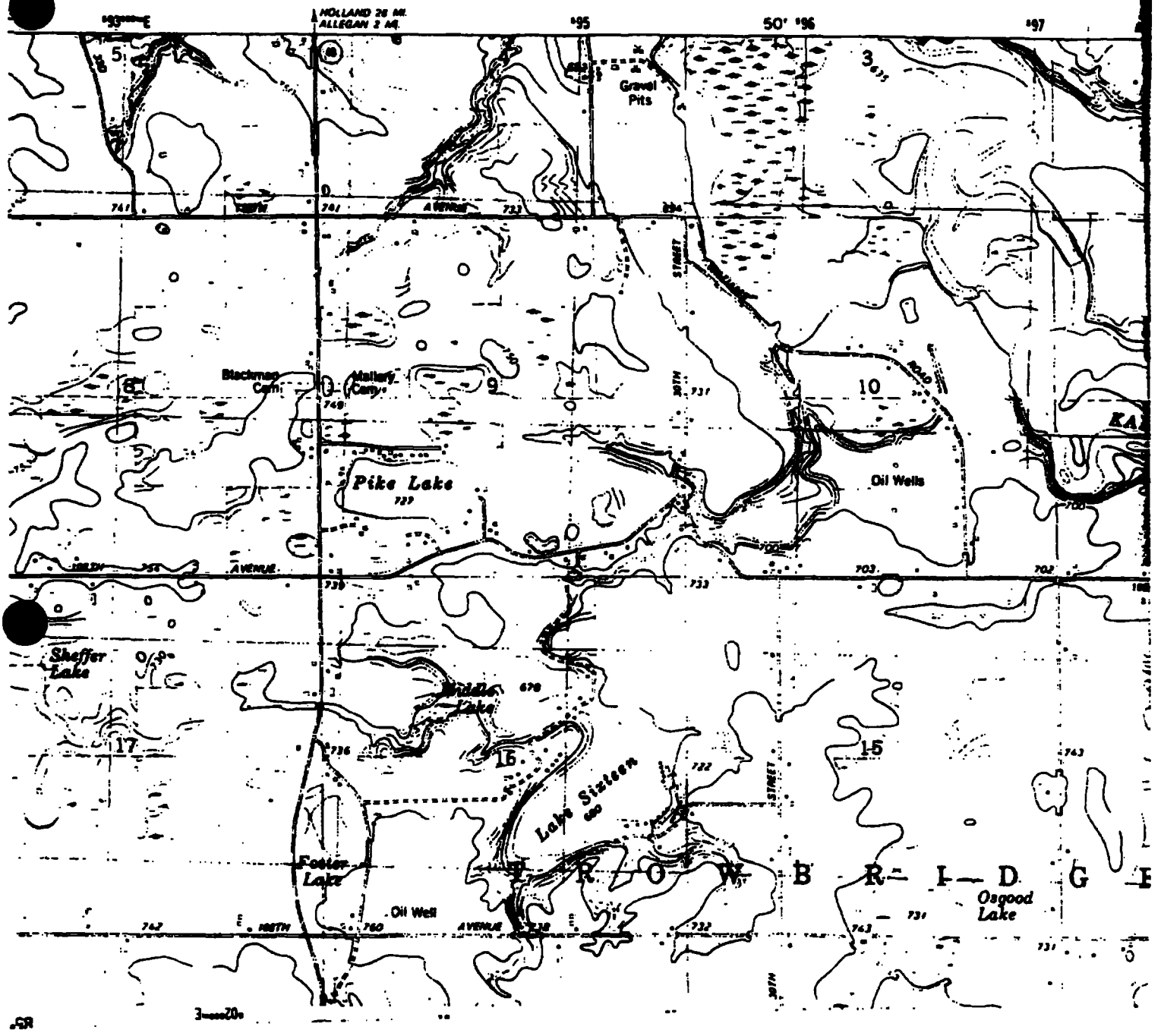
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



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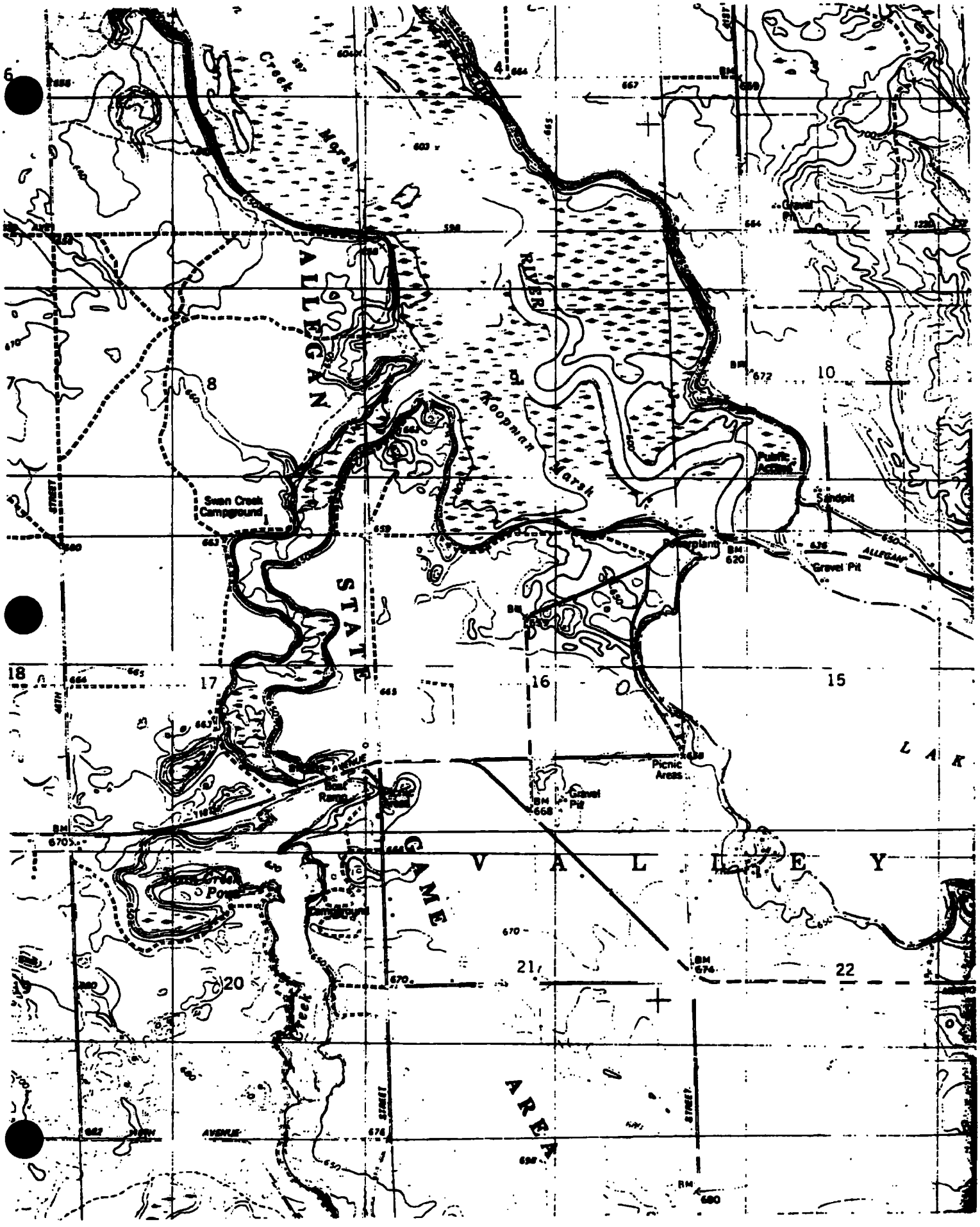

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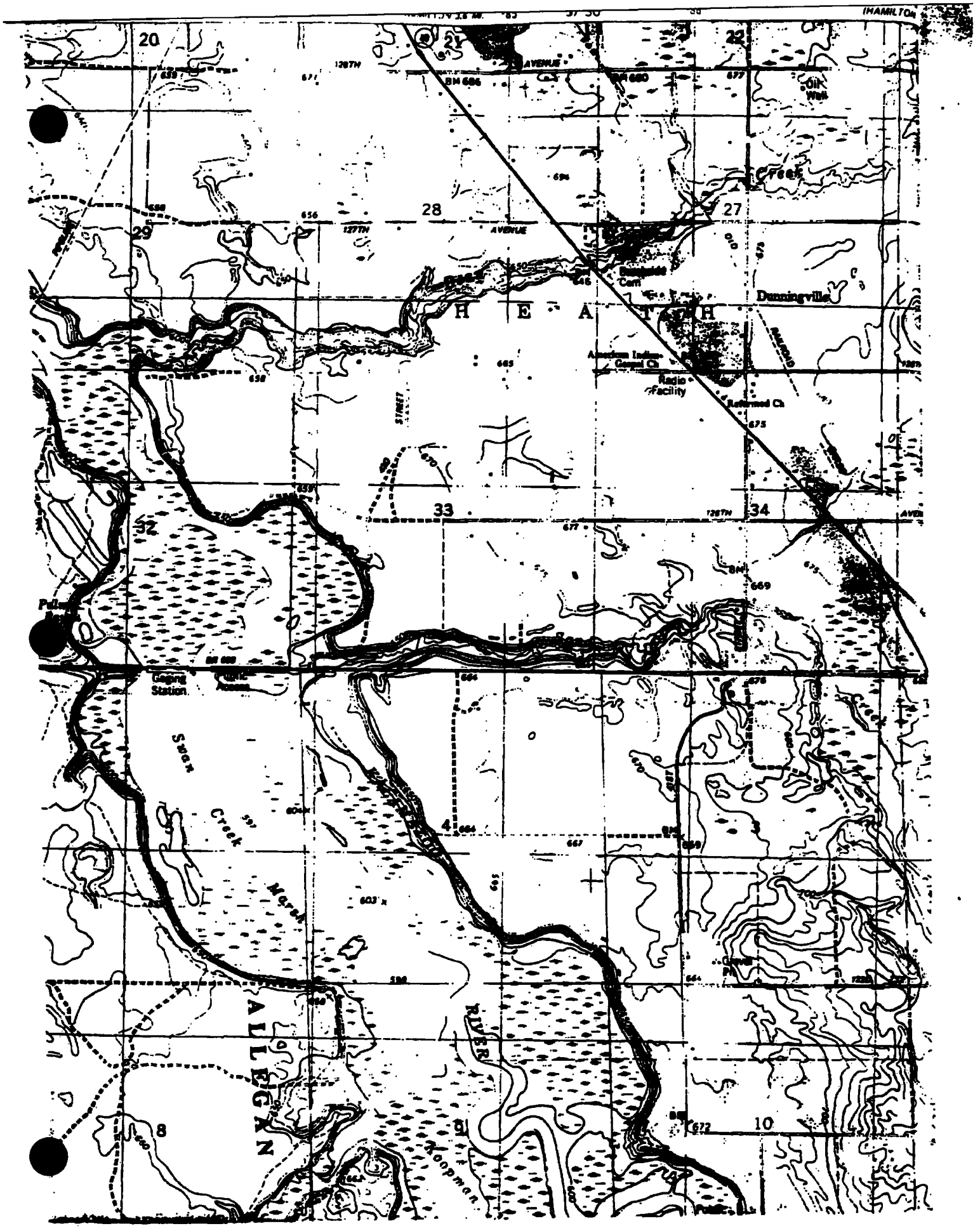

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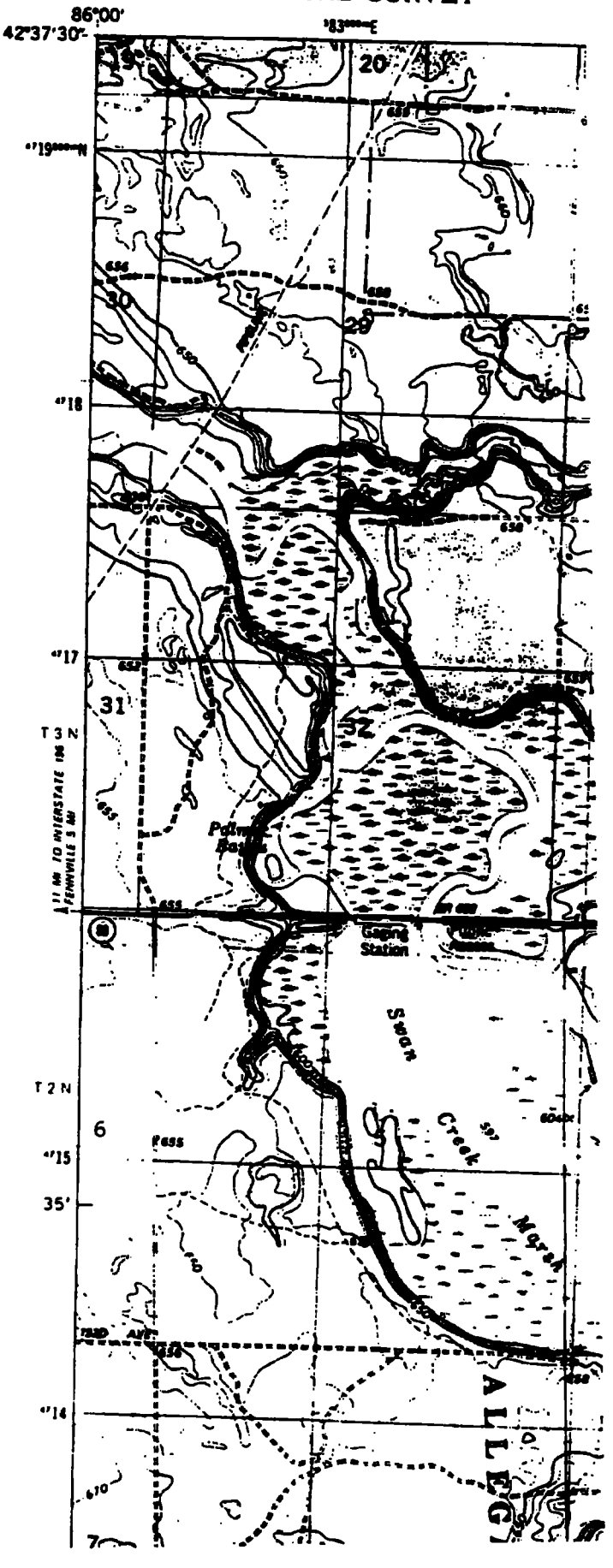
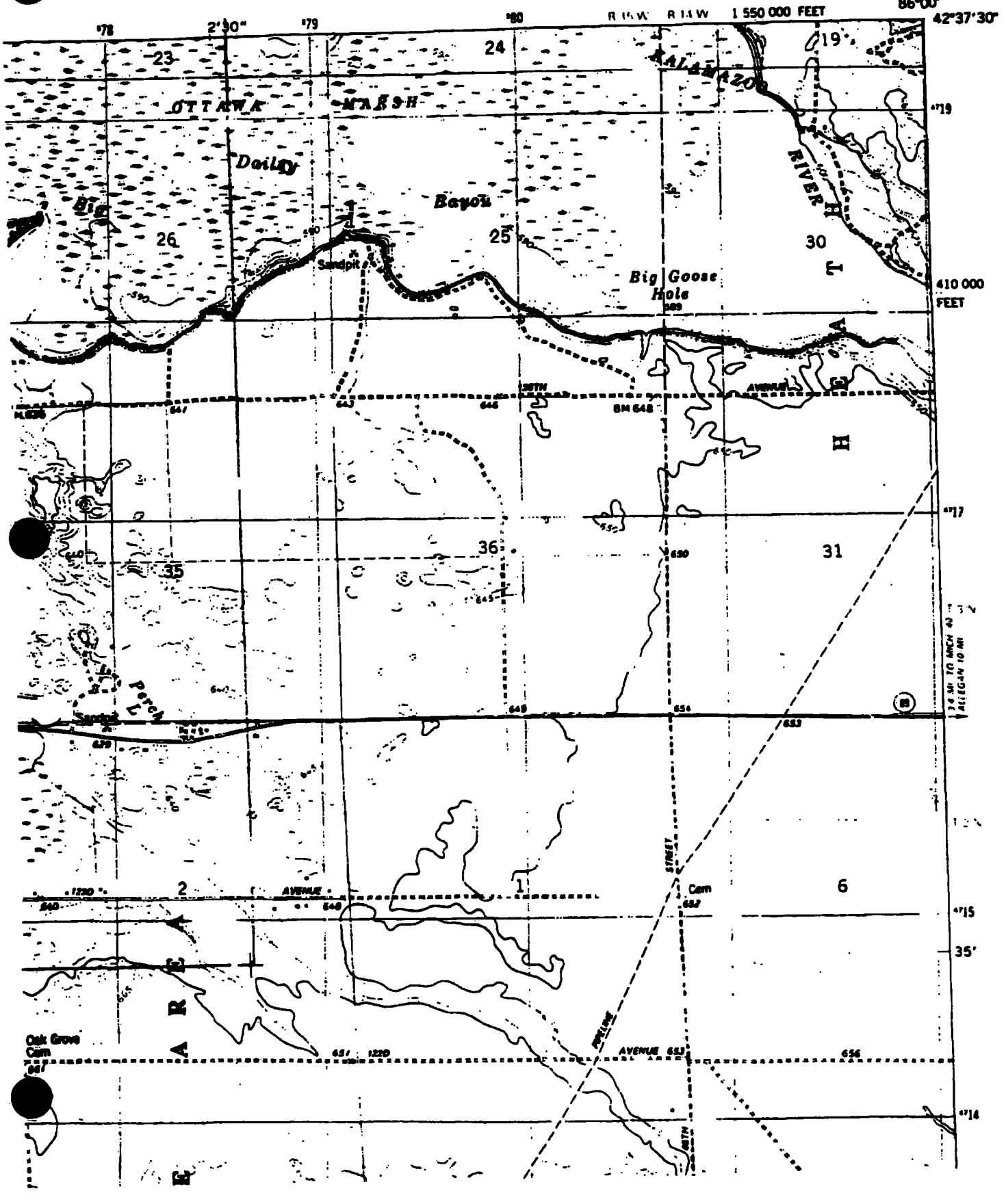
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY



NCRKZOO0026033

FENNVILLE QUADRANGLE
MICHIGAN–ALLEGAN CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
SE/4 FENNVILLE 15' QUADRANGLE



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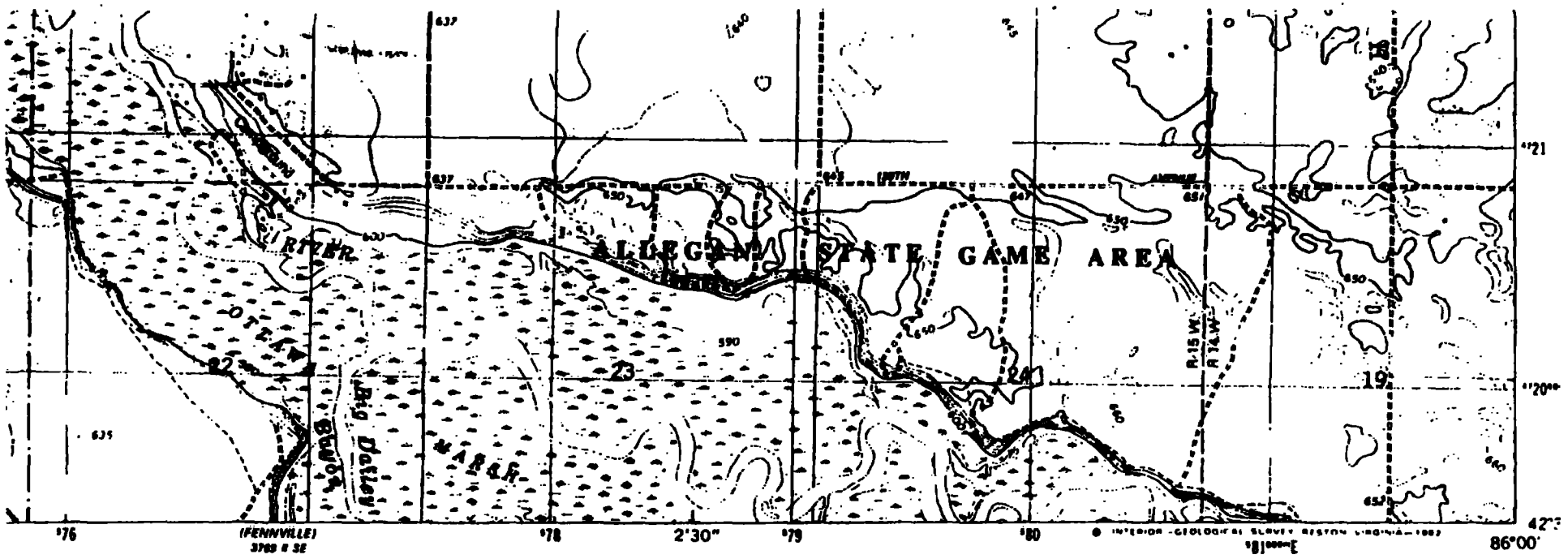


SCALE 1:24 000

1 MILE

0 1000 2000 3000 4000 5000 6000 7000 FEET

1 KILOMETER

CONTOUR INTERVAL 10 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
OR SALE BY U. S. GEOLOGICAL SURVEY, RESTON, VIRGINIA 22092
AND BY THE GEOLOGICAL SURVEY DIVISION
AN DEPARTMENT OF NATURAL RESOURCES, LANSING, MICHIGAN 48909
ER DESCRIBING TOPOGRAPHIC MAPS AND SYMBOLS IS AVAILABLE ON REQUEST

QUADRANGLE LOCATION

ROAD CLASSIFICATION

Primary highway, hard surface — Light-duty road, hard or improved surface

Secondary highway, hard surface — Unimproved road

Interstate Route U S Route State Route

HAMILTON WEST, MICH.

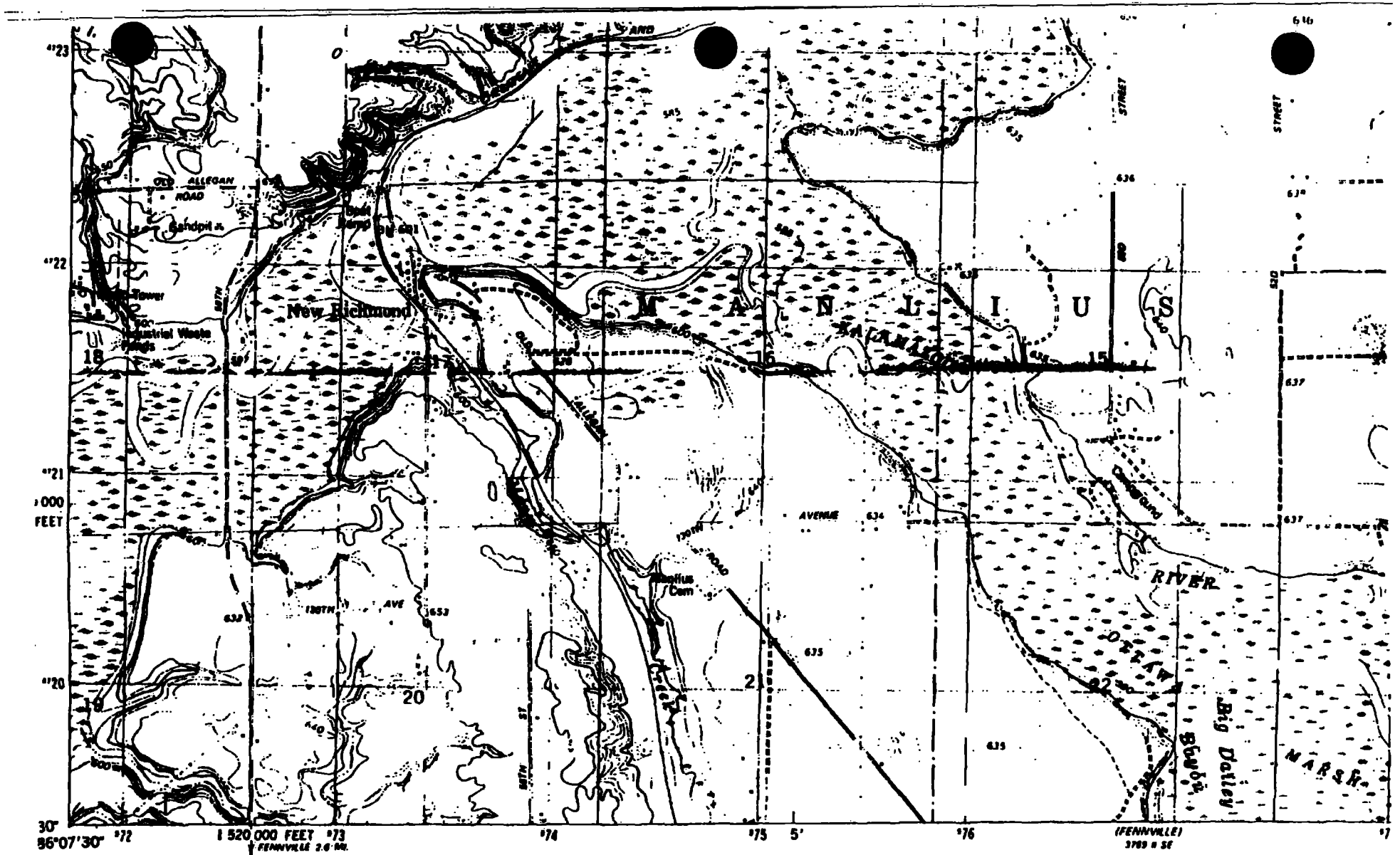
NE/4 FENNVILLE 15' QUADRANGLE

N4237.5-W8600/7.5

1981

DMA 3769 II NE-SERIES V882

NCRKZO0026035



Mapped, edited, and published by the Geological Survey

Control by USGS and NOS/NOAA

Topography by photogrammetric methods from aerial photographs taken 1976. Field checked 1978. Map edited 1981

Projection and 10,000-foot grid ticks: Michigan coordinate system, south zone (Lambert conformal conic)
1000-meter Universal Transverse Mercator grid, zone 16
1927 North American Datum
To place on the predicted North American Datum 1983 move the projection lines 1 meter north and 2 meters east as shown by dashed corner ticks

There may be private inholdings within

MN GN
2°
36 MILS
0°38'
11 MILS

UTM GRID AND 1981 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

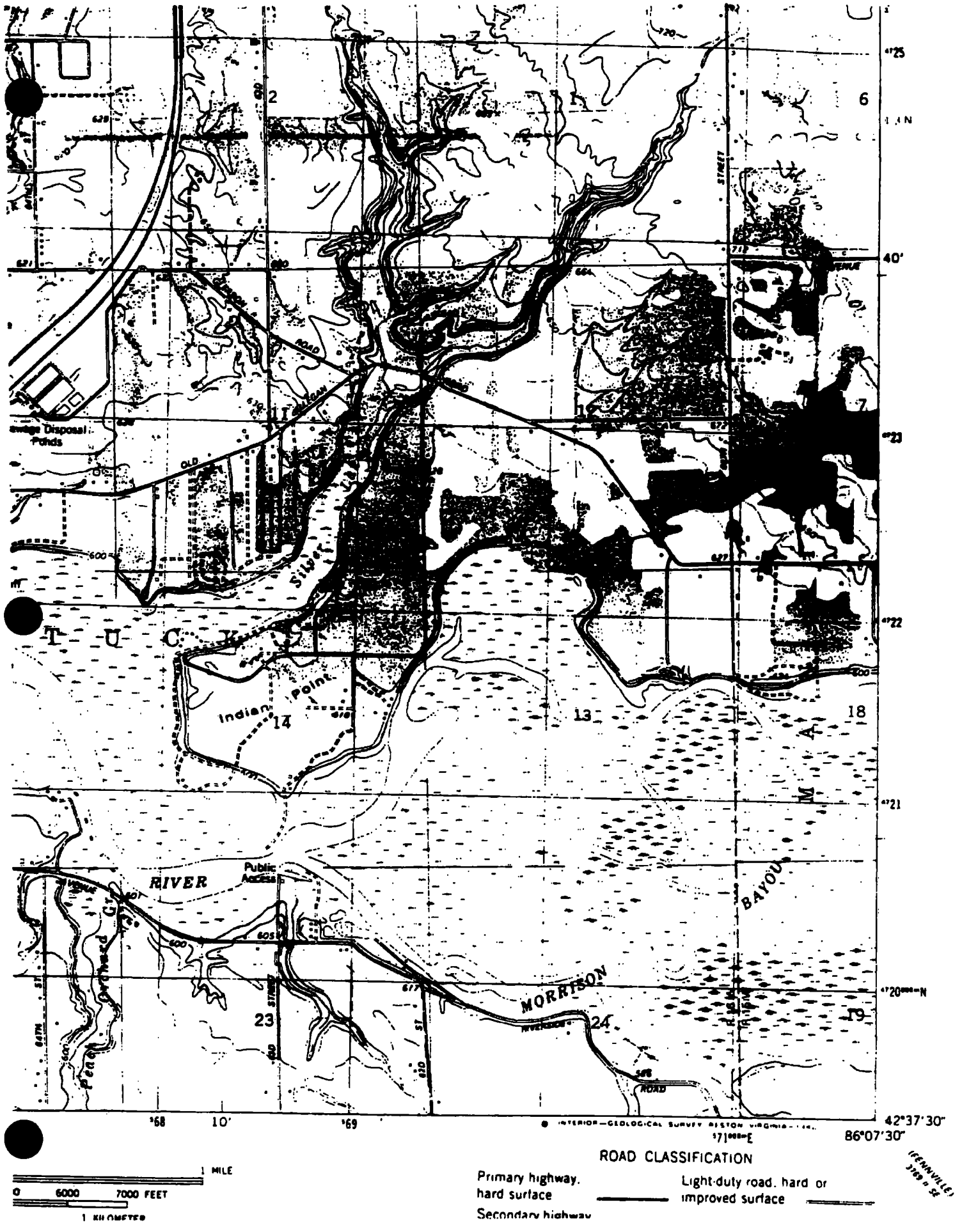
SCALE 1:24 000

1 0 1
1000 0 1000 2000 3000 4000 5000 6000
1 5 0 1 KILO

CONTOUR INTERVAL 10 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS
FOR SALE BY U. S. GEOLOGICAL SURVEY, RESTON, VIRGINIA 22092
AND BY THE GEOLOGICAL SURVEY DIVISION

NCRKZOO026036



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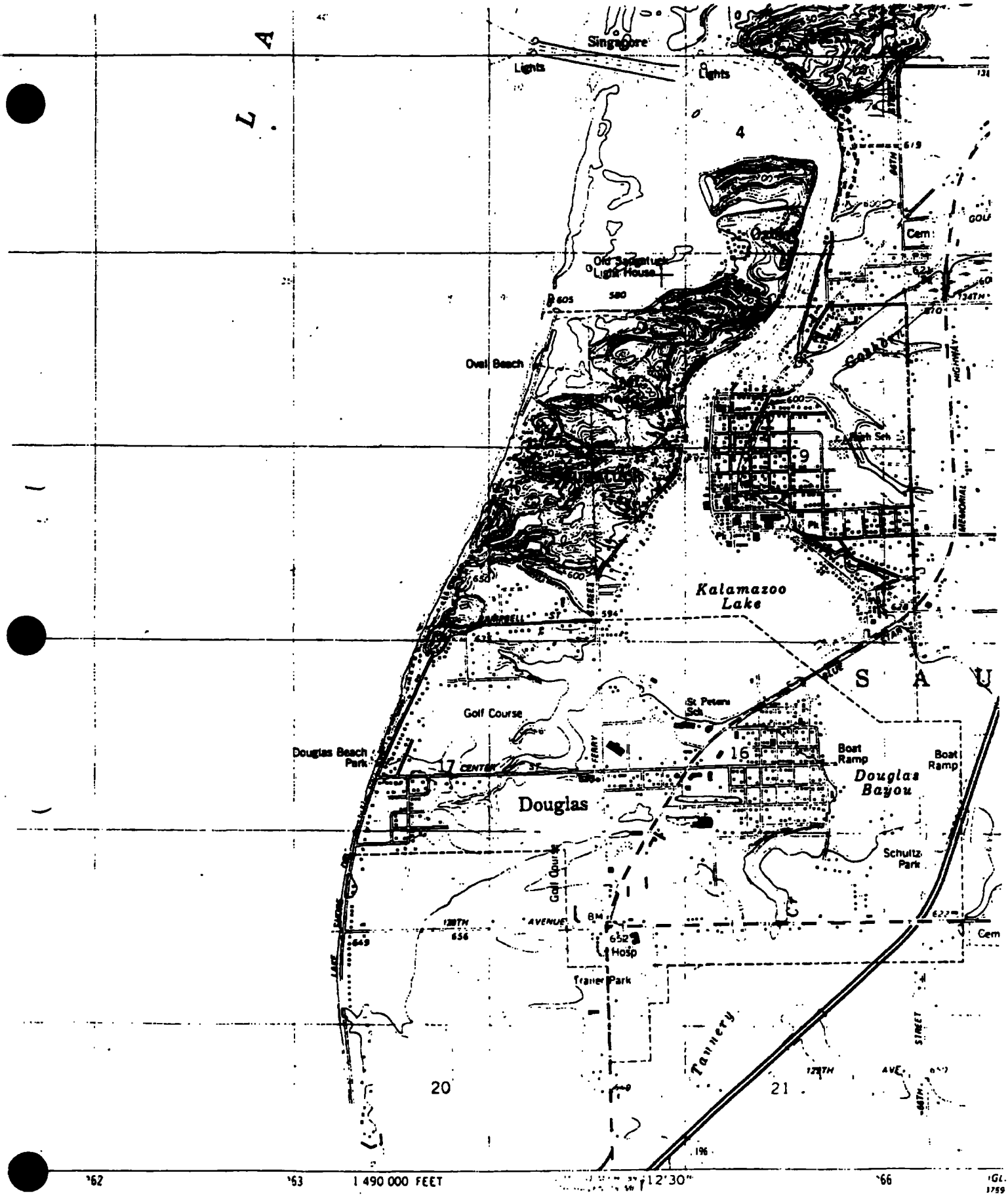

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graphy by photogrammetric methods from aerial photo

SCALE

NCRKZOO0026038

Ref. 8

Site Name Allied Paper - Portage Creek - Kalamazoo River

County Kalamazoo + Allegan

CALL LOG

1) Verify Site Location and Size.
2) Verify # and size of each containment structure.
3) Is there existing exposure of people documented?
4) Is the site fenced? Is it secure?
5) If sampling was done, how were samples collected? i.e. random selective, surface grab, composite etc..
6) Has the fire marshall considered the site a fire hazard?
7) What type of companies used the site? (Origin of chemicals)

DATE	AGENCY	PHONE NUMBER	PERSON CONTACTED
10/30/86	Kalamazoo County Agricultural Stabilization + Conservation Services (ASCS)	(616) 327-0940	Linda Mauk

≈ 333.7 acres of farmland spray irrigated with surface water

10/30/86	Allegan County ASCS	(616) 673-6940	Delores

No information available on acreage, but farmers do use surface water for irrigation.

Prepared by: Cheryl Wallace

NCRKZOO0026039

Reg 9 (page 5)

MACKINAC: Les Cheneaux Channels. Spearing Jan., Feb. only. East and Millecoquin Lakes—no size limit on pike.

MARQUETTE: Dead R. Storage, Michigamme R., Cataract and Tourist Park Basins, Greenwood Res., School, Witch and Michigamme Lakes—no size limit on pike. Peshekee River open to burbot netting by permit Dec. 15-Feb. 28.

MASON: No fishing in Sable R. from Hamlin Dam to mouth between Sept. 15 and Oct. 25 without a fishing permit obtainable at park entrance.

MECOSTA: Haymarsh Lake—no size limit on pike. Horsehead Lake—minimum size limit of 14" on large and smallmouth bass.

MENOMINEE: Westman Impoundment (including North and Hayward lks.)—no size limit on pike. Big Cedar R. open to smelt dipping down from mouth of Elwood Cr., Apr. 10-May 31.

MONROE: Dip net ban on Huron River—See Wayne Co.

MONTMORENCY: Fletcher Pond, Grass Lk., East and West Town Corner lks., Black River and tributaries—No size limit on pike. East Fish, West Fish and Middle Fish lks., Fuller Cr. Pond, Hunt Cr. above Section Z bulkhead and Fuller Cr. in the Hunt Cr. Trout Research Station Area—no fishing. Size restrictions on Little Wolf Lake (See note).

OAKLAND: See Quality Fishing Section.

OGEMAW: Jewett Lk.—fishing by special permit only, May 15-Feb. 28.

OTSEGO: North Twin, South Twin, Lost, West Lost, Ford and Section 4 lks. in Pigeon River Research Area—no fishing. Black R. and tributaries—no size limit on pike.

PRESQUE ISLE: Francis Lk., Ocqueoc R. Watershed, Black R. and tributaries above Tower Dam—no size limit on pike. Grand Lk. Pike Marsh—Unlawful for any person other than state employee to use or operate a motorized vehicle on the access road leading from U.S. 23 to the Grand Lk. Pike Marsh. Shutters and Clinton Creeks closed to fishing April and May.

ROSCOMMON: L. St. Helen, Backus Cr., Mud Lk. and Little Mud Lk. Waterfowl Flooding—no size limit on pike. Backus Cr. closed March 23-April 30 to fishing from confluence with Cut River upstream to Little Mud Lake Dam. Cut River closed March 23-April 30 to fishing from confluence with Backus Creek upstream to outlet at Marl Lake. Higgins Lk.—16" minimum size limit on all trout and salmon. Houghton Lk.—No spearing.

SCHOOLCRAFT: Big Island Lakes (Big Island, Townline, Mid (Cucumber), Coattail, McInnes, Klondyke, Ned's, Vance, Twilight, Blush, Byers, Bluegill, and connecting waters)—no fishing or spearing Dec. 1-Friday before last Saturday in April, artificial lures only, season closed on Ned's, Mid and Twilight Oct. 1-the day before the last Saturday in April, fishing restricted to artificial lures with single-pointed hooks; size and creel limits: muskellunge and pike, 40" and 1 per day; bass, 18" and 1 per day; trout, 15" and 1 per day, perch, bluegills and pumpkinseed sunfish, 5 per day in any combination, no size limit; Deep, Driggs, Kennedy, Stanley, Straits, McDonald, Thunder and Ross lks., and Seney Wildlife Refuge ponds—No size limit on pike.

SENEY NATIONAL WILDLIFE REFUGE: Limited fishing—check regulations with Refuge office.

WAYNE: Dipnets are banned for the taking of fish in the Huron River from the mouth at Lk. Erie to Flat Rock Dam all year long.

[redacted]

This program receives Federal aid in fish and/or wildlife restoration. Under Title VI of the 1964 Civil Rights Act and Section 504 of the Rehabilitation Act of 1973, the U.S. Department of the Interior prohibits discrimination on the basis of race, color, national origin, or handicap. If you believe that you have been discriminated against in any program, activity, or facility, or if you desire further information regarding Title VI, please write to the Office for Equal Opportunity, U.S. Department of the Interior, Washington, D.C. 20240.

MICHIGAN FISHING GUIDE 1986

[redacted]

MICHIGAN DEPARTMENT OF NATURAL RESOURCES

Master Angler Certificates are awarded anglers who catch state-record fish, or one of the top 5 fish of their kind entered during the year. Arm patches are given all entrants whose fish meet established criteria. To be eligible, fish must be weighed on inspected scales, signatures of two witnesses obtained, and pictures taken (in color, with angler holding fish in side view, preferred). For details and entry forms, contact DNR offices listed on page 2. Deadline for entries is Jan. 10.

YES MICHIGAN FISHING

NCRKZOO0026040

Inland waters—All waters except the Great Lakes, Lake St. Clair, Saginaw, Detroit, St. Clair and St. Marys rivers.

Great Lakes connecting waters—Lake St. Clair, St. Marys, St. Clair and Detroit rivers. Excluding tributaries.

Trout waters—Trout lake—a lake so designated in which trout are the predominant game fish. See listing in this folder. Trout stream—any stream so designated which contains a significant population of trout or salmon. Generally, fishing is permitted in trout waters only during the regular trout season.

Minnows—Chubs, shiners, dace, stonerollers, mudders, mudminnows, and suckers of a size used for bait in hook and line fishing.

Landing nets and hand nets—A mesh bag of webbing or wire, suspended from a circular or oval or rectangular frame attached to a handle.

Artificial Fly—Any commonly accepted single- or double-hooked wet or dry fly, streamer or nymph without spinner, spoon, scoop, metal head or any other fishing lure or bait attached. The fly or leader may be weighted.

Artificial Bait—Any commonly accepted lure or fly manufactured in imitation of or as a substitute for natural bait.

Use a net to take a fish within 100 ft. of a dam.

Take fish with firearms, explosives, poisons or methods other than lawful fishing methods.

Plant or import White Amur or live game fish or viable eggs of game fish except under permit from the Department.

Take fish for the sole purpose of removing the eggs.

Deposit fish offal (head, entrails, etc.) or any foreign matter in any waters of the State.

Deposit litter on any lands, private or public.

Fish for any species or possess fishing devices along a closed-to-fishing stream. Possess a spear, gaff, bow/arrow along a trout stream at any time. Use a seine for any species other than minnows.

Ice shelters must bear (on all sides) owner's name and address in waterproof letters not less than two inches high and must be removed before ice becomes unsafe. Shelters placed on Lake St. Clair must be removed before February 25. If used after February 25, must be removed daily. **Exception:** Persons who offer for rent 10 or more shanties on Lake St. Clair shall remove them before ice becomes unsafe.

Game and non-game animals, birds and fish, as well as frogs, snakes and turtles, play an important role in nature. They enrich the natural world and add visually and audibly to the pleasures of man. Don't kill or cause any creature to suffer confinement needlessly. A good ethical rule is to never kill what you do not intend to use. Certain species are threatened or endangered and are protected by law.

Fishermen can help in the management of their favorite lake by: 1. Keeping the small to medium-size panfish for food, and by releasing larger ones which help keep the population in balance by predation on the very small ones. 2. Releasing bass except for an occasional "bragging" fish and eating the more plentiful panfish instead.

No person shall in any one day catch, kill or have in possession at any one time more than the daily possession limit, except that a person may have more salmon (see hook & line regulations, Note 7, Page 9). You may transport or ship one day's limit under free permit obtainable at DNR field offices. On public waters, you may not possess mutilated fish that cannot be measured or identified. It is unlawful to possess illegally taken fish. **Fish or parts of fish taken by sport fishing gear and/or under a sports fishing license may not be bought or sold.**

PUBLIC HEALTH ADVISORY

You should be aware that some fish from some locations contain one or more chemical contaminants at levels of public health concern. Mercury, PCB, PBB, DDT, Dieldrin, Chlordane, Toxaphene and Dioxin are contaminants of concern. It should not be assumed that fish from waters which are not listed below are contaminant free. Many lakes and streams have not yet been tested. Even in the locations listed, not all of the fish species in the waterway have been tested in some cases.

As an eating precaution, it is advised that fish be skinned, trimmed, and filleted to remove fatty portions and cooked by baking, barbecuing or broiling on a rack to reduce the level of contaminants in fish.

Based on available monitoring data the following additional precautions are advised:

1. DO NOT EAT ANY FISH caught from Deer Lake, Carp River and Carp Creek (Marquette County) and Pine River (downstream from St. Louis), and Shiawassee River (M-59 to Byron Rd.).
2. DO NOT EAT LISTED SPECIES caught from Kalamazoo River (downstream from Kalamazoo) and Portage Creek (downstream from Milham Park): carp, suckers, catfish and largemouth bass. No more than one meal per week for all other species. Torch Lake (Houghton County), walleye and sauger. Shiawassee River (Byron Rd. to Owosso), carp. Tittabawassee River (downstream from Midland), carp and catfish. Lake Macatawa (Ottawa Co.), carp. Hersey River (downstream from Reed City), bullheads and trout. St. Joseph River (downstream from Berrien Springs Dam), carp. Manistique River (downstream from M-94 C.R. LS-2), carp. River Raisin (downstream from Winchester Bridge, Monroe), carp. Lake Michigan*: brown trout, lake trout (over 25"), carp.
3. DO NOT EAT MORE THAN ONE MEAL PER WEEK or 26 pounds per year of fish from the waters listed below:
   Lake Michigan*: catfish, chinook salmon (over 25"), lake trout (all areas), and whitefish (southern half). Lake Huron*: lake trout (all areas), and salmon, trout and muskellunge (southern half). Saginaw Bay*: carp, catfish, salmon and trout. Lake Superior*: (all areas): lake trout. Lake St. Clair and St. Clair River: muskellunge. Detroit River: muskellunge and Belle Isle: carp. Lake Erie (western end): carp, catfish and muskellunge. Lake Michigamme, Michigamme Reservoir, Peavy Pond, Paint River Pond, and the Michigamme River system to its junction with the Menominee River: rock bass greater than 9 inches, northern pike, walleye, smallmouth bass and muskellunge. Cass River (downstream from Bridgeport): carp. Grand River (Clinton County): carp. Saginaw River (entire length): carp. White Lake (Muskegon Co.): carp.

*Advisory also applies to these species migrating into tributary streams to these waters.

NOTE: Nursing MOTHERS, PREGNANT WOMEN, WOMEN WHO ANTICIPATE BEARING CHILDREN, AND CHILDREN AGE 6 AND UNDER SHOULD NOT EAT THE FISH LISTED IN ANY OF THE THREE CATEGORIES LISTED ABOVE.

For further information, call the Center for Environmental Health Sciences hotline 1-800-MI-TOXIC.

NCRKZOO0026041

100% Recycled 30% PCW

MITRE

10 July 1987
W52-1939

RECEIVED
JUL 1987
Program
Support Section

Ms. Jeanne Griffin
U.S. Environmental Protection Agency
Region V
230 South Dearborn Street
Chicago, Illinois 60604

Dear Ms. Griffin:

Enclosed please find the quality assurance comments concerning Allied Paper-Portage Creek.

If you have any questions regarding this material, please contact Kathleen Galloway at (703) 883-5843 or me at (703) 883-7676.

Sincerely,

Sue Russell

Sue Russell
Group Leader
Hazardous Waste and Safety Systems

SR/js

Enclosure

cc: S. Parrish
A. Sarno

The MITRE Corporation
Metrek Division
7525 Colshire Drive, McLean, Virginia 22102-3481

12/23/86 Allied Paper/Portage Creek/Kalamazoo River HRS & SI

1. Allied Paper is considered the primary source because the contamination begins at the point that Allied Paper's discharge is located. Recent data show detectable PCBs in Allied's clarifier discharge to Portage Creek at Bryant Mill Pond. The landfill and Bryant Mill Pond are considered the primary PCB source, although only the landfill was described under the Quantity of Waste section in the HRS packet. The landfill lies within the confines and floodplain of Bryant Mill Pond. While Allied sampling shows no PCBs in the landfill, two defined seeps from the sludge disposal area were discovered flowing into Portage Creek. These seeps were sampled for PCBs and suspended solids in October 1985. The Water samples revealed 4389 ng/l and 15 ng/l PCBs at seeps #1 and #2 respectively, while a sediment sample surrounding seep #1 revealed 69 mg/kg PCBs.

   The second major reason why Allied Paper is considered the primary source is that Allied and Bryant Mill Pond is the furthest upstream known locational PCB contamination. There are no PCBs in the Kalamazoo River upstream from the Kalamazoo River and Portage Creek confluence, nor are there any PCBs upstream of Bryant Mill Pond in Portage Creek. In addition, there are no PCBs detected in Portage Creek water or sediments at the Cork Street Bridge over Portage Creek (the upstream limit of Bryant Mill Pond) while PCBs have been detected at Alcott Street (the downstream limit of Bryant Mill Pond). With the exception of Lake Allegan, the PCB burden in Bryant Mill Pond is the largest in the Kalamazoo River system.

   Finally, Allied Paper manufactured carbonless copy paper among other products at this site. This was the only company in the Kalamazoo River system which manufactured carbonless copy paper. From 1957-1971, 41 million pounds of Aroclor 1242 was used nationally to manufacture carbonless copy paper which contained an average of 3.4% Aroclor by weight.

2. PCBs found in monitoring wells around the landfill are coming from the landfill itself (see the "seeps" point in item 1). If an upstream source was contaminating the wells, then monitoring wells 9, 10, 11, and 12 should also be contaminated. The only wells showing PCB contamination are wells #3 & 5 (map attached).

3. The Aquifer of Concern was identified. See page 5 of the Documentation Records attached to the HRS score sheets. The upper aquifer is contaminated (see item 2) and the lower aquifer is of concern. The municipal wells are in the lower aquifer. The depth of the municipal wells ranges from 46 feet to 306 feet and serve the population of Kalamazoo (78,722). The City of Portage's municipal wells are at approximately the same depth and serve the population of Portage (38,147). The lower aquifer is not contaminated, but may later become contaminated if the PCBs migrate from the upper to the lower aquifer or from the contaminated river water column. The population data are applicable in the Targets portion (Groundwater Route Part 5) because this is population at risk with municipal water wells completed in the aquifer of concern within the three mile radius (the wells are actually within the one mile radius).

4. We don't claim that Allied is the only PCB source, simply the primary source. We expect that a few other lesser sources will be identified in a full responsible party search which is conducted during the Remedial Investigation/Feasibility Study phase, not during the HRS scoring phase.

   The 80 miles of River are continuously contaminated from one site (Allied) because of long-term PCB loading to Bryant Mill Pond. We believe that contaminated sediments have been flushed form Bryant Mill Pond and repeatedly collected and flushed at downstream dams in the Kalamazoo River. Lake Allegan contains the largest burden for two reasons. First, much of its large volume is remote from the dam and therefore there is an increased opportunity for settling while there is a much reduced opportunity for flushing. Second, several impoundments upstream were lowered to "run of the river" status resulting in a scouring of some impounded PCB contaminated sediment from the river channel and its release through the opened dams.

   What has been raised by EPA's FIT Contractor and discussed with the Michigan DNR is that each hotspot in the Kalamazoo River must have an associated PCB source which is entirely responsible for each hotspot of contamination. As described above, we do not believe this argument. Basic stream dynamics show that some sediments cascade from impoundment to impoundment in a river system.

5. A new map is attached. Why are the Grand Rapids Quad map(s) requested? They show the Grand River.

6. The cover sheet has been completed and is attached.

7. The area geology and well logs are attached.

8. The NUS report does include a map describing the various "reaches" (see Mary Jane Ripp, Ecology and Environment). Another copy is attached.

9. Analytical data are available only for monitoring wells 1, 2, 3 and 5. Sample results were provided with the HRS packet.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

APR 24 1997

REPLY TO THE ATTENTION OF:
S-6J

Robert G. Beck, Chairman
Kalamazoo River Area of Concern Public Advisory Council
8135 Cox's Driver, Suite 106
Portage, MI 49002-5879

Dear Mr. Beck:

I am responding to your letter dated March 25, 1997 on behalf of Valdas V. Adamkus, Regional Administrator for the United States Environmental Protection Agency (U.S. EPA). In your letter, the Kalamazoo River Area of Concern Public Advisory Council petitions the U.S. EPA and the State of Michigan to implement "emergency cleanup measures to stop continuous release and migration of PCBs from the Bryant Millpond to the Portage Creek and the Kalamazoo River". U.S. EPA shares your concern about the continuing release of polychlorinated biphenyls (PCBs) from the Bryant Millpond. In addition, U.S. EPA is concerned about the human health and environmental risks presented by the PCB contamination at Bryant Millpond, as well as the PCB contamination in other impoundment areas along the Kalamazoo River.

The Bryant Millpond is presently being addressed as part of the Allied Paper/Portage Creek/ Kalamazoo River Superfund site. The Superfund program was established by the Congress of the United States to address the worst hazardous waste sites in the nation. U.S. EPA has delegated the lead for implementation of actions for this site to the Michigan Department of Environmental Quality (MDEQ), under an agreement between the two Agencies. Under this agreement, U.S. EPA is providing funding to MDEQ to conduct a risk assessment at the site. U.S. EPA also provides technical support to MDEQ, conducts limited oversight, and provides approval for any final remedial actions.

Congress has appropriated federal funds for taking actions at Superfund sites, but federal funds are limited. Furthermore, U.S. EPA prefers to have the polluter pay for or implement the remedial actions. Therefore, MDEQ is working to implement actions at the site through a group of paper companies. MDEQ has succeeded in securing an agreement with a group of paper companies, whose discharges caused the contamination, to conduct an investigation of the extent and nature of contamination at the site, and to evaluate alternative remedial actions. One of these paper companies is HM Holdings, Inc., the successor to the Allied Paper Company, which was the source of PCB contamination at Bryant Millpond.

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KB11901890

The investigation has determined that PCBs are the contaminant of primary concern and that this contamination was generated from the recycling of carbonless copy paper between 1957 and the 1970s. Allied Paper disposed of some paper residuals in landfills next to Portage Creek, but some of the residuals have flowed into Portage Creek and caused the contamination at the Bryant Millpond and also contributed to the contamination of sediments in downstream areas of Portage Creek and the Kalamazoo River. It should be emphasized that PCBs are no longer being discharged by Allied Paper, and that the Allied Paper landfills along Portage Creek are no longer in active operation. The sediments in Bryant Millpond have the highest PCB concentrations of all the impounded areas along the Kalamazoo River system and presents a substantial risk to wildlife in the area. Any erosion of the contaminated sediments will cause migration of PCB contamination downstream. However, the sediments are stabilized to some degree by vegetative growth, and the surficial sediments have a lower concentration than the deeper sediments.

MDEQ is presently in negotiations with the paper companies, including HM Holdings, Inc. to accelerate actions to improve containment of PCB wastes that are presently in landfills along Portage Creek and the Kalamazoo River. Such action will likely include excavation of nearby sediments associated with the landfills and containment of these contaminated sediments on the landfills. This possibility is being considered for the Bryant Millpond sediments. Please be assured that U.S. EPA is committed to supporting MDEQ in its effort to address the site expeditiously. MDEQ projects that the investigation will be complete and a remedial action will be selected for the Allied Paper landfills and the Bryant Mill Pond area during 1998. Following selection of the remedial action, MDEQ plans to negotiate with HM Holdings, Inc., and the other paper companies for design and implementation of the selected remedial action.

Both MDEQ and U.S. EPA have contemplated taking a short-term action to address the Bryant Millpond. In response to your petition, U.S. EPA will more formally evaluate the potential effectiveness and estimated costs of taking a short-term action to remove or better stabilize contamination at Bryant Millpond. This review will be conducted over the next three months, and we will report the results to your organization.

If you have any further questions, feel free to contact Rich Boice, the assigned Remedial Project Manager for this site, at (312) 886-4740.

Sincerely yours,

William E. Muno, Director
Superfund Division

KB11901891

TOTAL P.05

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http://www.epa.gov/Region5/superfund/npl/michigan/MID006007306.html
Last updated on 03/09/2015

Region 5 Superfund

You are here: EPA Home About Region 5 Superfund National Priority List (NPL) Fact Sheets Michigan ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER

U.S. EPA REGION 5
KALAMAZOO COUNTY
KALAMAZOO

Congressional District # 06

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER

EPA ID# MID006007306
Last Updated: January, 2015

Site Description

The Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site includes five disposal areas, five paper mill properties, an approximately 80-mile stretch of the Kalamazoo River from Morrow Dam to Lake Michigan, and a three-mile stretch of Portage Creek.

At this time, the site is divided into six cleanup projects known as operable units (OUs):

- OU #1, Allied Paper Property/Bryant Mill Pond Area;
- OU #2, Willow Boulevard and A-Site Landfill;
- OU #3, King Highway Landfill;
- OU #4, 12th Street Landfill;
- OU #5, Portage Creek and Kalamazoo River sediments; and
- OU #7, Plainwell Mill.

The primary site contaminant is polychlorinated biphenyls (PCBs), a hazardous substance and probable human carcinogen. PCBs were introduced to Portage Creek and the Kalamazoo River through past discharges and disposal of PCB-contaminated paper residuals by the paper industry. The five disposal areas are situated on the river banks and contain millions of cubic yards of PCB-contaminated waste. It has been estimated that the river sediments contain more than 120,000 pounds of PCBs. The contaminated sediments have largely been deposited in four impoundment areas within the river.

EPA proposed the site to the National Priorities List (NPL) in May 1989 and finalized the site on the NPL in August 1990.

In February 2007 two Administrative Orders on Consent (AOCs) were signed by both the U.S. Environmental Protection Agency (EPA) and Millennium Holdings, LLC and Georgia-Pacific, LLC (collectively known as the Kalamazoo River Study Group (KRSG)). One AOC requires the KRSG to conduct a supplemental remedial investigation/feasibility study (RI/FS) for the Portage Creek and Kalamazoo River sediments, and the other called for a time-critical removal action (TCRA) of sediments in a portion of the Kalamazoo River near Plainwell, Michigan. (Additional information is provided below in the "Cleanup Progress" section.) EPA is currently the lead regulatory agency on this project and is working closely with the Michigan Department of Environmental Quality (MDEQ) to oversee the cleanup activities.

2465

Site Responsibility

This site is being addressed through federal, state, and potentially responsible parties' actions.

Threats and Contaminants

The site is contaminated with PCBs, a hazardous substance and probable human carcinogen. It has been estimated that the river sediments contain more than 120,000 pounds of PCBs, and the five unconfined disposal areas situated on the river banks contain millions of cubic yards of PCB-contaminated waste.

Cleanup Progress

EPA's general cleanup approach for the Kalamazoo River is to first eliminate ongoing sources of PCBs, which includes the existing landfill OUs and paper mill properties (to ensure they are not a source of PCBs to the river) as well as exposed paper wastes along the river banks and flood plain soils (or impoundments), and then to address in-stream sediments. The exposed paper wastes are located behind State-owned and privately-owned dams along the river. Generally, EPA's cleanup will begin upstream and work downstream on a reach-by-reach and dam-to-dam basis.

INTERIM ACTIONS

To date, a number of initial measures have been taken to reduce the release of PCBs from the disposal areas. In 1992, a fence was erected around the entire OU #1 Allied Paper property, including the Bryant Mill Pond area (approximately 70 acres on Portage Creek), to restrict access and thereby reduce the potential for exposure from direct contact with exposed sediments. Because of concern about the ongoing release of PCBs from the Bryant Mill Pond area to Portage Creek and the slow progress (at the time) of actions under the state-lead RI/FS, EPA entered into negotiations in 1997 with H.M. Holdings, Inc., to expedite an action to address the Bryant Mill Pond sediments. In November 1997, EPA and H.M. Holdings reached an agreement in principal for H.M. Holdings to fund, up to a certain monetary limit, an EPA-conducted removal and on-site containment action for the Bryant Mill Pond sediments. The Removal Action began in June 1998. Portage Creek was temporarily diverted from its normal streambed in order to conduct "dry" excavation of 150,000 cubic yards of the creek bed and floodplain soils. Excavation work was completed in May 1999. Excavated material was placed in the Historical Residual Dewatering Lagoon and the Bryant Former Residual Dewatering Lagoons within OU #1. PCB concentrations remaining in the Bryant Mill Pond and adjacent floodplain soils after the removal action were less than 1 part per million (ppm). The cost of the removal action was $7.5 million.

Other interim actions that were completed include:

- Sheet pile and temporary cap installation at the Willow Blvd/A-Site Landfill (OU #2) to prevent direct erosion into the river.

- Sheet pile installation at the Allied Paper Landfill (OU #1), along with a cap.

In June 2009, the KRSG completed a time-critical removal action to remove PCB-contaminated sediment from the Kalamazoo River's Plainwell Impoundment near Plainwell, Michigan. The KRSG conducted the TCRA under a February 2007 AOC, with EPA oversight. Work began in March 2007. A total of 130,000 cubic yards of contaminated in-stream and bank sediment were removed by this action. Consistent with the federal Toxic Substances

Control Act, sediments containing PCB concentrations greater than 50 ppm were disposed at Environmental Quality Co.'s Wayne Disposal Landfill in Belleville, Michigan. Sediments with concentrations less than 50 ppm, which are considered non-hazardous waste and which represented 80 percent of the waste material, were disposed at Allied Waste's C and C Landfill near Marshall, Michigan, and its Ottawa Farms Landfill near Coopersville, Michigan. The estimated cost of this project was $30 million. This project also rerouted the Kalamazoo River to its original channel and removed the dam near Plainwell. The Kalamazoo River is now free-flowing from Kalamazoo to Otsego City, Michigan.

In June 2009, Georgia-Pacific LLC (GP) and EPA entered into a legal agreement committing GP to conduct a time-critical removal action in the Plainwell #2 Dam area. This removal action project began in August 2009 approximately three miles upstream of the earlier Plainwell Dam cleanup, and included a two-mile stretch of the Kalamazoo River. The project was completed in December 2010. Approximately 11,000 linear feet of riverbank was cleared, excavated and restored, with approximately 18,000 cubic yards of soil and debris disposed off-site at the Allied Waste C&C Landfill in Marshall, Michigan, and at Ottawa County Farms Landfill in Coopersville, Michigan. This action removed 90 percent of the PCB-contaminated soil from the area at a cost of about $10 million.

In July 2011, EPA signed an Action Memorandum to conduct a time-critical removal action along a 1.8-mile stretch of Portage Creek from Alcott Street to the confluence of the Kalamazoo River. EPA began implementing this PCB hot spot excavation project in September 2011. In 2012, EPA removed 13,000 cubic yards of PCB-contaminated sediment and soil from select areas within Portage Creek upstream of Stockbridge Avenue to Vine Street. This included the most contaminated areas of Portage Creek near Upjohn Park and Axtell Creek. EPA also conducted sampling in nearby Upjohn Park and determined no PCBs were present in park soil. In 2013, EPA continued excavation of the remaining downstream contaminated portions of Portage creek. The cleanup work, which was originally expected to be completed during the summer of 2014, was completed ahead of schedule in November 2013, with final restoration activities completed in 2014. A total of 23,700 cubic yards of contaminated soil and sediment were removed at a cost of about $16 million.

OPERABLE UNIT 1: ALLIED LANDFILL

The Remedial Investigation Report developed for the site by MDEQ was finalized and approved by EPA in March 2008. A groundwater investigation to determine the impacts, if any, from the Allied Landfill (OU #1) was completed in the summer of 2009. The groundwater investigation confirmed the conclusions in the RI Report that groundwater from OU #1 is flowing toward Portage Creek. In October 2009, Millennium Holdings submitted the draft Feasibilty Study Report for OU #1 which examined a range of cleanup alternatives. As a result of the April 23, 2010, Lyondell bankruptcy settlement, Millennium Holdings ceased work at OU #1 and approximately $50 million was placed in a trust to pay for the remaining work at OU #1. EPA completed the Feasibility Study in January 2014. EPA held several public availability sessions and conducted site tours of the Allied Landfill, including discussing potential cleanup alternatives, in 2013 and 2014. EPA continues to engage the public and the City of Kalamazoo throughout the remedy selection process. A release date for a proposed cleanup plan for the Allied Landfill has not yet been determined, but it is anticipated in summer 2015.

OPERABLE UNIT 2: WILLOW BOULEVARD AND A-SITE LANDFILL

The Willow Blvd/A-Site Landfill was under MDEQ control through completion of the RI/FS

Report in 2006. EPA completed a Record of Decision for the closure of the landfill in 2006. In September 2009, the legal settlement between EPA and Georgia Pacific for design and implementation of the cleanup was approved by a federal District Court. Under the legal agreement, Georgia-Pacific agreed to consolidate waste materials, construct a permanent landfill cap, and install a groundwater monitoring system. The design work was completed in 2010 and construction activities began in April 2011. Capping activities at Willow Bouldevard and A-Site were completed in the fall of 2013. Long-term monitoring of groundwater will continue into the future.

OPERABLE UNIT 3: KING HIGHWAY LANDFILL

Cap construction at the King Highway Landfill was completed in the fall of 2001. During summer 2002 the cap was seeded for vegetative growth. In the fall of 2007, a gas collection trench was constructed at the landfill. The King Highway Landfill remains under MDEQ control.

OPERABLE UNIT 4: 12th STREET LANDFILL

In September 2001, EPA signed the Record of Decision for the 12th Street Landfill. The remedy includes excavation of PCB residuals that have migrated from the landfill and consolidation of those residuals back into the landfill, stabilization of the side slopes of the landfill, installation of a cap, and long-term monitoring of groundwater. Weyerhaeuser is designing and implementing the cleanup, with oversight by EPA and MDEQ. Landfill consolidation and capping was completed in December 2010. Landfill cap maintenence activities were conducted in the summer of 2011 and long-term monitoring of groundwater will continue into the future.

To accommodate the channel diversion as part of the TCRA near the Plainwell Dam (discussed above under "Interim Actions"), the slope of the 12th Street Landfill adjacent to the Kalamazoo River was reshaped, upgraded, stabilized and restored in 2007. As a result of this work, contamination adjacent to the river along the 12th Street Landfill was removed.

OPERABLE UNIT 5: PORTAGE CREEK AND KALAMAZOO RIVER SEDIMENTS

On February 21, 2007, EPA reached two settlement agreements with Georgia-Pacific Corporation and Millennium Holdings LLC, two of the Potentially Responsible Parties (PRPs) collectively known as the Kalamazoo River Study Group. The agreements were a result of 2 years of mediated negotiations between the PRPs and EPA, MDEQ, and the Natural Resource Trustees (including the Michigan Department of Natural Resources, MDEQ, Michigan Department of Attorney General, National Oceanic and Atmospheric Administration, and the U.S. Fish and Wildlife Service).

Under one agreement, KRSG agreed to perform the TCRA sediment excavation in the Kalamazoo River near Plainwell, Michigan (as described above under "Interim Actions").

Under the second agreement, KRSG agreed to conduct a Supplemental RI/FS on the 80-mile stretch of the Kalamazoo River from Morrow Dam to Lake Michigan and on Portage Creek from Cork Street to the confluence with the Kalamazoo River. Although large amounts of data had been obtained throughout the river, numerous areas needing further investigation were identified. The Kalamazoo River was divided into seven areas. The status of work in the various areas of the river is as follows:

- Supplemental RI/FS work is underway in Area 1 which includes a 21-mile stretch of the Kalamazoo River from Morrow Dam to the Plainwell Dam and 3 miles of Portage Creek. Sampling has been completed, and EPA approved the supplemental Remedial Investigation (SRI) Report for Area 1 in June 2012. A draft Feasibility Study (FS) Report, which details potential cleanup options for Area 1, was submitted to EPA in November 2012. EPA disapproved the FS Report in February 2013 and conditionally approved a revised FS Report in March 2014. EPA approved the final FS Report in November 2014. EPA anticipates proposing a remedy for Area 1 in early summer 2015.
- The draft SRI Report for Area 2, which includes a 1.8-mile stretch of the Kalamazoo River from the former Plainwell dam to the Otsego City dam, was submitted to EPA for review in December 2012. EPA disapproved the draft SRI Report in April 2013, a revised SRI Report in February 2014, and a newly-revised SRI Report in July 2014. The next version of the revised SRI Report is anticipated to be submitted in the spring of 2015.
- Initial sampling for the supplemental RI in Area 3, which includes a 3.4-mile stretch of the Kalamazoo River from the Otsego City dam to the Otsego dam, was completed in October 2012. Additional sampling in Area 3 was completed in the summer of 2013. The Area 3 draft SRI Report was submitted to EPA for review in March 2014. EPA submitted preliminary comments on the draft report in August 2014 and a revised report is expected in the summer of 2015.
- Planning for the supplemental RI/FS in Area 4, which includes a 4.7-mile stretch of the Kalamazoo River from the Otsego City dam to the Trowbridge dam, known as the Trowbridge Impoundment, began in December 2012. A work plan to conduct field investigations was approved by EPA in June 2013. It is anticipated, given the large size of this impoundment, that the field investigation will take 3 years to complete. In 2014, Georgia Pacific, with oversight from MDEQ and EPA, conducted field reconaissance work and conducted the first phase of sampling.

MILL PROPERTIES

Several old paper mills exist along the Kalamazoo River. EPA is investigating these areas to determine whether the mill properties, although inactive, are a source of PCB contamination to the river.

Operable Unit 7: Plainwell Mill

Preliminary work to remove PCB-contaminated sediment from the banks of the Plainwell Mill began in the fall of 2007 and was completed in March 2008. Approximately 5,000 cubic yards of material were removed. The first phase of the Remedial Investigation, a cursory groundwater investigation, was completed in December 2008. Weyerhaeuser subsequently conducted Phase 2 of the RI at the Plainwell Mill in the summer of 2011, and submitted the draft RI Report to EPA in August 2011. Additional soil and groundwater sampling as part of Phase 2 of the RI was completed during the summer of 2012. The revised RI Report for the Plainwell Mill was submitted to EPA for review in November 2012 and approved in the summer of 2013. The Feasibility Study Report, which evaluates various cleanup alternatives, was submitted to EPA in June 2013, and a revised FS Report was submittted in August 2014. EPA disapproved the latest FS Report in October 2014 but expects to be able to approve the next version of the document. EPA anticipates proposing a remedy for the Plainwell Mill during the sumer of 2015.

Other Mill Properties

Work at the Georgia-Pacific Kalamazoo Mill and former Hawthorne Mills (consisting of removal of buildings, removal of contaminated soil and site stabilization) was completed in July 2007. In December 2008, Georgia-Pacific submitted a report to EPA asserting its position

that the two properties no longer contribute PCBs to the Kalamazoo River. In July 2009, EPA concurred with this report and no further work on these mill properties is anticipated at this time.

MILLENNIUM BANKRUPTCY

On January 6, 2009, Lyondell Chemical Company and 79 affiliated debtors filed for bankruptcy under Chapter 11 reorganization. One of the debtors is Millennium Holdings, LLC, one of the PRPs at the Kalamazoo River site. On April 23, 2010, the US Bankruptcy Court approved Lyondell's reorganization plan. Millennium Holdings ceased all work at the site. Part of the settlement included a $50 million trust being established for cleanup of OU #1 and a $50 million cash settlement to be used for cleanup of the entire site. Georgia-Pacific is addressing its obligations to complete the supplemental RI/FS according to the 2007 AOC. All work on the project under the two AOCs signed with EPA in 2007 is proceeding according to schedule. EPA is currently working with Georgia-Pacific, MDEQ, and other stakeholders to ensure that the cleanup of the Kalamazoo River site continues.

Contacts

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(312) 886-0992

Community Involvement Coordinator, U.S. EPA
Heriberto Leon
(312) 886-6163

Aliases

ALLIED CORP KALAMAZOO PLT
ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIV
PORTAGE CREEK
ALLIED PAPER
ALLIED PAPER/PORTAGE CK/KALAMAZOO RIVER

Site Profile Information

This profile provides you with information on EPA's cleanup progress at this Superfund site.

11

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

EXHIBIT
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MAY 28 1998

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

MEMORANDUM

SUBJECT: Region 5 Request for Approval of a $2 Million Exemption for a Time-Critical Removal at the Allied Paper/Portage Creek/Kalamazoo River Superfund Site, Kalamazoo, Michigan -- **ADDENDUM**

FROM: Stephen D. Luftig, Director Elaine Davies for
Office of Emergency and Remedial Response

TO: Timothy Fields, Jr.
Acting Assistant Administrator

This addendum transmits Region 5's Action Memorandum, which requests an exemption from the $2 million statutory limit and approval to expend up to $7.5 million for a time-critical removal action at the Bryant Mill Pond Area of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site, Kalamazoo, Kalamazoo County, Michigan. The Action Memorandum indicates that this removal qualifies for an exemption both on an emergency basis and because it is "consistent with the remedial action to be taken". This site is on the National Priorities List (NPL). Because estimated costs for this removal exceed $6 million, Assistant Administrator approval of the emergency exemption is required.

Region 5's attached Action Memorandum provides a detailed explanation of this site and the release that constitutes an imminent and substantial endangerment to public health or welfare or the environment. The Action Memorandum clearly documents the health and ecological risk from the PCB-contaminated sediments. The confidential enforcement addendum provides additional information related to funding for this action.

Prior to and since the drafting of the Action Memorandum, significant amounts of information about the Site has been provided to Region 5, primarily by Millennium Holdings, Inc. ("MHI"), the successor company to Allied Paper, Inc., and the party with whom U.S. EPA has recently finalized negotiations for a cashout agreement for the Bryant Mill Pond time-critical removal action.

None of the information supplied to date by MHI has altered the Agency's decision regarding the imminent and substantial endangerment to human health or the environment present at the

Bryant Mill Pond Area, or the need for the proposed time-critical removal action. During the course of negotiations, however, several minor inaccuracies in the Action Memorandum have been noted by MHI, particularly in the document's description of the background of the Site. The Michigan Department of Environmental Quality ("MDEQ"), too, has reviewed the Action Memorandum and has suggested several modifications. Region 5 has reviewed the suggestions of both MHI and MDEQ, and has determined that, in order to make the Action Memorandum consistent with the "Background" portion of the cashout agreement, certain modifications should be made. Accordingly, the final Action Memorandum for the Bryant Mill Pond Area removal action will be modified as follows:

1) Page 1, paragraph 2:

MDEQ has suggested that the Action Memorandum state the month of the year that the Site was listed on the National Priorities List. Accordingly, the first sentence of the paragraph will be modified as indicated:

> The Site, designated as State Enforcement lead by agreement between Region 5 and the State of Michigan, was listed on the National Priorities List (NPL) in **August**, 1990.

2) Page 2, first full paragraph:

MHI's consultant contends that there are other sources of PCBs at the Site "upstream of the confluence of Portage Creek and the Kalamazoo River. These sources include sediments in the vicinity of other operable units as well as sediments upstream of the Morrow Lake Dam . . . .."

Region 5 believes it is unclear whether the PCB contamination at and near Morrow Lake Dam is more upstream than that at the Bryant Mill Pond Area, but Region 5 believes that the Bryant Mill Pond Area is the most upstream source of any PCB contamination likely to cause high levels of downstream contamination. Accordingly, the first sentence of this paragraph will be changed as indicated:

> **Due to the amount of PCB-contaminated paper residuals, soils and sediments at the Bryant Mill Pond Area, and the high concentrations of PCBs in those residuals, soils and sediments, Region 5 believes that the Bryant Mill Pond Area is the most important upstream source of PCB-contamination at the Site and to the Kalamazoo River.**

3) Page 3, first partial paragraph:

MHI's consultant has indicated that the Bryant HRDL and the FRDLs contain only paper-making residual wastes. Accordingly, the following sentence will be modified as indicated:

> The on-site containment units **to be utilized during the removal action** currently

contain PCB-contaminated paper residual wastes produced during Allied Paper's operation of its papermaking facilities.

4) Page 4, first partial paragraph:

The word "downstream" will be substituted for "later," so that the final sentence will read:

"Eighty miles **downstream**, the Kalamazoo River empties into Lake Michigan."

5) Page 5, first partial paragraph:

MHI's consultant has indicated that the former Type III Landfill located on the Allied Paper Operable Unit of the Site contains, in addition to paper residual wastes, general refuse. Accordingly, the following sentence will be added as indicated:

These areas all . . . Area. **(Additionally, the former Type III Landfill contains a substantial amount of general refuse.)** Two clarifiers . . ..

6) Page 5, second and fourth full paragraphs:

Region 5 has learned that certain historical information contained in these paragraphs may be inaccurate. Accordingly the paragraphs will be modified as follows:

Allied Paper's operations at the Allied Paper Operable Unit of the Site consisted of two paper mills: the Monarch Mill and the Bryant Mill. Allied Paper operated the Monarch Mill starting in 1955 and installed a clarifier shortly thereafter. In 1954, Allied Paper's predecessor installed a clarifier at the Bryant Mill. Allied Paper became the owner of the Bryant Mill in 1956. Allied Paper also operated mills along Portage Creek both upstream and downstream of the Allied Paper Operable Unit.

For a period of . . ..

Prior to the installation of the clarifiers, wastewater from the mills' operations was discharged directly into Portage Creek. After installation of the clarifiers, the supernatant was discharged either to Portage Creek or to the City of Kalamazoo wastewater treatment facility, while the settled residuals were placed in dewatering lagoons (the HRDLs and FRDLs). **Dewatered residuals were removed from the lagoons and either used as fill on the property or placed in a landfill which Allied paper established in 1966 and used until 1988.**

7) Page 7, second full paragraph:

MHI's consultant has pointed out that, since the Site was not listed on the NPL until 1990, it is

somewhat illogical to call it the "Superfund Site" as of 1986. Accordingly, the first sentence of the paragraph will be revised as follows:

In 1986, MDNR contractors completed a study of remedial feasibility for **the area of PCB-contamination which, four years later, would approximately comprise the Superfund Site.**

8) Page 9, second full paragraph:

MDEQ has advised that the Michigan Department of Community Health is the state agency which issued the fish advisory for the Kalamazoo River. Accordingly, the following sentence will be revised as indicated:

The waters of Portage Creek . . . Michigan. **Since 1977, the Michigan Department of Community Health** has placed a fish advisory/ban on the Kalamazoo River, due to elevated levels of PCBs in fish.

9) Page 10, first full paragraph:

MHI's consultant has questioned U.S. EPA's statements regarding the effect of PCBs from the Site on bald eagle reproduction. U.S. EPA's information regarding the effect of PCB contamination at the Site upon bald eagles is based on letters and information received from the U.S. Department of Interior's Fish and Wildlife Service, which will be added to the Administrative Record for the removal action. By letter dated April 9, 1993 from Charles Wooley, Field Supervisor of the Fish and Wildlife Service, to David Ullrich of Region 5, the Fish and Wildlife Service identified the bald eagle as among the endangered, threatened or candidate species that may occur within the Site. Furthermore, by letter dated December 21, 1994, David A. Best, a Fish and Wildlife Service Biologist, informed the MDNR and U.S. EPA that a bald eagle egg collected from a nest in the Ottawa Marsh, located downstream from the on-Site mills, contained PCBs at 102 ppm. Mr. Best also recently confirmed to Terese Van Donsel of Region 5 that reproduction of bald eagles in the area affected by PCB-contamination at the Site continues to be inadequate.

Nevertheless, Region 5 agrees that it is appropriate to modify the Action Memorandum to accurately identify the source of the information regarding the effect of PCB contamination on bald eagles. Accordingly, the last sentence of the paragraph will be modified as indicated:

> **According to information provided to U.S. EPA by the United States Department of Interior's Fish and Wildlife Service, bald eagles living in the area potentially affected by PCB contamination at and from the Site have not been able to reproduce successfully for at least the past seven years. A bald eagle egg collected in 1994 contained PCBs at 102 ppm.**

10) Page 13, first partial paragraph:

MDEQ has advised that the fish advisory has been in effect since 1977. Accordingly, the first full sentence on page 13 will be revised as indicated:

> A fish advisory has been in effect for portions of Portage Creek and the Kalamazoo River since approximately 1977.

11) Page 13, third full paragraph:

MDEQ has requested that the Action Memorandum note that wildlife living downstream from the Bryant Mill Pond Area may be affected by the upstream contamination. Accordingly, the following sentence will be modified as indicated:

> As noted in the ecological risk assessment . . . wildlife living in the area **and/or downstream** is also at risk of direct contact and ingestion of PCBs.

12) Page 17, second full paragraph:

MDEQ noted that the sentence commencing "The proposed excavation and placement . . ." incorrectly suggests that placement of the contaminated waste will be within the Bryant Mill Pond Area. Accordingly, the sentence will be revised as indicated:

> The proposed excavation and placement of contaminated paper residuals, soils and sediments **from** the Bryant Mill Pond Area **to the Bryant HRDL** is expected to mitigate threats posed to public health and the environment.

The conditions at this site meet the NCP §300.415(b)(2) criteria for a removal action and the CERCLA § 104(c) criteria for obligations to exceed $2 million. OERR, OGC, and OECA have concurred on the attached Action Memorandum. Therefore, I recommend that you approve the Region 5 request for removal activities at the Site. Please indicate your decision by signing below.

Approved: Timothy Fields, Jr. Date: 6/5/98

Disapproved: _____ Date: _____

Attachment: Action Memorandum

100% Recycled 30% PCW

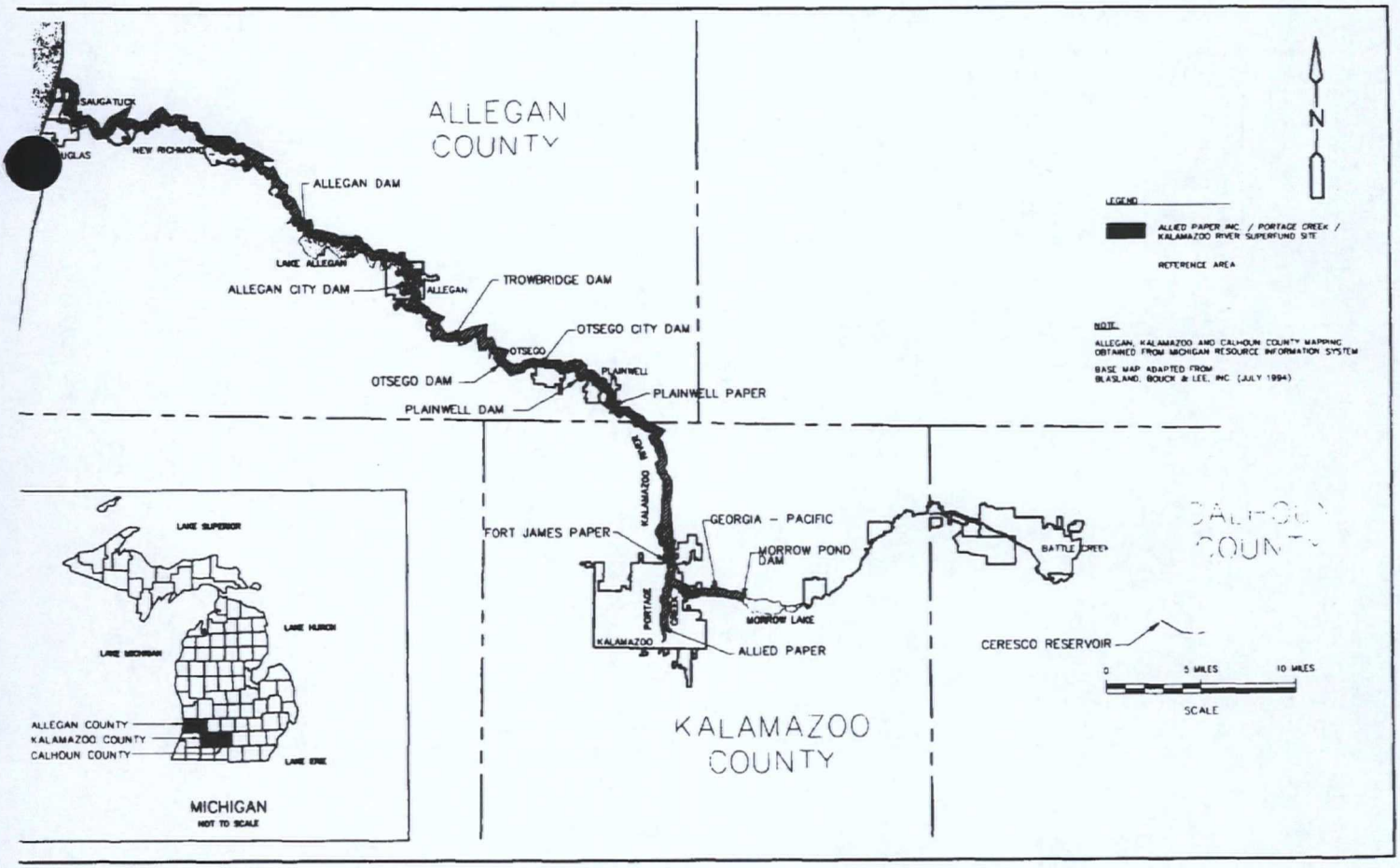
CDM Camp Dresser & McKee

167610 K3

Final
Human Health Risk Assessment
Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site

Michigan Department of Environmental Quality Environmental Response Division

August 18, 2000



Report

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NCRKZOO0116294

STATE OF MICHIGAN

JOHN ENGLER, Governor
DEPARTMENT OF ENVIRONMENTAL QUALITY
HOLLISTER BUILDING, PO BOX 30473, LANSING MI 48909-7973
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LANSING MI 48909-7926

September 15, 2000

Saugatuck-Douglas Library
Reference Desk
10 Mixer St.
Douglas, Michigan 49406

Reference Desk: Human Health Risk Assessment

Please find enclosed a copy of the August 18, 2000 Human Health Risk Assessment. This report presents the results and findings of the Human Health Risk Assessment performed by Camp Dresser and McKee (CDM).

Also enclosed is a fax transmittal sheet. I would appreciate it if you would take the time to fax this response to me as soon as you have logged in the above document and placed it with the rest of the file. This will help us to keep better track of the documents in the repositories.

Thank you in advance for your assistance in this matter. If you have any questions, please feel free to contact me.

Sincerely,

Brian von Gunten

Brian von Gunten
Project Manager
Superfund Section
Environmental Response Division
517-373-6808

cc: P8

fax sent 9/18/00

Fax Transmittal Form

To: Brian von Gunten
Michigan Department of Environmental Quality
Environmental Response Division

Fax Number: (517) 335-4887

From: Saugatuck-Douglas Library

We have received and logged in the following documents:

Human Health Risk Assessment

Sincerely,

Loren McCaleb

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

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Executive Summary

This Executive Summary presents an overview of the Human Health Risk Assessment (HHRA) of the Allied Paper, Inc./Portage Creek/Kalamazoo River (API/PC/KR) Superfund Site. This HHRA presents the approach and assumptions used to develop quantitative estimates of risk and hazard. Risks and hazards were estimated for five populations: (1) sport angler – central tendency assumptions (2) sport anglers – high end assumptions; (3) subsistence anglers; (4) residents (5) recreationalists. Exposures to polychlorinated biphenyls (PCBs) from the site can result primarily from ingestion of fish or by direct contact with, or inhalation of, dust and volatile emissions from floodplain soil near three of the former river dams. In addition, exposures by recreational users of the river to sediments and surface water were evaluated semi-quantatively. Potential exposure to waterfowl, turtles and air above the surface water were found to be inadequately characterized by available data.

A fish advisory is currently in place on parts of the Kalamazoo River and Portage Creek (MDCH, 2000a). For the general population, on the Kalamazoo River between Morrow Pond Dam and Allegan Dam and on Portage Creek below Monarch Mill Pond, the advisory recommends no consumption of carp, catfish, suckers, smallmouth bass and largemouth bass and no more than one meal per week of all other species. For the general population, below Allegan Dam the advisory recommends no consumption of carp, catfish and northern pike, no more than one meal per week of largemouth and smallmouth bass, and unlimited consumption of all other species.

For nursing mothers, pregnant women, women intending to have children and children under 15 years of age, no consumption of any species is recommended for fish caught above Allegan Dam. For fish caught below Allegan Dam, the advisory recommends for women and children no consumption of carp, catfish, northern pike smallmouth bass and largemouth bass and suggests eating no more than one meal per month for all other species. Table E-1 presents the 2000 Michigan fish advisories for the API/PC/KR site. 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 this advisory, 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; more than ten percent (10%) of anglers are eating more than one meal per week of 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.

TABLE E-1
MICHIGAN FISH ADVISORY FOR PCBs
API/PC/KR SITE

Water Body	Species	General Population									Women & Children								
		Length (inches)									Length (inches)								
		6-8	8-10	10-12	12-14	14-18	18-22	22-26	26-30	30+	6-8	8-10	10-12	12-14	14-18	18-22	22-26	26-30	30+
Kalamazoo River (From Battle Creek to Morrow Pond Dam)	Carp	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
Kalamazoo River (From Morrow Pond Dam to Allegan Dam) and Portage Creek (Below Monarch Mill Pond, Kalamazoo Co.)	Carp, Catfish, Suckers	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Largemouth and Smallmouth Bass					NC	NC	NC	NC						NC	NC	NC	NC	
	All other species	●	●	●	●	●	●	●	●	●	NC	NC	NC	NC	NC	NC	NC	NC	NC
Kalamazoo River (Below Allegan Dam)	Carp, Catfish	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC	NC
	Largemouth and Smallmouth Bass					●	●	●	●						NC	NC	NC	NC	
	Northern Pike							NC	NC	NC							NC	NC	NC
	All other species	UC	UC	UC	UC	UC	UC	UC	UC	UC	■	■	■	■	■	■	■	■	■

Notes:
NC = No Consumption.
UC = Unlimited Consumption.
● = One meal per week.
■ = One meal per month .

NCRKZOO0116303

An HHRA has five steps:

- Data Evaluation
- Toxicity Assessment
- Exposure Assessment
- Risk Characterization
- Uncertainty Analysis

In the Data Evaluation, available fish data collected in 1993 and 1997 were compiled and reviewed. Data were collected for several species from 11 Aquatic Biota Study Areas (ABSAs), including smallmouth bass, a representative sport fish, and carp, a representative bottom feeder. Data for these species were used in the HHRA.

Smallmouth bass samples were analyzed with the skin on and carp were analyzed with the skin removed, which is most representative of the edible portions of fish prepared and consumed by anglers (USEPA, 1995a). While individual aroclors were analyzed, the HHRA was based on total polychlorinated biphenyls (PCBs). All detected aroclors were summed and a total PCB concentration was used to assess exposure and risk. The United States Environmental Protection Agency (EPA) recommends using total PCB data, given that all of the detected PCB aroclors have been associated with toxic effects.

In the Toxicity Assessment, the potential health effects of PCBs are evaluated and toxicological benchmarks are identified which can be used to quantify cancer risks and noncancer hazard. The potential health effects of PCBs include cancer, reproductive effects and immunological effects (ATSDR, 1996). Cancer slope factors, which are an indicator of a chemical's cancer potency, are used to quantify cancer risks. Reference doses (RfDs), or allowable doses, are used to measure the potential toxicity or non-cancer health hazard associated with exposure to a chemical for effects other than cancer. RfDs have been published for reproductive and immunological endpoints (USEPA, 1999).

PCBs are considered probable human carcinogens on the basis of animal studies of rats, which have shown a statistically significant increase in liver cancer, and human studies of capacitor workers which have shown a statistically significant increase in liver, gastrointestinal, skin and gall bladder cancers. While the number of observed cancers vs. expected cancers were higher in several human studies, a dose-response relationship could not be established with the human studies. (*Integrated Risk Information System*, USEPA, March 1999). Clear dose-response relationships were established for several aroclors in animal studies conducted by Brunner (Brunner et al., 1996). These studies form the basis of *PCBs: Cancer Dose-Assessment and Application to Environmental Mixtures* (EPA, 1996), whereby a range of cancer slope factors are proposed based on the persistence and bioaccumulation potential of PCBs in environmental media.

The Exposure Assessment involves developing exposure scenarios whereby people are coming into contact with contaminated materials or biota. While exposure to other 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.

Two scenarios were evaluated for floodplain soil exposures, the nearby resident scenario and the recreationalist scenario. The exposure assumptions used to evaluate the resident scenario are summarized below:

Assumption	Resident	Reference
Soil Ingestion	114 mg-yr/kg-day (age adjusted)	MDNR, 1995
Dermal Contact Rate	353 mg-yr/kr-day (age adjusted)	MDEQ, 2000
Inhalation Rate	7.52 m^3-yr/kg-day (age adjusted)	MDNR, 1995
Age	1-31 years	U.S. EPA, 1997
Fraction from Contaminated Source	1.0	Site-Specific
Exposure Frequency	350 days/year (ingestion) 245 days/year (dermal)	MDNR, 1995
Exposure Duration	30 years + 9 (cancer) 30 years (noncancer) 2 years (reproductive)	U.S. EPA, 1997
Absorption Efficiency	0.14	U.S. EPA, 1998

The exposure assumptions used to evaluate the recreationalist scenario are summarized below:

Assumption	Resident	Reference
Soil Ingestion	2.8 mg-yr/kg-day 47 mg-yr/kg-day 34 mg-yr/kg-day	MDNR, 1995
Dermal Contact Rate	85 mg-yr/kg-day 61 mg-yr/kg-day	U.S. EPA, 1997b
Inhalation Rate	1.37 m^3-yr/kg-day 1.9 m^3-yr/kg-day	U.S. EPA, 1997b
Age	6 - 31 years	
Fraction from Contaminated Source	1.0	Site-Specific
Exposure Frequency	128 days	MDEQ, 2000
Exposure Duration	2 years (reproductive) 24 years (immunological) 24 years & 9 years (cancer)	U.S. EPA, 1997b U.S. EPA, 1997b U.S. EPA, 1996
Absorption Efficiency	0.14	U.S. EPA, 1998

Additional details on the derivation of these assumptions is presented in Section 3.5.2.

As identified by the Michigan Department of Natural Resources, major recreational uses of the Allegan State Game Area and other areas along the Kalamazoo river include:

1. Hunting and fishing
2. Canoeing
3. Picnicking
4. Mushroom picking, berry picking, and wild food gathering
5. Sightseeing
6. Wild animal observation/bird watching

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. The difference between the three fishing scenarios was reflected in different fish ingestion rates, exposure durations, species consumed, loss of PCBs during cooking and fractions of the total fish ingested that were from a contaminated source. These assumptions are summarized as follows:

Assumption	Central Tendency Sport Angler	High End Sport Angler	Subsistence Angler	Reference
Body Weight	70kg	70kg	70kg	EPA, 1997
Fish Ingestion Rate	0.015 kg/day (24 meals/year)	0.078 kg/day 125 meals/year	0.11 kg/day (179 meals/year)	West, 1993
Fraction from Contaminated Source	1.0	0.5	1.0	
Exposure Frequency	365 days/year	365 days/year	365 days/year	EPA, 1997
Exposure Duration Reproductive	30 years + 9 (cancer) 30 years (noncancer) 2 years (reproductive)	30 years + 9 (cancer)* 30 years (noncancer) 2 years (reproductive)	30 years + 9 (cancer)* 30 years (noncancer) 2 years (reproductive)	EPA, 1994
Species	Smallmouth bass (100%) & Smallmouth bass/Carp (75%) (25%)	Smallmouth bass (100%) & Smallmouth bass/Carp (75%) (25%)	Smallmouth bass (100%) & Smallmouth bass/Carp (75%) (25%)	Site Specific
Reduction Factor	0%	22%	22%	Zabik, 1995
Absorption Efficiency	100%	100%	100%	ATSDR, 1996

*9 years internal exposure added to external exposure (USEPA, 1996)

The two sport angler scenarios represent the central tendency and the high end portion of the risk distribution respectively, and the subsistence angler scenario represents an important subgroup of the fish eating population.

One other assumption for the central tendency angler was based on MDEQ Surface Water Quality Division guidance. The Division does not use a reduction factor to account for losses of PCBs during trimming or cooking of fish. For this reason, no reduction factor was used to characterize risks and hazards to the central tendency angler.

These assumptions were based on work previously conducted by USEPA Region V on Manistique Harbor, Michigan, Saginaw Bay, Michigan, and the Lower Fox River, Wisconsin Superfund sites. Fish ingestion rates for the sport angler are based on the *Great Lakes Water Quality Initiative Technical Support Document for Human Health Criteria and Values* (EPA, 1995). The fish ingestion rate of 15 grams per day, which is also used by the MDEQ Surface Water Quality Division to establish surface water quality standards, represents the mean value for sport anglers and the 90th percentile for the overall population in the Great Lakes. This value is consistent with data reported in the *Michigan Sport Angler Fish Consumption Studies* (West, 1989 and 1993) and the *Kalamazoo River Angler Survey* (MDHC, 1998) as a mean value for sport anglers. The HHRA quantified risks and hazard using these assumptions. For each scenario, and for each of 8 areas representing stretches of the River between dams, the risks associated with both average and maximum PCB concentrations detected in fish were estimated. For floodplain soil exposures, average and maximum concentrations of samples collected from behind the former impoundments of three dams (Trowbridge, Plainwell and Otsego) were used to calculate risk and hazard estimates for nearby residents. A 30-year residence period was assumed.

The Risk Characterization combines information from the data evaluation, toxicity assessment and exposure assessment to develop estimates of cancer risk and noncancer hazard. Cancer risks are expressed as a probability of an individual developing cancer from site-related exposures, or in this case, from ingesting fish or being exposed to floodplain soil. Noncancer risk is expressed as a hazard index, which is a ratio of the estimated dose of PCBs received from an exposure to the RfD, which is the dose below which adverse effects are not expected. Two noncancer endpoints were evaluated - reproductive health effects and immunological health effects.

USEPA has established an acceptable target range for carcinogenic risk of 1 in one million to 1 in 10,000, while for all Superfund sites, the acceptable risk level is established by the EPA Regional Administrator on a case by case basis. The Michigan Department of Environmental Quality (MDEQ) considers risk below 1 in 100,000 to be acceptable. Both USEPA and MDEQ consider hazard quotients below 1.0 to be acceptable.

Tables E-2 through E-7 summarize the estimated risks and hazards for sport and subsistence anglers, residents, and recreationalists. Tables E-2 and E-3 present risks and hazards for anglers based on average and maximum fish concentrations, respectively. Tables E-4 and E-5 present risks and hazards for residents based on average and maximum concentrations, respectively. Table E-6 and E-7 present risks and hazards for recreationalists based on average and maximum concentrations, respectively.

Using both average and maximum fish concentrations, cancer risks for subsistence anglers in all study areas were outside (greater than) the USEPA target cancer risk range of 1 in 1 million to 1 in 10,000 and the MDEQ risk threshold of 1 in 100,000. Hazard quotients for subsistence anglers in all study areas were greater than the acceptable USEPA and MDEQ hazard quotient threshold of 1.0.

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 75 percent smallmouth bass and 25 percent carp were outside the USEPA target cancer risk range and exceeded the MDEQ cancer threshold for all ABSAs.

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 75 percent smallmouth bass and 25 percent carp exceeded the USEPA and MDEQ hazard quotient threshold of 1.0 for both the immunological and reproductive endpoints.

Using average floodplain soil concentrations, cancer risks to residents in all three floodplain soil areas were within the USEPA 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 USEPA target cancer risk range and exceeded the MDEQ threshold.

Using both average and maximum floodplain soil concentrations, hazard quotients based on immunological endpoints for residents in all three floodplain soil areas exceeded the USEPA and MDEQ hazard quotient threshold of 1.0. Hazard quotients for the reproductive endpoint exceeded 1.0 using maximum concentrations for the Trowbridge and Plainwell areas. Hazard quotients using average concentrations did not exceed 1.0.

Using average floodplain soil concentrations, cancer risks to recreationalists in all three floodplain areas were within the USEPA target risk range and below the MDEQ cancer risk threshold. Using maximum floodplain soil concentrations, cancer risks were within the USEPA 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 5 in 100,000.

TABLE E-2
SUMMARY OF RISKS AND HAZARDS FOR SUBSISTENCE AND SPORT ANGLERS
AVERAGE CONCENTRATIONS
API/KC/KR SITE

Source Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk from Ingestion of Fish					
				Subsistence		Sport – Central Tendency		Sport – High End	
				100% SMB	75% SMB / 25% CARP	100% SMB	75% SMB / 25% CARP	100% SMB	75% SMB / 25% CARP
Fish	Fish	ABSA 3,4,5 (Combined)	Total PCBs	1.3E-03	2.9E-03	2.3E-04	5.1E-04	4.6E-04	1.0E-03
		ABSA 6	Total PCBs	1.3E-03	2.2E-03	2.4E-04	3.9E-04	4.8E-04	7.9E-04
		ABSA 7	Total PCBs	2.0E-03	2.3E-03	3.5E-04	4.1E-04	7.1E-04	8.3E-04
		ABSA 8	Total PCBs	2.7E-03	3.5E-03	4.7E-04	6.2E-04	9.4E-04	1.3E-03
		ABSA 9	Total PCBs	2.6E-03	2.4E-03	4.5E-04	4.1E-04	9.2E-04	8.4E-04
		ABSA 10	Total PCBs	2.6E-03	4.5E-03	4.5E-04	7.9E-04	9.2E-04	1.6E-03
		ABSA 11	Total PCBs	1.0E-03	2.4E-03	1.8E-04	4.2E-04	3.7E-04	8.6E-04

Notes: Target cancer risk range: 1E-06 to 1E-04 (USEPA); 1E-05 (MDEQ)

TABLE E-2(Continued)
SUMMARY OF RISKS AND HAZARDS FOR SUBSISTENCE AND SPORT ANGLERS
AVERAGE CONCENTRATIONS
API/KC/KR SITE

Source Medium	Exposure Medium	Exposure Point	Chemical	Non-Carcinogenic Hazard Quotient from Ingestion of Fish					
				Subsistence		Sport-Central Tendency		Sport-High End	
				100% SMB	75% SMB / 25% CARP	100% SMB	75% SMB / 25% CARP	100% SMB	75% SMB / 25% CARP
Fish	Fish	ABSA 3,4,5 (Combined)	Total PCBs	17 (R) 58 (I)	37 (R) 130 (I)	2.9 (R) 10 (I)	6.5 (R) 23 (I)	5.9 (R) 21 (I)	13 (R) 46 (I)
		ABSA 6		17 (R) 60 (I)	29 (R) 100 (I)	3.0 (R) 11 (I)	4.9 (R) 17 (I)	6.1 (R) 21 (I)	10 (R) 35 (I)
		ABSA 7		26 (R) 90 (I)	30 (R) 100 (I)	4.5 (R) 16 (I)	5.2 (R) 18 (I)	9.1 (R) 32 (I)	11 (R) 37 (I)
		ABSA 8		34 (R) 120 (I)	46 (R) 160 (I)	6.0 (R) 21 (R)	7.9 (R) 28 (R)	16 (R) 42 (I)	16 (R) 56 (I)
		ABSA 9		33 (R) 120(I)	30 (R) 110 (I)	5.8 (R) 20 (I)	5.3 (R) 19 (I)	12 (R) 41 (I)	11 (R) 38 (I)
		ABSA 10		33 (R) 120 (I)	58 (R) 200 (I)	5.8 (R) 20 (I)	1.0 (R) 36 (I)	12 (R) 41 (I)	21 (R) 72 (I)
		ABSA 11		13 (R) 46 (I)	31 (R) 110 (I)	2.3 (R) 8.1 (I)	5.4 (R) 19 (I)	4.7 (R) 16 (I)	11 (R) 39 (I)

Notes: Target hazard index: 1.0 (USEPA and MDEQ)
(R): Reproductive endpoint
(I): Immunological endpoint

TABLE E-3
SUMMARY OF RISKS AND HAZARDS FOR SUBSISTENCE AND SPORT ANGLERS
MAXIMUM CONCENTRATIONS
API/KC/KR SITE

Source Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk from Ingestion of Fish					
				Subsistence		Sport – Central Tendency		Sport – High End	
				100% SMB	75% SMB / 25% CAR	100% SMB	75% SMB / 25% CAR	100% SMB	75% SMB / 25% CAR
Fish	Fish	ABSA 3,4,5 (Combined)	Total PCBs	5.3E-03	9.9E-03	9.3E-04	1.7E-04	1.9E-03	3.5E-03
		ABSA 6	Total PCBs	5.0E-03	6.6E-03	8.7E-04	1.1E-03	1.8E-03	2.3E-03
		ABSA 7	Total PCBs	5.1E-03	6.0E-03	8.9E-04	1.1E-03	1.8E-03	2.1E-03
		ABSA 8	Total PCBs	5.7E-03	7.6E-03	1.0E-03	1.3E-03	2.0E-03	2.7E-03
		ABSA 9	Total PCBs	7.9E-03	8.2E-03	1.4E-03	1.4E-03	2.8E-03	2.9E-03
		ABSA 10	Total PCBs	3.3E-03	8.3E-03	5.8E-04	1/4E-03	1.2E-03	2.9E-03
		ABSA 11	Total PCBs	5.9E-03	1.0E-02	1.0E-03	1.8E-03	2.1E-03	3.7E-03

Notes: Target cancer risk range: 1E-06 to 1E-04 (USEPA); 1E-05 (MDEQ)

TABLE E-3 (Continued)
SUMMARY OF RISKS AND HAZARDS FOR SUBSISTENCE AND SPORT ANGLERS
MAXIMUM CONCENTRATIONS
API/KC/KR SITE

Source Medium	Exposure Medium	Exposure Point	Chemical	Non-Carcinogenic Hazard Quotient from Ingestion of Fish					
				Subsistence		Sport – Central Tendency		Sport – High End	
				100% SMB	75% SMB / 25% CARP	100% SMB	75% SMB / 25% CAR	100% SMB	75% SMB / 25% CARP
Fish	Fish	ABSA 3,4,5 (Combined)	Total PCBs	68 (R) 240 (I)	160 (R) 440 (I)	9.9 (R) 35 (I)	22 (R) 78 (I)	20 (R) 70 (I)	45 (R) 160 (I)
		ABSA 6	Total PCBs	64 (R) 220 (I)	84 (R) 300 (I)	11 (R) 38 (I)	14 (R) 52 (I)	23 (R) 80 (I)	29 (R) 100 (I)
		ABSA 7	Total PCBs	65 (R) 230 (I)	77 (R) 270 (I)	11 (R) 40 (I)	14 (R) 47 (I)	23 (R) 81 (I)	27 (R) 94 (I)
		ABSA 8	Total PCBs	73 (R) 260 (I)	97 (R) 340 (I)	13 (R) 45 (I)	17 (R) 59 (I)	26 (R) 91 (I)	34 (R) 120 (I)
		ABSA 9	Total PCBs	100(R) 360 (I)	100 (R) 370 (I)	18 (R) 62 (I)	18 (R) 64 (I)	36 (R) 130 (I)	37 (R) 130 (I)
		ABSA 10	Total PCBs	42 (R) 150 (I)	110 (R) 370 (I)	7.4 (R) 26 (I)	19 (R) 65 (I)	15 (R) 53 (I)	37 (R) 130 (I)
		ABSA 11	Total PCBs	75 (R) 260 (I)	130 (R) 460 (I)	13 (R) 46 (I)	23 (R) 81 (I)	27 (R) 93 (I)	47 (R) 160 (I)

Notes: Acceptable hazard index: 1.0 (USEPA and MDEQ)
(R): Reproductive endpoint
(I): Immunological endpoint

TABLE E-5
SUMMARY OF RISKS AND HAZARDS
FOR RESIDENTS LIVING NEAR EXPOSED FLOODPLAIN SOILS
MAXIMUM CONCENTRATIONS
API/KC/KR SITE

Source Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk Exposure Routes Total [1]	Chemical	Non-Carcinogenic Hazard Quotient Exposure Routes Total
Floodplain Soils	Floodplain Soils	Trowbridge	Total PCBs	3.6E-04	Total PCBs	1.4 (R) 19 (I)
Floodplain Soils	Floodplain Soils	Otsego	Total PCBs	1.6E-04	Total PCBs	0.61 (R) 8.5 (I)
Floodplain Soils	Floodplain Soils	Plainwell	Total PCBs	3.8E-04	Total PCBs	1.5 (R) 20 (I)

Notes: Target cancer risk range: 1E-06 to 1E-04 (USEPA); 1E-05 (MDEQ)
Acceptable hazard index: 1.0 (USEPA and MDEQ)
(R): Reproductive endpoint
(I): Immunological endpoint

TABLE E-4
SUMMARY OF RISKS AND HAZARDS FOR RESIDENTS
LIVING NEAR EXPOSED FLOODPLAIN SOILS
AVERAGE CONCENTRATIONS
API/K/KR SITE

Source Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk Exposure Routes Total	Chemical	Non-Carcinogenic Hazard Quotient Exposure Routes Total
Floodplain Soils	Floodplain Soils	Trowbridge	Total PCBs	5.4E-05	Total PCBs	0.21 (R) 2.9 (I)
Floodplain Soils	Floodplain Soils	Otsego	Total PCBs	3.7E-05	Total PCBs	0.14 (R) 2.0 (I)
Floodplain Soils	Floodplain Soils	Plainwell	Total PCBs	4.8E-05	Total PCBs	0.19 (R) 2.6 (I)

Notes: Target cancer risk range: 1E-06 to 1E-04 (USEPA); 1E-05 (MDEQ)
Acceptable hazard index: 1.0 (USEPA and MDEQ)
(R): Reproductive endpoint
(I): Immunological endpoint

TABLE E-6
SUMMARY OF RISKS AND HAZARDS FOR RECREATIONAL VISITORS TO EXPOSED
FLOODPLAIN SOILS AVERAGE CONCENTRATIONS
API/K/KR SITE

Source Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk Exposure Routes Total [1]	Chemical	Non-Carcinogenic Hazard Quotient Exposure Routes Total
Floodplain Soils	Floodplain Soils	Trowbridge	Total PCBs	7.3E-06	Total PCBs	0.023 (R) 0.31 (I)
Floodplain Soils	Floodplain Soils	Otsego	Total PCBs	5.0E-06	Total PCBs	0.016 (R) 0.21 (I)
Floodplain Soils	Floodplain Soils	Plainwell	Total PCBs	6.4E-06	Total PCBs	0.021 (R) 0.27 (I)

Notes: Target cancer risk range: 1E-06 to 1E-04 (USEPA); 1E-05 MDEQ)
Acceptable hazard index: 1.0 (USEPA and MDEQ)

TABLE E-7
SUMMARY OF RISKS AND HAZARDS FOR RECREATIONAL VISITORS TO EXPOSED FLOODPLAIN SOILS MAXIMUM CONCENTRATIONS
API/KC/KR SITE

Source Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk Exposure Routes Total [1]	Chemical	Non-Carcinogenic Hazard Quotient Exposure Routes Total
Floodplain Soils	Floodplain Soils	Trowbridge	Total PCBs	4.8E-05	Total PCBs	0.15 (R) 2.0 (I)
Floodplain Soils	Floodplain Soils	Otsego	Total PCBs	2.1E-05	Total PCBs	0.068 (R) 0.9 (I)
Floodplain Soils	Floodplain Soils	Plainwell	Total PCBs	5.0E-05	Total PCBs	0.16 (R) 2.1 (I)

Notes: Target cancer risk range: 1E-06 to 1E-04 (USEPA); 1E-05 MDEQ)
Acceptable hazard index: 1.0 (USEPA and MDEQ)

Using average floodplain soil concentrations, hazard quotients based on both the immunological and reproductive endpoints were below the USEPA and MDEQ threshold of 1.0. Using maximum concentrations, hazard quotients based on the immunological endpoint exceeded the USEPA and MDEQ threshold for the Plainwell (2.1) and Trowbridge (2.0) areas; the hazard quotient for the Otsego area was 0.9. Using maximum concentrations, hazard quotients based on the reproductive endpoint were all below the hazard quotient threshold.

Risk-based fish concentrations (RBC_{fish}) and sediment concentrations (RBC_{sed}) were developed to be protective of sport and subsistence anglers. Risk-based floodplain soil concentrations (RBC_{soil}) were developed to be protective of residents living near exposed floodplain soil. RBCs were developed for both cancer and noncancer endpoints. Risk-based concentrations have been developed for PCBs using an allowable cancer risk of 1 in 100,000 and a noncancer hazard index of 1.0. **Table E-8** presents the risk-based and hazard-based fish concentrations (RBC_{fish}).

Concentrations are protective at a cancer risk level of 1 in 100,000 and a noncancer hazard index of 1.0. For central tendency sport anglers who consume up to 24 meals per year of fish, a fish concentration of 0.042 mg/kg is protective of cancer endpoints, a concentration of 0.075 mg/kg is protective of the noncancer immunological endpoint and a concentration of 0.26 mg/kg is protective of the noncancer reproductive endpoint. For high end sport anglers who consume up to 125 meals/year of fish, a fish concentration of 0.021 is protective of cancer endpoints, a concentration of 0.048 is protective of the noncancer endpoint, and a concentration of 0.16 mg/kg is protective of the noncancer reproductive endpoint. For subsistence anglers who consume up to 179 meals per year, a fish concentration of 0.008 mg/kg is protective of cancer endpoints, 0.016 mg/kg is protective of the noncancer immunological endpoint and 0.056 mg/kg is protective of the noncancer reproductive endpoint.

The Michigan Department of Community Health (MDCH) has established fish advisories for the general population, women and children. According to the MDCH criteria for placing fish on the Michigan Sport Fish Consumption Advisory for the general population, when between 11 and 49 percent of fish samples exceed 2 mg/kg of PCBs, a one meal per week advisory is issued. When more than 50 percent of fish samples exceed 2 mg/kg, a no consumption advisory is issued. For women of child bearing age and children under 15 years of age, at concentrations of greater than 0.05 mg/kg up to 0.2 mg/kg of PCBs in fish , a one meal per week advisory is issued. At concentrations greater than 0.2 mg/kg up to 1 mg/kg, a one meal per month advisory is issued.

TABLE E-8
RISK-BASED FISH FILLET CONCENTRATIONS (RBC_{fish}) (1)
API/PC/KR SITE

Receptor	RBC_{fish} Protective of 1E-05 Cancer Risk for PCBs (mg/kg)	RBC_{fish} Protective of 1.0 Hazard Index for PCBs (mg/kg)
Sport Angler – Central Tendency Assumes 24 meals/year 0.015 kg/day	0.042	0.075 (I) 0.26 (R)
Sport Angler – High End Assumes 125 meals/year 0.078 kg/day	0.021	0.048 (I) 0.16 (R)
Subsistence Angler Assumes 179 meals/year 0.11 kg/day	0.008	0.016 (I) 0.056 (R)

(1) Concentrations protective of both carp and smallmouth bass.
(I): Immunological Endpoint
(R): Reproductive Endpoint

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, who have been reported to consume between 3-4 meals per week, the RBC_{fish} developed in this HHRA indicate that concentrations in the range of 0.08 (cancer) and 0.016 (noncancer) are needed to be protective of health. The differences between the derivations of the two noncancer values are listed in the following table:

	MDCH	HHRA
Meals/year	225	179
Average daily fish consumption (kg)	0.14	0.11
Reduction by cleaning/cooking (%)	50	22
Weight of subject (kg)	70	70
Target dose, HPV or RfD (µg/kg/day)	0.05	0.02
PCB level in fish (mg/kg)	0.05	0.016

Most of the difference between the two results can be attributed to the difference between the health protection value (HPV) used by the MDCH (0.05 µg/kg/day) and the U.S. EPA RfD used in the HHRA (0.02 µg/kg/day). These values were derived from the same data by different methodologies. The Great Lakes Fish Advisory Task Force used a "weight of evidence" approach to derive the HPV used by the MDCH from data on a wide range of health effect endpoints. The U.S. EPA derives RfDs from data on specific endpoints with uncertainty and modifying factors added.

The MDCH Division of Environmental Epidemiology has reviewed this document and considers it to be adequately consistent with the MDCH protocol for issuing fish consumption advisories. Although there are differences between the cleanup levels and the MDCH first Level of Concern as cited above, MDCH considers the parameters and assumptions used in the two derivations are reasonable, the resulting levels to be reasonably close, and the cleanup levels to be more protective than the MDCH Level of Concern. MDCH acknowledges the U.S. EPA and MDEQ's authority to establish the cleanup levels to be used at any site.

Table E-9 presents the risk-based and hazard-based sediment concentrations (RBC_{soil}). The RBC_{fish} were used to develop RBC_{sed}. RBC_{sed} represent the sediment concentrations protective of fish that are consumed at the ingestion rates specified for sport and subsistence anglers. The RBC_{sed} were developed using the biota-to-sediment accumulation factor (BSAF) method presented in Region V EPA guidance (Pelka, 1998). RBC_{sed} range from 0.52 mg/kg protective of sport anglers who consume 100 percent game fish such as bass to 0.075 mg/kg protective of subsistence anglers who consume 100 percent bottom feeding fish such as carp.

TABLE E-9
RISK-BASED SEDIMENT CONCENTRATION (RBC_{sed}) (1)
(mg/kg sediment)
API/PC/KR SITE

Scenario	RBC_{sed} Protective of Fish Ingestion at 1E-05 Cancer Risk For PCBs (mg/kg)		RBC_{sed} Protective of Fish Ingestion at 1.0 Hazard For PCBs Quotient (mg/kg)	
	Bass (2)	Bass/Carp(3)	Bass (2)	Bass/Carp(3)
Sport Angler - Central Tendency	0.52	0.42	0.93 (I) 3.2 (R)	0.75 (I) 2.6 (R)
Sport Angler - High End	0.26	0.21	0.6 (I) 2.0 (R)	0.48 (I) 1.6 (R)
Subsistence Angler	0.093	0.075	0.20 (I) 0.70 (R)	0.16 (I) 0.57 (R)

(1) Incorporates fillet to whole body conversion factor of 0.25 for bass and 0.4 for carp.
(2) Assumes 3 percent lipid.
(3) Assumes 6 percent lipid.

Table E-10 presents the risk-based floodplain soil concentration (RBC_{soil}) protective of residents. For the cancer endpoint the RBC_{soil} is 2.6 mg/kg. For noncancer endpoints, the RBC_{soil} is 8.5 mg/kg for the reproductive endpoint and 3 mg/kg for the immunological endpoint.

Table E-11 presents the risk-based floodplain soil concentration (RBC_{soil}) protective of recreationalists. For the cancer endpoint, the RBC_{soil} is 17 mg/kg. For noncancer endpoints, the RBC_{soil} is 35 mg/kg for the reproductive endpoint and 32 mg/kg for the immunological endpoint.

As with any health risk assessment, certain assumptions were made which introduce uncertainty into the results and conclusions. Principal sources of uncertainty include the representative exposure concentrations in fish, the toxicity and carcinogenicity of PCBs in environmental mixtures versus laboratory studies, and the degree of exposure including duration of exposure and fish ingestion rates. Assumptions are made using best professional judgement and the scientific literature on risk assessment.

TABLE E-10
RISK-BASED FLOODPLAIN SOIL CONCENTRATIONS (RBC_{SOIL})
PROTECTIVE OF RESIDENTS
API/PC/KR SITE

Receptor	RBC_{soil} Protective of 1E-05 Cancer Risk (mg/kg)	RBC_{soil} Protective of 1.0 Hazard Quotient (mg/kg)
Resident	2.6	8.5 (R) 5.0 (I)

Notes (R) = Reproductive endpoint
(I) = Immunological endpoint

TABLE E-11
RISK-BASED FLOODPLAIN SOIL CONCENTRATIONS (RBC_{SOIL})
PROTECTIVE OF RECREATIONAL VISITORS
API/PC/KR SITE

Receptor	RBC_{soil} Protective of 1E-05 Cancer Risk (mg/kg)	RBC_{soil} Protective of 1.0 Hazard Quotient (mg/kg)
Recreationalist	17	35 (R) 32 (I)

Notes: (R) = Reproductive endpoint
(I) = Immunological endpoint

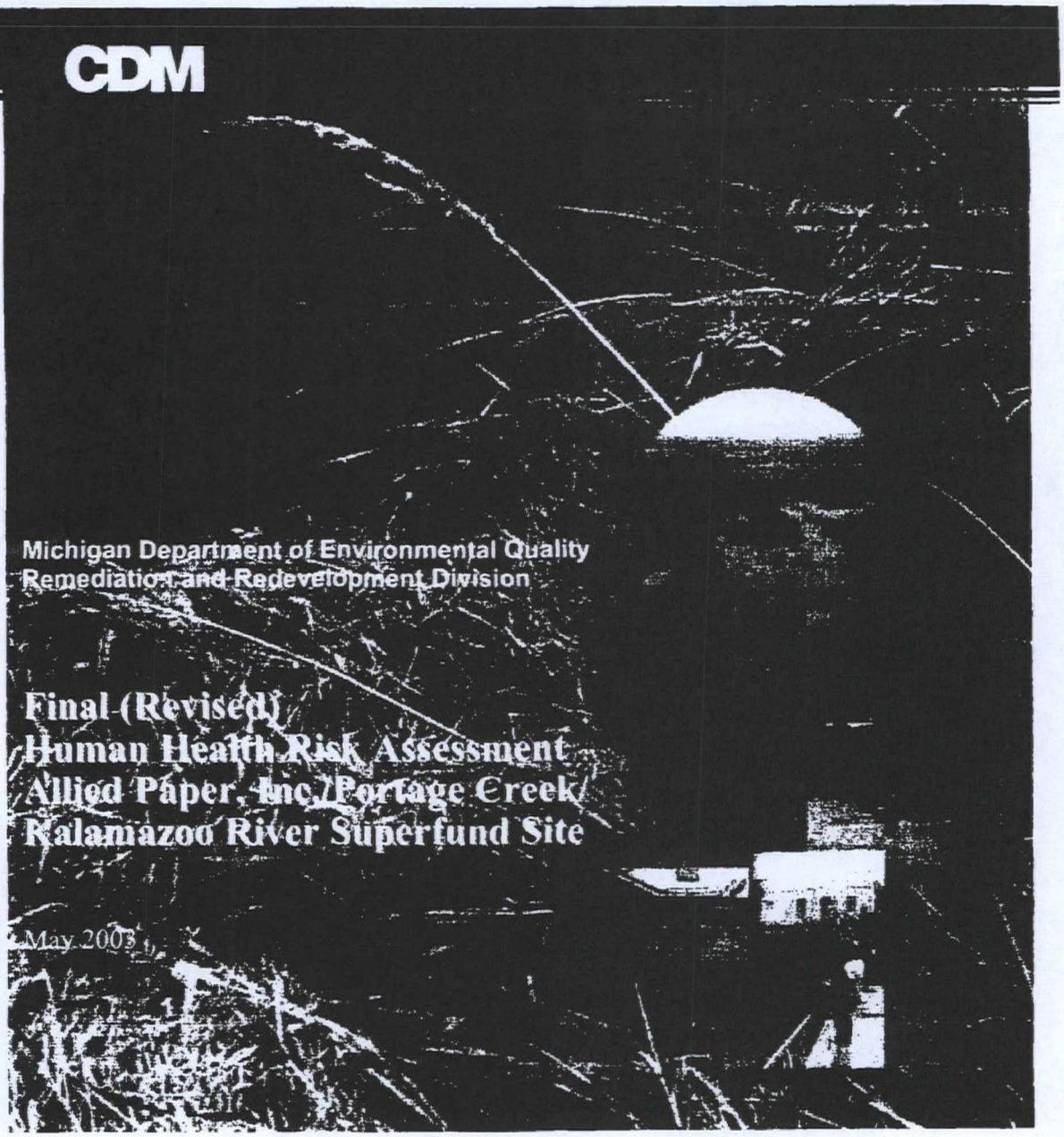
100% Recycled 30% PCW

5/03

Human Health Risk Assessment

EPA Region 5 Records Ctr.
249486

CDM



Michigan Department of Environmental Quality
Remediation and Redevelopment Division

Final (Revised) Human Health Risk Assessment Allied Paper, Inc./Portage Creek/ Kalamazoo River Superfund Site

May 2003

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NCRKZOO0168499

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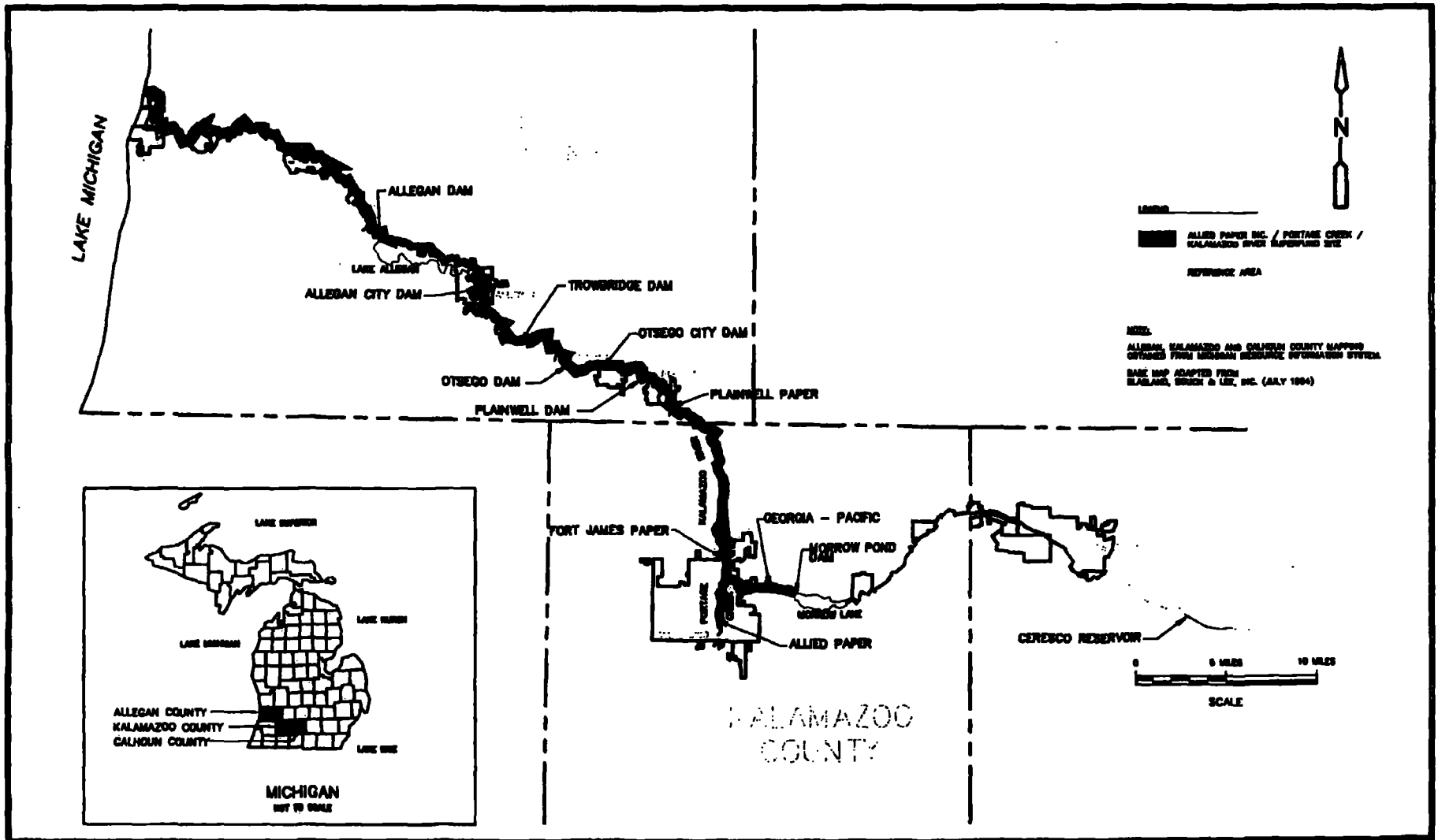
Section 1
Introduction

This document presents the human health risk assessment (HHRA) for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (API/PC/KR) in Southwestern Michigan. Figure 1-1 presents the extent of the site study area. This assessment is based on concentrations of polychlorinated biphenyls (PCBs) detected in media at the site, exposure assumptions for people living on and near the site, and toxicity information for PCBs, which together are used to characterize risks to human receptors. Risks are estimated based on existing (baseline) conditions, that is, in the absence of any remedial action or institutional controls. This information is intended for use by risk managers in making risk management decisions to protect human receptors.

1.1 Report Objectives

The objective of the HHRA is 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 eliminate 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
- Develops risk-based sediment and floodplain soil concentrations protective of human health



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

KALAMAZOO RIVER HUMAN HEALTH RISK ASSESSMENT
STUDY AREA

CDM
environmental engineers, scientists, planners, & mgmt consultants
Atlanta

1-1

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Exposures to the following media are evaluated: (1) exposed sediments/floodplain soil in former impoundment areas; (2) near and in-stream sediment; (3) surface water; (4) biota, including fish and waterfowl; and (5) air. This HHRA estimates cancer and noncancer risks for those exposure pathways considered potentially significant and for which sufficient data were available to support such calculations. In an effort to focus resources on those pathways with the greatest hazard potential, potentially significant pathways were determined by means of a comparison of API/PC/KR site data with similar data collected from the Lower Fox River and Lower Green Bay Estuary in Wisconsin. A full quantitative HHRA was conducted for these water bodies under the direction of the Wisconsin Department of Natural Resources (WDNR).

Assuming that similar exposure assumptions are appropriate for both the Michigan and Wisconsin sites, pathways found to be significant in the Lower Fox/Green Bay site were evaluated in the API/PC/KR assessment. Exceptions were made when detected concentrations were substantially lower at the API/PC/KR site.

1.2 Scope

This HHRA evaluates potential current and foreseeable future risks to people who may recreate on or live near the Kalamazoo River and its floodplain. The range of possible exposures to river water, sediment, biota, and floodplain soil were examined. For some types of exposure, a quantitative assessment of cancer risk and noncancer hazard was conducted. For other types of exposure, only a qualitative evaluation was conducted because previous investigations for a similar site found such exposures to not be associated with a significant risk, given similar or higher media concentrations.

PCB contamination is the primary focus of this HHRA and the only chemical of concern evaluated for the site. This HHRA focuses on the following two populations:

- People who may recreate on or near the Kalamazoo River and the floodplain
- People who may live near the Kalamazoo River and the floodplain

A separate HHRA has been conducted for the King Highway Landfill Operable Unit, a Georgia Pacific property along the Kalamazoo River (Blasland, Bouck & Lee [BB&L] 1996, 1997), and for the Willow Boulevard/A-Site (Camp Dresser & McKee Inc. [CDM] 2000).

1.3 Report Organization

This HHRA is being conducted under contract to the Michigan Department of Environment Quality (MDEQ) and follows guidance and directives issued by both the MDEQ and the U.S. Environmental Protection Agency (EPA).

The organization of this report follows the general format outlined in Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part A). The remainder of this report is organized as follows:

- Section 2 – Data Evaluation
- Section 3 – Exposure Assessment
- Section 4 – Toxicity Assessment
- Section 5 – Risk Characterization
- Section 6 – Determination of Risk – Based Sediment and Floodplain Soil Concentrations
- Section 7 – Uncertainty Assessment
- Section 8 – References

Section 2
Data Evaluation

This HHRA evaluates potential current and foreseeable future risks to people who may recreate on or live near the Kalamazoo River and its floodplain. The range of possible exposures to river water, sediment, biota, and floodplain soil were examined. For some types of exposure, a quantitative assessment of cancer risk and noncancer hazard was conducted. For other types of exposure, only a qualitative evaluation was conducted because previous investigations for a similar site found these exposures to not be associated with a significant risk, given similar or higher media concentrations.

This section evaluates available data collected on and near the API/PC/KR site and determines whether data are adequate for conducting a quantitative or qualitative risk assessment.

2.1 Data Evaluation

Samples have been collected from fish, turtle, sediment, and surface water from the Kalamazoo River since 1971. The majority of the data used in this HHRA were collected in 1993 and 1997 and were reported in various technical memoranda prepared by BB&L, including Draft Technical Memorandum 12 – Former Impoundment Sediment and Geochronological Dating Investigation; Draft Technical Memorandum 14 (and addenda) – Biota Investigation; and Draft Technical Memorandum 5 – Willow Boulevard/A-Site Operable Unit: Results of Air Investigation.

Exposures to fish, turtle, floodplain soil, sediment, surface water, air, and waterfowl were considered in this risk assessment. Based on a review of these exposures, one of the following determinations was made for each exposure scenario/pathway under consideration:

- Quantitative evaluation of the associated exposure is needed
- Qualitative evaluation of the associated exposures is sufficient
- Additional data are needed to adequately evaluate the associated exposure

2.1.1 Fish Data

Fish data were collected in 1993 and 1997 as part of the Biota Investigation (BB&L 1994e, 1998). Several species of fish were collected including smallmouth bass, golden redhorse, carp, and spotted and white suckers. These data have been summarized and discussed in *Ecological Risk Assessment for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site* (CDM June 1999).

Two species, smallmouth bass and carp, were selected to represent a popular targeted sport fish and a bottom feeding fish in the human health assessment. The 1993 fish tissue data included skin-off fillet data for carp and skin-on fillet data for smallmouth bass. These data were used for the risk assessment calculations. *Guidance for Assessing*

Chemical Contaminant Data for Use in Fish Advisories (EPA 1995) recommends that samples be prepared in a manner that best represents the edible portions of fish prepared and consumed by anglers. Concentrations of PCBs detected in fish fillets are presented in Table 2-1 for each of the seven areas evaluated in this risk assessment. To aid in the evaluation of aquatic habitats and chemical exposure, the API/PC/KR site was divided into 12 Aquatic Biota Study Areas (ABSAs). Nine of these ABSAs were evaluated as exposure areas in the HHRA. A list of these ABSAs is presented on Table 2-2. ABSAs 1 and 2 are located upstream of known sources associated with the API/PC/KR site and serve as reference areas for PCB contamination in fish tissues.

Table 2-1 Smallmouth Bass and Carp Data, API/PC/KR Site

Area/Species	Total Aroclor			
	Frequency of Detection	Range of Detection (mg/kg)	Average Conc. (mg/kg)	Maximum Conc. (mg/kg)
ABSA 3, 4, 5 Combined				
Small Mouth Bass	44/44	0.09 - 3.9	0.95	3.9
Carp	44/44	1.1 - 17	5.7	17
ABSA 6				
Small Mouth Bass	11/11	0.27 - 3.7	0.99	3.7
Carp	11/11	1.1 - 8.0	3.4	8.0
ABSA 7				
Small Mouth Bass	11/11	0.39 - 3.7	1.5	3.7
Carp	11/11	0.71 - 6.4	2.7	6.4
ABSA 8				
Small Mouth Bass	11/11	0.74 - 4.2	1.9	4.2
Carp	11/11	1.3 - 9.6	4.6	9.6
ABSA 9				
Small Mouth Bass	11/11	0.23 - 5.8	3.3	5.8
Carp	21/21	0.099 - 6.5	1.8	6.5
ABSA 10				
Small Mouth Bass	11/11	1.1 - 2.4	1.9	2.4
Carp	11/11	1.9 - 17	7.6	9.1
ABSA 11				
Small Mouth Bass	21/22	0.13 - 4.3	0.54	8.3
Carp	22/22	0.36 - 17	4.9	17

ABSA: Aquatic Biota Study Area. See Table 2-2 for description of ABSAs.

Table 2-2 API/PC/KR Biological Study Areas

ABSA 3	Kalamazoo River from Morrow Dam to Mosel Ave., Kalamazoo Aquatic biota were collected just downstream of Morrow Dam.
ABSA 4	Kalamazoo River at Mosel Ave. to Hwy. 131 bridge. Aquatic biota were collected from the Kalamazoo River near Mosel Avenue.
ABSA 5	Kalamazoo River near Hwy 131 bridge to Plainwell Dam. Aquatic biota were collected from the Kalamazoo River upstream of Plainwell Dam. Includes TBSAs 8, 9, and 10.
ABSA 6	Kalamazoo River from Plainwell Dam to Otsego City Dam. Aquatic biota were collected from the Kalamazoo River upstream of Otsego City Dam. Includes TBSA 10.
ABSA 7	Kalamazoo River from Otsego City Dam to Otsego Dam. Aquatic biota were collected just upstream of Otsego Dam.
ABSA 8	Kalamazoo River from Otsego Dam to Trowbridge Dam. Aquatic biota were collected upstream of Trowbridge Dam. Includes TBSA 3 and 5.
ABSA 9	Kalamazoo River from Trowbridge Dam to Lake Allegan Dam. Aquatic biota were collected from Lake Allegan.
ABSA 10	Kalamazoo River from Lake Allegan Dam to Ottawa Marsh. Aquatic biota were collected downstream of Allegan Dam. Includes TBSA 1.

Table 2-2 API/PC/KR Biological Study Areas

ABSA 11	Kalamazoo River from Ottawa Marsh to US 31. Aquatic biota were collected near Saugatuck.

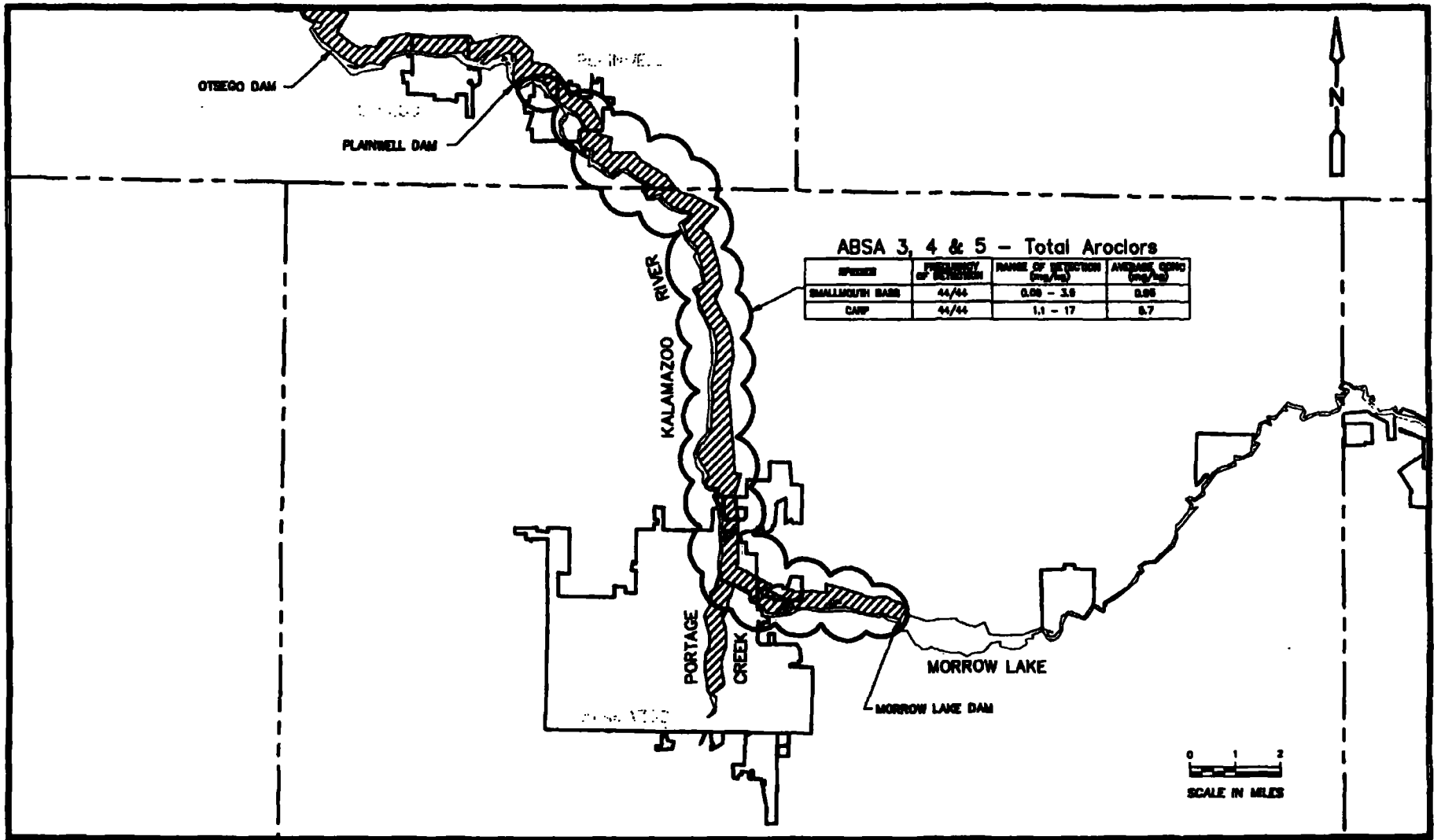
Note: ABSAs 1 and 2 are located upstream of Morrow Dam.

Three ABSAs, 3, 4, and 5, cover the area between Morrow Dam and Plainwell Dam. Data from these three ABSAs were combined for purposes of this assessment because it is assumed that fish can migrate within these areas, but due to the presence of the dams, will not migrate to adjacent ABSAs (i.e., ABSAs 2 and 6). After combining ABSAs 3, 4, and 5, all data sets represent a stretch of the river between two dams. Figures 2-1 through 2-4 illustrate fish data collected from the nine HHRA study areas.

Between 11 and 22 fish fillet samples for each species (smallmouth bass and carp) were collected for each ABSA. Quality control data is presented in Draft Technical Memorandum 14 – Biota Investigation (BB&L 1994) and generally conforms to the data quality objectives established for the site. For these reasons, fish data sets were considered adequate for risk assessment purposes. Because fish ingestion is the primary exposure pathway of concern for this site, this pathway was evaluated quantitatively. Risks and hazards were calculated using both average and maximum tissue concentrations.

2.1.2 Turtle Data

Taking of snapping turtles for consumption is known to occur in the vicinity of the site. While not well documented, the quantities of turtles ingested by individuals are believed to be less than the quantities of fish ingested. Representative data for PCB concentrations in turtle tissue are not available. Eleven turtle samples were collected from ABSAs 5 and 10. Detected concentrations of PCBs in turtles were reported in the Biota Investigation. Aroclor 1260 was detected in 11 out of 11 samples from ABSA 5, and 9 out of 11 samples from ABSA 10. Aroclor 1254 was detected one time in a sample from ABSA 10 at 0.53 mg/kg. Concentrations of Aroclor 1260 ranged from 0.021 to 0.49 mg/kg at ABSA 1 (reference area), 0.23 to 1.9 mg/kg at ABSA 5, and 0.11 to 8.1 mg/kg at ABSA 10. Turtles were collected from May 16 through May 21, 1994. Because samples were collected in the spring, lipid levels would likely be at their lowest. Similarly, concentrations of PCBs, which accumulate in fatty tissue, would also be lower at this time of year. Turtle samples collected later in the summer or fall would likely exhibit higher lipid levels and, possibly, higher PCB levels. Available data may under-represent PCB concentrations to which people ingesting turtles caught later in the summer and fall would be exposed.



ABSA 3, 4 & 5 – Total Aroclors

SPECIES	FREQUENCY OF DETECTION	RANGE OF DETECTION (mg/kg)	AVERAGE CONC (mg/kg)
SMALLMOUTH BASS	44/44	0.09 – 3.6	0.95
CARP	44/44	1.1 – 17	6.7

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KALAMAZOO RIVER HUMAN HEALTH RISK ASSESSMENT
ABSA 3, 4 & 5

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Figure No. 2-1

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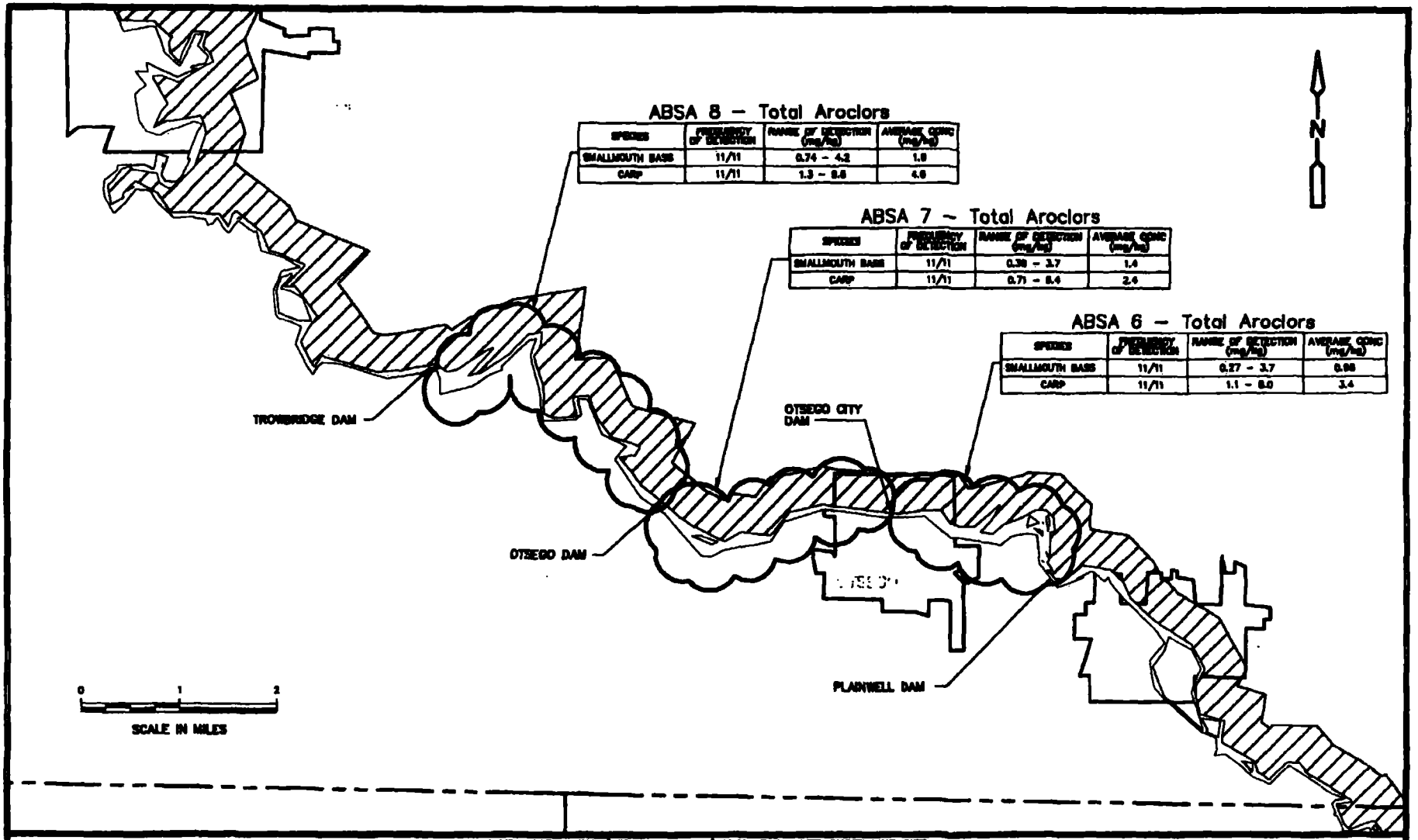

ABSA 8 – Total Aroclors

SPECIES	FREQUENCY OF DETECTION	RANGE OF DETECTION (mg/kg)	AVERAGE CONC (mg/kg)
SMALLMOUTH BASS	11/11	0.74 – 4.2	1.8
CARP	11/11	1.3 – 8.6	4.6

ABSA 7 – Total Aroclors

SPECIES	FREQUENCY OF DETECTION	RANGE OF DETECTION (mg/kg)	AVERAGE CONC (mg/kg)
SMALLMOUTH BASS	11/11	0.38 – 3.7	1.4
CARP	11/11	0.71 – 8.4	2.4

ABSA 6 – Total Aroclors

SPECIES	FREQUENCY OF DETECTION	RANGE OF DETECTION (mg/kg)	AVERAGE CONC (mg/kg)
SMALLMOUTH BASS	11/11	0.27 – 3.7	0.98
CARP	11/11	1.1 – 8.0	3.4

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KALAMAZOO RIVER HUMAN HEALTH RISK ASSESSMENT
ABSA 6, 7 & 8

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Figure No. 2-2

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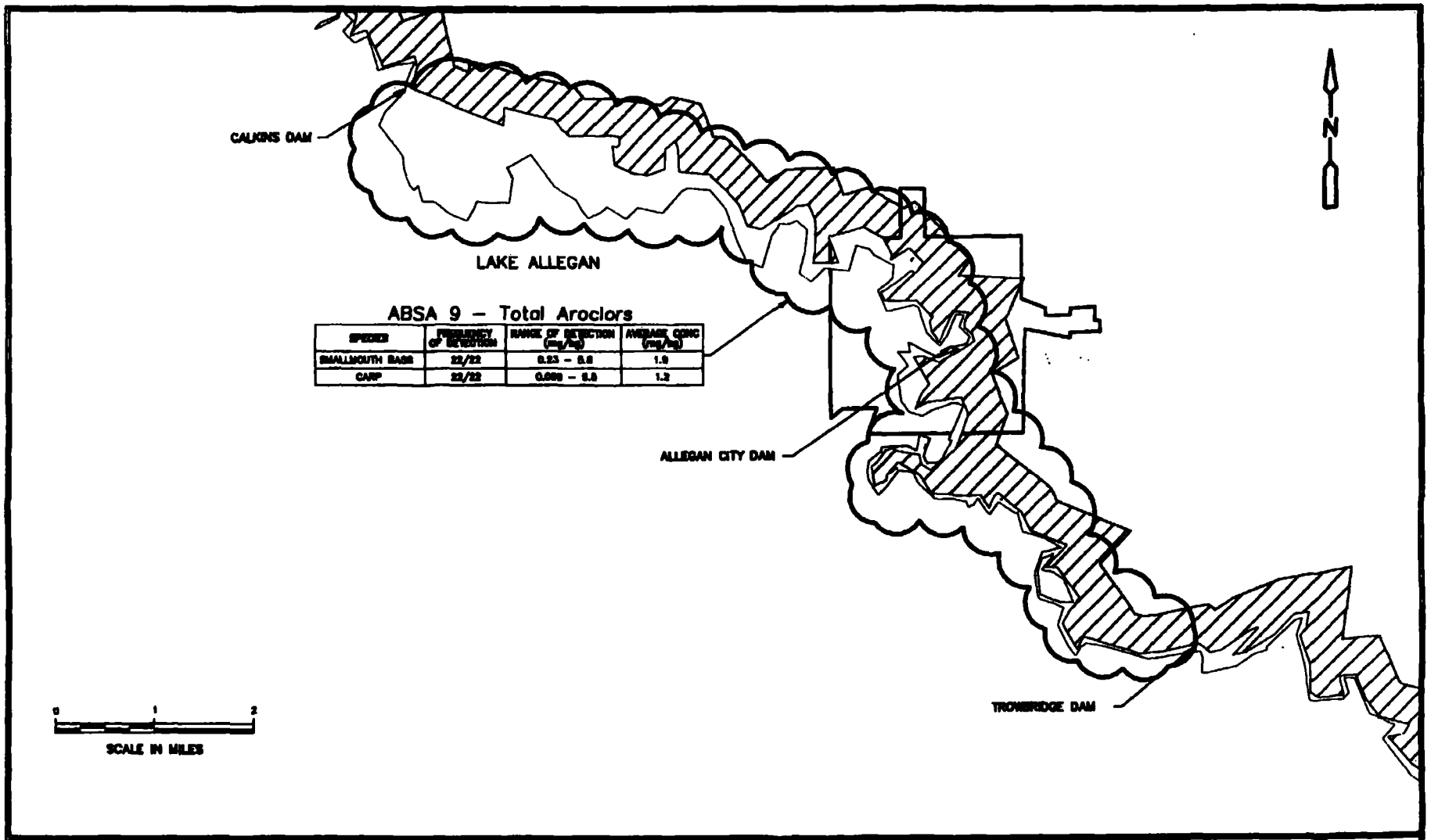

ABSA 9 – Total Aroclors

SPECIES	FREQUENCY OF DETECTION	RANGE OF DETECTION (mg/kg)	AVERAGE CONC (mg/kg)
SMALLMOUTH BASS	22/22	0.23 – 5.8	1.9
CARP	22/22	0.099 – 5.8	1.2

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KALAMAZOO RIVER HUMAN HEALTH RISK ASSESSMENT
ABSA 9

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Figure No. 2-3

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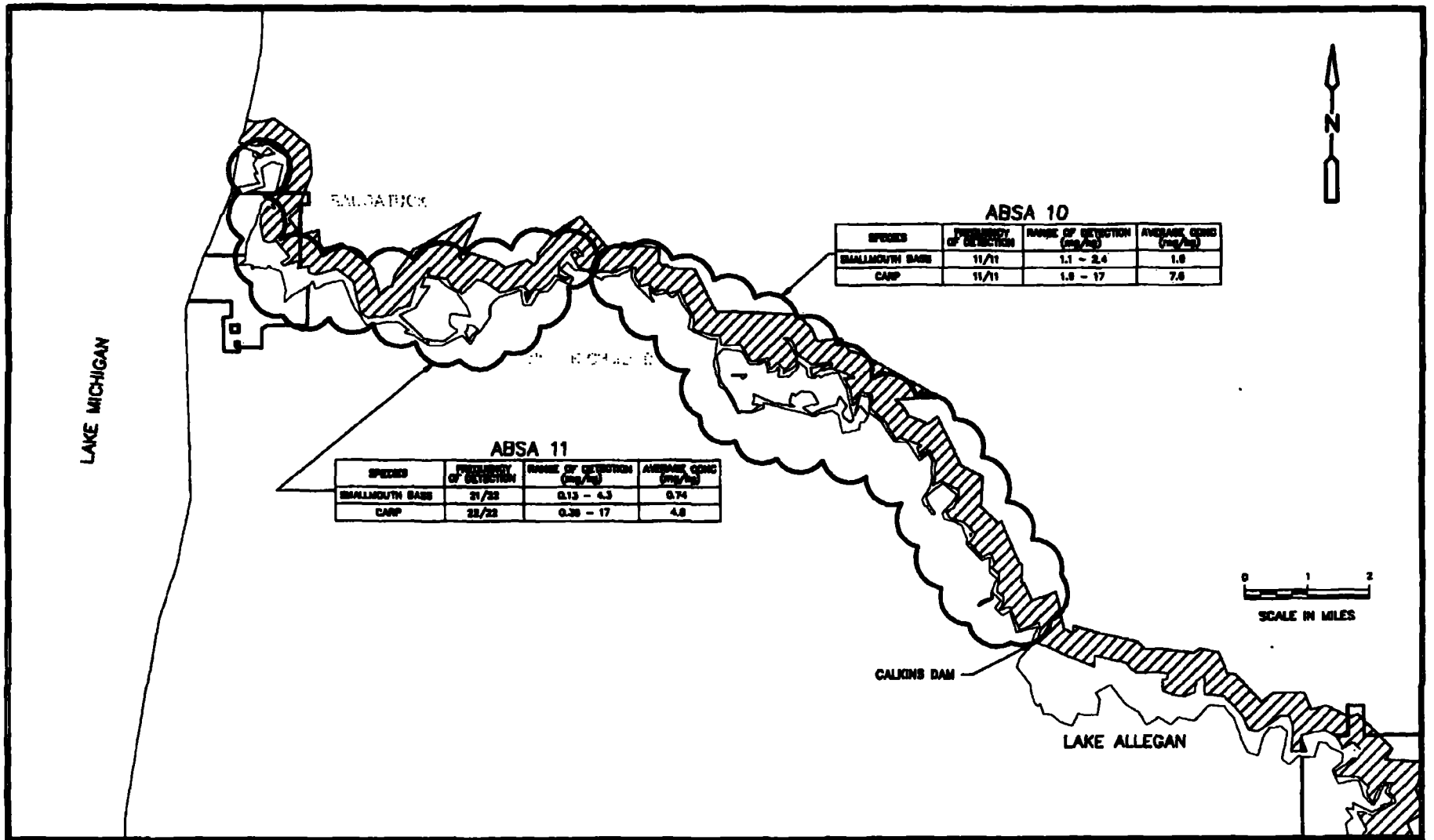

SPECIES	FREQUENCY OF DETECTION	RANGE OF DETECTION (mg/kg)	AVERAGE CONC (mg/kg)
SMALLMOUTH BASS	11/11	1.1 – 2.4	1.8
CARP	11/11	1.9 – 17	7.6

SPECIES	FREQUENCY OF DETECTION	RANGE OF DETECTION (mg/kg)	AVERAGE CONC (mg/kg)
SMALLMOUTH BASS	21/22	0.13 – 4.3	0.74
CARP	22/22	0.36 – 17	4.8

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KALAMAZOO RIVER HUMAN HEALTH RISK ASSESSMENT
ABSA 10 & 11

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Figure No. 2-4

NCRKZOO0168517

While PCB concentrations in turtles caught later in the season may be higher, detected PCB concentrations in turtles were generally less than those detected in fish. For example, total PCBs ranged from 0.13 to 5.8 mg/kg in smallmouth bass fillets and 0.1 to 17.2 mg/kg in carp fillets compared to 0.11 to 8.1 mg/kg in turtle tissue. Further, turtle ingestion rates are assumed to be less than fish ingestion rates, therefore, risks associated with turtle ingestion are likely to be less than those associated with fish ingestion. Lack of representative turtle data represents a data deficiency that could result in the underestimation of risks and hazards, and prevents defensible quantification of possible human health impacts.

2.1.3 Waterfowl

A limited number of waterfowl samples have been collected from the Kalamazoo River. In 1985, the U.S. Fish and Wildlife Service (USFW) collected 12 mallards, 2 wood duck, 1 Canada goose, and 1 blue-winged teal from Otsego City Impoundment, Trowbridge Impoundment, Allegan State Game area, and Saugutuck. Samples were analyzed for Aroclor 1260. These data are reported in Kalamazoo River Action Plan (Michigan Department of Natural Resources [MDNR] 1987). Detected concentrations ranged from 0.60 mg/kg in an immature mallard from Saugatuck to 4.8 mg/kg in an adult mallard from Otsego City Impoundment. Also in 1985, the USFW collected 2 mallards from the Kalamazoo River and 9 mallards from the Potawatomie Marsh. Samples were analyzed for total PCBs, which were detected in one sample at a concentration of 0.29 mg/kg. These data sets are included in Appendix C.

Based on the age of these data sets and their limited nature, these data cannot support defensible estimates of risks or hazards to hunters. This exposure pathway is, however, considered important for the Kalamazoo River area, since hunting waterfowl is a widespread recreational activity. Additional data are needed to adequately evaluate risks to this population. This pathway may be evaluated in an addendum to this HHRA.

2.1.4 Floodplain Soil/Sediment

The Kalamazoo River has been dammed in five places within the API/PC/KR. From the 1950s through the 1970s the paper companies discharged PCB contaminated effluent to the Kalamazoo River. Impoundments created by these dams acted as settling basins for PCB wastes. Three of these dams, Plainwell, Otsego, and Trowbridge, and their impoundments, were acquired by the state of Michigan in the late 1960s. The impoundments were drained in the early 1970s although the dams were not completely removed, thereby exposing sediments previously overlain by river water. These exposed sediments are part of the API/PC/KR site.

The exposed floodplain soils in the vicinity of the former Plainwell, Otsego, and Trowbridge dams cover approximately 61, 37, and 346 acres, respectively. Data from samples obtained from the top 0 to 6 inches soils were evaluated in this HHRA, because this horizon is most accessible to people living nearby. Table 2-3 summarizes

floodplain data for these three areas. Figure 2-5 illustrates areas of exposed floodplain soils. The highest PCB concentrations were detected in the Plainwell area, followed by Trowbridge and Otsego. The frequency of detection was above 80 percent for all areas indicating that deposition of contamination was widespread. Due to the proximity of residential areas to these areas of exposed sediment, exposures associated with floodplain sediment/soil are quantitatively evaluated in the HHRA.

Table 2-3 Floodplain Soil Data, API/PC/KR Site

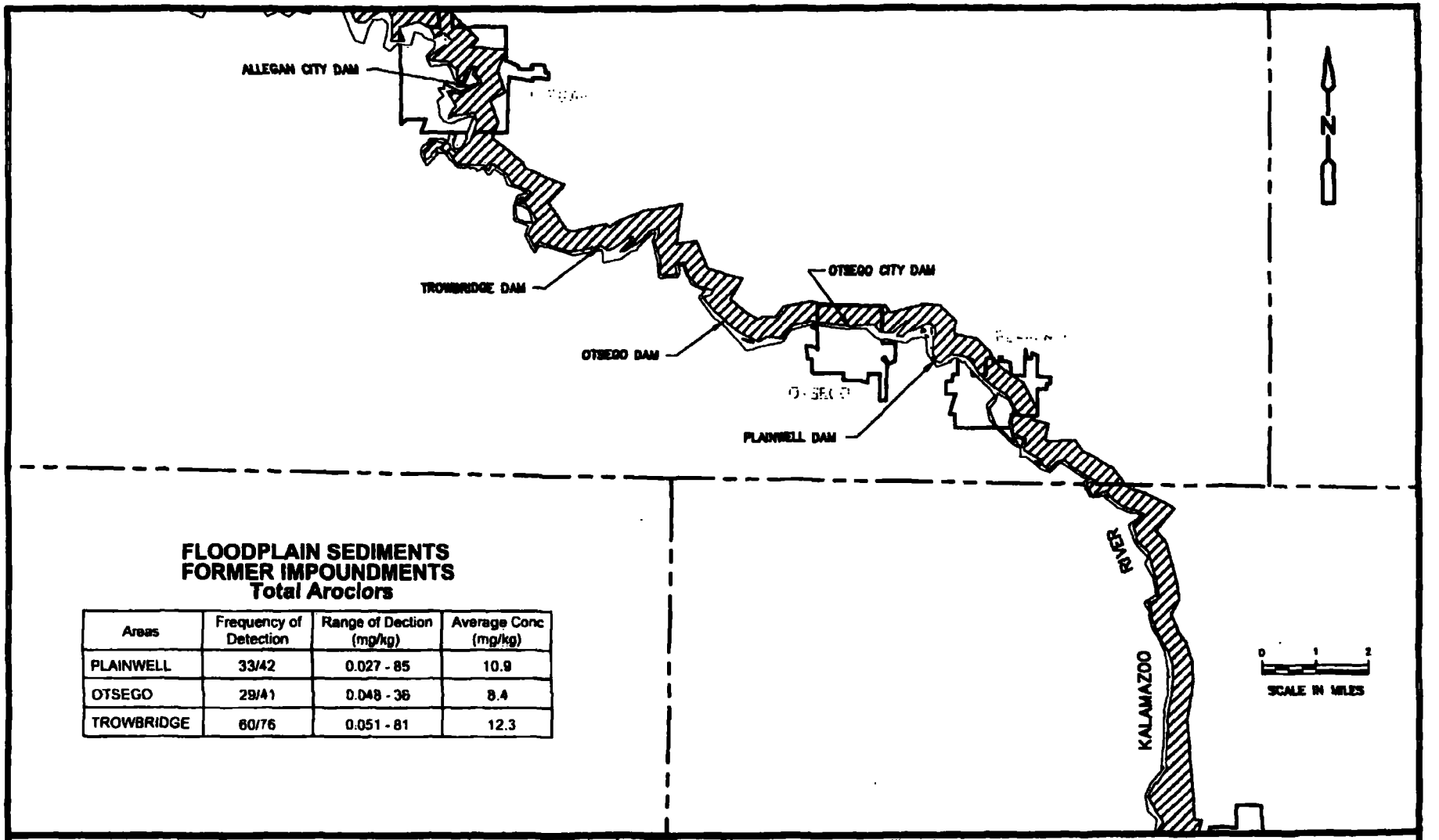
	Total Aroclor			
Area	Frequency of Detection	Range of Detection (mg/kg)	Average Conc. (mg/kg)	Maximum Conc. (mg/kg)
Plainwell	33/42	0.027 - 85	10.9	85
Otsego	29/41	0.048 - 36	8.4	36
Trowbridge	60/76	0.051 - 81	12	81

2.1.5 River Sediment

Over 1,000 instream cores have been collected from 151 transects in the Kalamazoo River. Five to nine samples were collected from each transect and 365 samples were analyzed for PCBs, total organic carbon, grain size, and percent solids. These data were collected as part of the Remedial Investigation and were reported in Draft Technical Memorandum 10 - Sediment Characterization/Geostatistical Pilot Study (BB&L 1994a). Note that to date not all sediment cores have been analyzed. Sediment data used in this assessment were those available at the time the report was prepared.

The major potential exposure pathway associated with near and in-stream sediments is indirect, involving first uptake of PCBs into fish, then consumption of these contaminated fish by anglers. Since adequate fish tissue data were available for use in the HHRA, no modeling of transport of PCB in the food chain was necessary for the assessment of risks or hazards for this pathway. Sediment data were, however, used along with data from fish tissues, to estimate Biota Sediment Accumulation Factors (BSAFs). These factors were critical to the development of possible risk-based remediation goals based on fish consumption.

Based on an evaluation prepared by the Michigan Department of Community Health (MDCH), and a review of data and risks associated with sediment exposures at the Lower Fox River site, direct contact exposure to instream sediments during recreational activities is not an important means of exposure to PCBs. The Health Consultation for Allied Paper/Portage Creek/Kalamazoo River (MDCH 1997), prepared under a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR) (July 2, 1997), notes that "moist sediments might adhere more strongly to skin than drier soil, but river water would tend to wash the sediments off before the soiled skin reaches the mouth or food." Further, the report concludes that "based on the PCB concentrations reported in the sediment and water of the Kalamazoo River, and considering the frequency of exposure to the sediments, and limited absorption of PCBs from soils, there is no need to restrict access to the sediment and water of the Kalamazoo River."



FLOODPLAIN SEDIMENTS
FORMER IMPOUNDMENTS
Total Aroclors

Areas	Frequency of Detection	Range of Dection (mg/kg)	Average Conc (mg/kg)
PLAINWELL	33/42	0.027 - 85	10.9
OTSEGO	29/41	0.048 - 36	8.4
TROWBRIDGE	60/76	0.051 - 81	12.3

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KALAMAZOO RIVER HUMAN HEALTH RISK ASSESSMENT
FLOODPLAIN SEDIMENTS

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Figure No. 2-5

NCRKZOO0168520

These considerations indicated that exposure to instream sediments is not considered an important exposure pathway. Such exposures are not further evaluated in this HHRA.

2.1.6 Surface Water

Surface water concentrations of PCBs have been reported in Draft Technical Memorandum 16 – Surface Water Investigation (BB&L 1995a) and the description of the Current Situation (BB&L 1992). Maximum and central tendency (median) PCB concentrations reported in surface water in the most recent of these reports are 0.000071 µg/L and 0.000025 µg/L, respectively. All detected concentrations are below drinking water maximum contaminant levels (MCLs) published by EPA. The MCL for PCBs is 0.5 micrograms per liter (µg/L). The Kalamazoo River is not used for drinking water, but incidental ingestion could occur during swimming, wading, or similar activities. The quantity of water consumed during swimming (50 milliliters/hour, which is a typical swimming event) is estimated to be much less than that consumed when water is used for drinking (2 liters/day) (EPA 1989). MDEQ has established a surface water criterion for PCBs of 0.00012-µg/L protective of wildlife and a criterion of 0.000026-µg/L protective of human health. Water concentrations detected in the Kalamazoo have exceeded the criterion protective of human health; however, exposures via direct contact and incidental ingestion of surface water are not considered significant pathways and were not further evaluated in this HHRA. Further rationale for elimination of these pathways is presented in Section 3.2.

2.1.7 Air

No air data have been collected in the immediate vicinity of the River or exposed floodplain soils. An air investigation was conducted at the Willow Boulevard/A-Site Operable Unit (OU) located in Kalamazoo Township, Michigan. As reported in Draft Technical Memorandum 5 – Willow Boulevard/A-Site Operable Unit[1]: Results of the Air Investigation, the air investigation involved collection of 15 samples over a 3-month period from 5 perimeter samplers and 2 background location samplers. Objectives of the air investigation were to (1) identify the highest representative PCB concentrations expected for adjacent or nearest public access and residential locations, and (2) provide data necessary to determine whether significant quantities of PCBs are migrating from the operable unit via the air pathway.

Sampling of both particulate phase and vapor phase PCBs according to standard EPA protocols was conducted using glass-fiber filters and high-volume polyurethane foam (PUF) cartridges, respectively. Arithmetic average concentrations of PCBs ranged from 0.00049 µg/m^3 to 0.0029 µg/m^3; this range is below the secondary risk screening level of 0.02 µg/m^3 developed by the MDEQ Air Quality Division. At the time of sampling, the Willow Boulevard/A-Site OU was partially vegetated. Conditions have

[1] This OU is the site of two locations where PCB-containing wastes were placed adjacent to the river and within the floodplain.

since changed and the site is no longer vegetated but is covered with a temporary soil cover.

These data are not appropriate for evaluating risks and hazards associated with exposures to particulates or volatile emissions from the river or exposed floodplain soils. Instead of using site data, quantitative estimates of particulate and volatile emission from the exposed floodplain soil were developed using algorithms adapted from Standard Guide for Risk-Based Corrective Action Applied at Petroleum Release Sites (ASTM 1995). Exposures to PCBs in air based on these estimates are used in quantitative risk estimates for both residential and recreational exposure scenarios. Exposures to volatile emissions from surface water have not been evaluated. In the absence of air data or air modeling to characterize this exposure pathway, overall site risks are likely to be underestimated.

Section 3
Exposure Assessment

Exposure assessment evaluates sources of contaminants in the API/PC/KR site, transport of contaminants to areas with human activity, and exposure to contaminants in these areas via inhalation, ingestion, and dermal contact. Whether an exposure occurs, and its magnitude and nature, depend on characteristics of the site. In this section, the character of the API/PC/KR site is described with a focus on those aspects most important for evaluating possible exposure to PCBs (Section 3.1). Subsequently, the potential for various exposure pathways[1] to cause human health impacts are analyzed, and means to quantitatively estimate health risks and hazards are developed.

3.1 Site Description

The API/PC/KR site is located in a moderately densely populated area. The site is located within the floodplain of the Kalamazoo River, a Class A water body and used for swimming, boating, and fishing. No restrictions against development along the river exist for areas outside of the 100-year floodplain. Land use along the river includes urban commercial and industrial; urban, suburban, and rural residential; agricultural; and recreational (MDPH 1991).

In addition to fishing and boating, recreational activities identified by the MDNR along the Kalamazoo River include:

- Canoeing
- Picnicking
- Mushroom and berry picking
- Wild food gathering
- Sightseeing/wild animal observation
- Bird watching

The primary source of contamination at the site is PCB residuals that were discharged into the river system by several paper mill facilities located upstream. In the de-inking phase of recycling paper fibers, specialty inks containing PCBs were liberated. Much of the dewatered paper waste was disposed of in landfills and sludge disposal areas located on the banks of the river. Erosion from these facilities, as well as direct discharge of millions of gallons per day of effluent into the river, has resulted in an estimated mass of over 29,300 kg of PCBs in instream sediments, and 24,500 kg of PCBs in exposed sediments at three former improvements (BB&L 2000).

The site contains six dams, three of which are owned by the MDNR and three that are owned by municipalities and private entities. These dams (in a downstream order)

[1] An exposure pathway consists of a source of contamination, a release/transport mechanism, a point of contact with contamination, and a route of exposure (inhalation, ingestion, or dermal contact) (see Section 3.2).

are: Plainwell Dam, Otsego City Dam, Otsego Dam, Trowbridge Dam, Allegan City Dam, and Caulkins Dam on Lake Allegan. The Plainwell, Otsego, and Trowbridge dams are the three MDNR dams. During the time when these dams impounded water, PCB-contaminated sediments were deposited in the impoundments. When the superstructures of these dams were removed in 1986 and the water level was lowered to the dam sill, most of the deposited contaminated sediments were exposed in the floodplain. These exposed sediments are continuously being eroded into the Kalamazoo River and constitute a continual source of PCBs to the river system. The largest acreage of exposed sediments is behind the Trowbridge Dam. Residential properties are found immediately adjacent to the exposed sediments behind the Trowbridge and Otsego Dams. In some areas, the gray paper residual waste can be observed in the backyards of residential homes along the river. Additionally, the construction of a golf course behind the Trowbridge impoundment occurred on top of and immediately adjacent to exposed sediments containing paper residual waste. Established gardens have been observed in the former impoundment area behind Otsego Dam.

These MDNR-owned dams, along with the Caulkins Dam impounding Lake Allegan, have been identified as areas where local anglers frequently catch fish in the Kalamazoo River. Attractive habitat for fish near the dams attracts the anglers observed fishing in these stream reaches. Some fishing locations have been established on exposed floodplain sediments. In addition to attracting anglers, the three MDNR impoundments also attract waterfowl hunters, as evidenced by the duck blinds observed in the backwaters behind the remaining dam structures.

Floodplain and river sediments are both transport and exposure media. That is, sediments (instream and floodplain) are continuously entrained in and deposited from the water column, causing redistribution of PCBs in the riverine system. Further, some PCBs may become dissolved in surface water or entrained in air. In addition, sediments are a source for PCBs in fish, turtles, and probably waterfowl, and a potential source of exposure to residents and recreationalists living near or visiting areas with exposed contaminated sediments. For purposes of this evaluation, residents who live near the exposed floodplain soils were considered the most highly exposed individuals for direct contact exposure pathways. Risk and hazard quotient estimates for these individuals will serve as a conservative representation of risks and hazards to individuals that frequent the river.

Exposure routes either directly to the river and floodplain soil, or to secondary exposure media (surface water and air), include ingestion, sediment or soil, and surface water; dermal contact with sediment or soil and surface water; and inhalation of particulates and/or vapor emissions from exposed sediments.

Importantly, sediments are also a source of PCBs in fish tissues. Anglers, both recreational and subsistence, may be exposed to significant levels of PCBs via ingestion of fish taken from contaminated reaches of the river. In many assessments of

PCB contamination in river systems, consumption of contaminated fish has resulted in the highest estimates of exposure and health risk. Significant further evaluation of possible exposure of anglers and their families is provided in a later subsection. In particular, the existence and potential for exposure for subsistence anglers is characterized in Section 3.3.1. Subsistence anglers are those individuals who derive a large portion of their total dietary protein from consumption of locally caught fish.

Recreational and subsistence anglers, recreational users of the river for purposes other than fishing, and residents who may live near or on the river, were considered in the HHRA. For each of the populations, an exposure scenario was developed. An exposure scenario defines a particular manner in which people are exposed to contamination. An example of an exposure scenario includes: 1) ingestion of fish by subsistence anglers; and 2) ingestion of, dermal contact with, and inhalation of particulates and vapors from floodplain soil by nearby residents. Some of the possible exposure scenarios for the API/PC/KR site were evaluated quantitatively, i.e., numerical estimates of cancer risks and noncancer hazards were developed. Some of the possible exposure scenarios were evaluated qualitatively, i.e., a discussion of the significance of a particular pathway or adequacy of the data to evaluate the pathway was provided.

3.2 Determination of Exposure Pathway Significance

Many exposure pathways exist at most sites with significant chemical contamination. However, only a subset of these pathways, in almost all cases, might result in estimated risks high enough to warrant action to reduce exposures. In the following subsections, exposure pathways at the API/PC/KR site are identified that could result in risks above levels of concern.

3.2.1 General Considerations

Researchers have investigated the role of various environmental pathways of exposure to contaminants in the Great Lakes. Several multimedia studies indicated that most cases of human exposure (80 to 90 percent) to chlorinated organic compounds occur through the food pathway. A more recent multimedia study supports these findings and indicates that the primary pathway of exposure to PCBs is from fish consumption (Birmingham, et al. 1989; Newhook, et al. 1988; Fitzgerald, et al. 1996). Pathways involving ingestion of biota including fish and waterfowl were determined to warrant quantitative evaluation for the API/PC/KR site. However, as discussed in Section 2, data are insufficient to support quantitative analysis of exposures and risks to hunters who take and ingest waterfowl from the API/PC/KR site. Potential human health impacts for the hunter population remains a potentially significant source of uncertainty in this risk assessment.

During hunting or fishing activities, contact with river surface water and sediment may occur. Contact with surface water and sediment may also occur during other recreational activities such as swimming and boating. In general, contact with

sediment and surface water does not result in significant risks or hazards. This assumption is consistent with the findings presented in *Health Consultation for Allied Paper/Portage Creek/Kalamazoo River* (MDCH 1997). In that document, it is stated that "moist sediments might adhere more strongly to skin than drier soil, but river water would tend to wash the sediments off before the soiled skin reaches the mouth or food." In addition, the quantity of water consumed during swimming has been estimated to be significantly less than that consumed when water is used for drinking water (50 milliliters/hour, which is a typical swimming event versus 2 liters/day) (EPA 1989, 1992). For this reason, the ingestion of surface water is not considered a significant pathway.

To confirm that contact with instream sediment and surface water would not result in significant risks or hazards for the API/PC/KR site, site data were compared to data from the Lower Fox River in Wisconsin. Exposure conditions at the two sites are very similar in that both sites have active recreational populations involved in fishing, hunting, and boating and residential populations living on or near the site. An HHRA conducted for the Lower Fox River evaluated numerous pathways and found that only the following four exposure pathways were associated with significant risks or hazards:

- Ingestion of fish by subsistence anglers
- Ingestion of fish by recreational anglers
- Ingestion of waterfowl by hunters
- Inhalation of contaminants in outdoor air from volatizing from surface water by nearby residents

Significant risk is defined by MDEQ as a level above a cancer risk threshold of 1 in 100,000 excess lifetime cancer risk, and significant hazard of noncancer adverse health effect is indicated by a hazard quotient greater than 1.0.

The first two of these pathways were quantitatively evaluated for the API/PC/KR site. Additional data are needed, however, to adequately evaluate ingestion of waterfowl by hunters and volatilization from surface water to outdoor air.

Exposure pathways involving direct contact with surface water and instream sediment, i.e., the recreational wader or swimmer, were not associated with significant risks or hazards for the Lower Fox River. Drinking water ingestion was evaluated for the Lower Fox River, but water from the Kalamazoo River is not used for drinking water; therefore, this pathway is not relevant to the site.

3.2.2 Quantitative Comparisons with Lower Fox River

Table 3-1 presents upper-bound and average concentrations of PCBs in sediment, surface water, fish, and waterfowl at the Lower Fox River and API/PC/KR sites.

Upper-bound and average concentrations for all abiotic and biotic media are higher from the API/PC/KR site than from the Lower Fox River site.

Relative risks and hazards for the two rivers can be estimated by scaling estimates for the Kalamazoo River using the Lower Fox River as a baseline. Scaling assumes that exposure assumptions for recreational swimmers, waders, sport anglers, and subsistence anglers are comparable at the two sites. These scaling assumptions are justified in the present case because of the substantial similarities of the two river environments.

Table 3-1 Comparison of Total PCB Exposure Point Concentrations of Lower Fox River and Kalamazoo River API/PC/KR Site

	Upper Bound [1]		Central Tendency [2]	
Medium	**Fox River [3]**	**Kalamazoo [4]**	**Fox River [3]**	**Kalamazoo [4]**
Fish Tissue (mg/kg) (Fillet data)	4.6 [6]	17.34 (max-carp) 5.8 (max-smb)	3.0 [6]	7.6 (carp) 1.9 (smb)
Waterfowl Tissue (mg/kg)	1.23 [7]	4.8 (max)	0.54	1.7
Surface Water (mg/L)	1.49E-04 [8]	7.1E-05 (max)	4.42E-05	2.5E-05 (median)
Sediment (mg/kg)	3.75 [9] 710 [12]	156 (max-ABSA 7) [10] 13.6 (U95, ABSA 7)	3.69 [11] 20 [12]	3.7 [5]

(1) Upper-bound measure concentrations - lower of the 95% UCL on the arithmetic mean or the maximum detected concentration.

(2) Central Tendency = the arithmetic mean except for Kalamazoo surface water which is median value.

(3) Lower Fox River data from ThermoRetec, 2001.

(4) Kalamazoo River data derived from following sources:
Fish (BB&L 1995b; 1998)
Waterfowl (MDNR 1987)
Surface Water (BB&L 1995a)
Sediment (BB&L 1994a)

(5) Average from ABSAs 3,4,5,6,7,8,9 as reported in CDM 1999 originally derived from BB&L 1994a.

(6) Upper-bound concentration is the maximum detected in fillet samples of walleye collected from the DePere to Green Bay reach in the 1990s. Central tendency concentration is average for carp collected in the same reach in the 1990s. The most common species sampled include walleye, carp, trout, and bass.

(7) Upper-bound concentration is the 95% UCL on the arithmetic mean of samples collected from Little Rapids to DePere reach.

(8) Upper-bound concentration is the 95% UCL on the arithmetic mean of surface water samples collected from the DePere to Green Bay reach. All water concentrations result from analyses of unfiltered samples.

(9) Upper-bound concentration is the 95% UCL on the arithmetic mean of samples collected from Little Lake Butte des Morts reach. Concentration is based on interpolated data. Note that some higher concentrations (710 max; 20 average mg/kg) were found in the DePere to Green Bay reach.

(10) For the Kalamazoo River site, ABSA 7 was chosen for the comparison because the maximum PCB concentration occurred in this reach of the river and because overall concentrations in this ABSA were relatively high. The average concentration in ABSA 7 (5.2 mg/kg) is about twice the sitewide average (2.4 mg/kg). Using ABSA 7 to represent the API/PC/KR site should provide a "worst case" for comparison with the Fox River.

(11) Highest average based on interpolated data from Little Lake Buttes des Morts reach.

(12) The higher value was calculated from the DePere to Green Bay reach.

When all exposure parameters for a population are held constant, risks and hazards are proportional to exposure concentrations. The ratio of media concentrations to risks or hazards for the Lower Fox can therefore be used to estimate risks or hazards associated with API/PC/KR media concentrations. Such scaled risks and hazards associated with exposure to upper-bound instream sediment and surface water are

shown in Table 3-2. Even though PCB concentrations for surface water and most instream sediment in API/PC/KR were higher than the Lower Fox, exposure involving contact with these media would not result in risks or hazards that exceeded regulatory thresholds. A more complete description of the results of risk and hazard scaling are presented in Appendix D.

Table 3-2 Comparison of Calculated Fox River and Scaled Kalamazoo River API/PC/KR Site Risks and Hazards

		Fox River		Kalamazoo River	
Pathway	**Media**	**Calculated Risks**	**Calculated Hazards**	**Scaled Risks**	**Scaled Hazards**
Recreational Angler	Surface Water	1.7E-08 - 1.2E-07 [1]	1.0E-03 - 6.0E-03 [1]	1.2E-07 - 3.5E-07 [2]	2.2E-03 - 2.9E-02 [2]
	(ingestion, dermal contact)				
Subsistence Angler	Surface Water	2.4E-08 - 1.6E-07 [1]	2.0E-03 - 8.0E-03 [1]	2.8E-08 - 4.7E-07 [2]	5.4E-02 - 3.9E-02 [2]
	(ingestion, dermal contact)				
Recreational Swimmer	Surface Water	6.8E-08 [3]	1.4E-02 [3]	2.0E-07 [4]	4.1E-02 [4]
	(ingestion, dermal contact)				
	Sediment	8.7E-08 [3]	2.5E-02 [3]	5.8E-08 - 2.1E-07 [5]	1.7E-02 - 6.2E-02 [5]
	(ingestion, dermal contact)				
Recreational Wader	Surface Water	7.8E-09 [3]	2.0E-03 [3]	2.3E-08 [4]	9.8E-03 [4]
	(ingestion, dermal contact)				
	Sediment	1.9E-07 [3]	2.5E-02 [3]	1.3E-07 - 4.7E-07 [5]	1.7E-02 - 6.2E-02 [5]
	(ingestion, dermal contact)				

Scaled risks are calculated as FOX RIVER - RISK OR HAZARD * API/PC/KR - MEDIA CONCENTRATION ÷ FOX RIVER - MEDIA CONCENTRATION

Notes:

[1] Based on range of calculated cancer and noncancer risks associated with the average concentration and the upper-bound concentration (either 95% UCL or maximum).

[2] Based on scaled cancer and noncancer risks associated with the average concentration and the maximum concentration.

[3] Based upper-bound concentrations (either on 95% UCL or maximum). Based on concentrations of PCBs in Little Lake Butte des Morts.

[4] Based on maximum concentrations.

[5] Based on range of calculated cancer and noncancer risks associated with the average concentration and the 95% UCL.

3.3 Receptors

Recent data compiled through the ATSDR Great Lakes program indicate the following:

- Approximately 4.7 million people consumed Great Lakes' sport-caught fish within the past year
- Knowledge of and adherence to health advisories for sport-caught fish vary across different populations
- Advisory awareness is especially low in women and minority populations

- Fish are an essential component of the diets of minority and Native American populations; they consume fish that tend to have higher levels of contaminants, and their cooking practices increase their exposure to Great Lakes contaminants compared to recommended fish preparation techniques (Johnson 1998)

Further for the API/PC/KR site,

- Residences abut former impoundment areas, and some gray residuals from paper wastes have been observed in residential yards

- Evidence of recreational use is observed in former impoundment areas; including established gardens, trails, hunting blinds, and fishing spots

The above information, combined with the pathways analysis presented in Section 3.2, indicates that five receptor groups should be quantitatively evaluated in this HHRA for one or more pathways of exposure, including:

- Subsistence anglers
- Central Tendency Sport anglers
- High end sport anglers
- Nearby residents
- Recreationalists

3.3.1 Subsistence Anglers

Subsistence anglers are individuals who would not be able to meet their daily nutritional requirements if they could not supplement their diet with sport-caught fish. In a survey financed by the Michigan Great Lakes Protection Fund, *Michigan Sport Anglers Fish Consumption Study*, 1991-1992 (West 1993), a sample of 7,000 persons with Michigan fishing licenses was drawn and surveys were mailed in 2-week cohorts from January 1991 to January 1992. Respondents were asked to report consumption patterns during the proceeding 7 days. A response rate of 46.8 percent was reported with 2,681 surveys returned. Fish consumption rates were found to be higher among minorities, people with low income, and people residing in small communities.

Three subpopulations of subsistence anglers have been evaluated in several studies of the Great Lakes region:

- Low-income/minorities
- Native Americans
- Hmong

Out of a total estimated population of 329,912 in Allegan and Kalamazoo counties, West (1993) estimated a low income (<$25,000) population of 99,094, and a minority/low-income population of 9,022.

The MDCH conducted the Kalamazoo River Angler Survey and Biological Testing Study. This study, funded by the ATSDR, involved field surveys conducted from May to September 1994 and interviews of 938 anglers in Kalamazoo and Allegan Counties. Information on income level was not reported, though unemployment rates were reported. Unemployment rates for anglers in Allegan County (20.5 percent) and Kalamazoo County (17.4 percent) were higher than the overall unemployment rates for these counties (MDCH 2000b). Respondents were questioned on age, education, race (white, nonwhite), gender, smoking status, drinking status, weight change, and awareness of fish advisories.

Almost 4 percent of the Allegan County anglers reported that they fished for food only, while none of the Kalamazoo County anglers reported that they fished for food only. An additional 10.6 percent of all anglers responded that they fished for both food and recreation (MDCH 1998).

Allegan and Kalamazoo County public health agency staff conducted the interviews. Interviewers reported they were unable to interview Hmong anglers that have been observed fishing in the Lake Allegan area. At other Superfund sites, this segment of the population makes up a large component of the subsistence fishing population. Two key studies, *Hmong Fishing Activity and Fish Consumption* (Hutchinson and Kraft 1994) and *Fish Consumption by Hmong Households in Sheboygan, Wisconsin* (Hutchinson 1994) examined fishing activity and fish consumption rates in Green Bay, Wisconsin and Sheboygan, Wisconsin, respectively.

Native American anglers were not specifically targeted in the Kalamazoo Angler Survey although an early draft of the survey reported that 9 percent of 143 male respondents in Allegan County were Native American and 0.5 percent of 213 male respondents in Kalamazoo County were Native American. A number of studies have been conducted on fish ingestion rates of Native American populations in Alaska (Wolfe and Walker 1987); the Columbia River Basin (CRITFC 1994); Wisconsin (Peterson, et. al 1994; Fiore 1989); and the St. Lawrence River (Fitzgerald 1995, 1996).

The Lower Fox River HHRA evaluated four different subsistence fishing scenarios:

- Low-income, minority (based on West 1993 data)
- Native American angler (based on Peterson 1994 and Fiore 1989)
- Hmong (based on Hutchinson and Kraft 1994)
- Hmong (based on Hutchinson 1998)

The overall ingestion rates and exposure frequencies for the low-income, minority angler were the highest of these four scenarios; risks and hazards for the low-income, minority angler were also the highest of these four scenarios. For this reason, and the existence of this subpopulation within and near the API/PC/KR site, the subsistence scenario used for the site is based on a low-income, minority population.

3.3.2 Sport Anglers

Fishing is a popular recreational activity on the Kalamazoo River. Because multimedia studies have indicated that most cases of human exposure to chlorinated organic compounds (80 to 90 percent) occur through the food pathway, and the primary pathway of exposure is from fish consumption, risks and hazards to the sport angler population were evaluated in this HHRA.

The Kalamazoo River is a favorite fishing site for sport anglers and subsistence fishermen. Smallmouth bass are a favorite target in the Kalamazoo area. Additionally, the downstream reaches of the Kalamazoo River below Caulkins Dam is known for steelhead and salmon fishing. The Kalamazoo River is also popular for catching carp, panfish, channel catfish, and sucker species (personal communication with Jim Dexter, MDNR).

Anglers have been observed fishing in the vicinity of the three MDNR dams on a regular basis, and the Trowbridge Dam has a boat launch ramp used by anglers and duck hunters to access the backwater areas behind this impoundment. Fishing is limited on Lake Allegan due to poor habitat, and most fishing is restricted to channel catfish, carp, and occasional panfish.

Two populations of sport anglers were evaluated to provide some indication of the possible range of exposures and risks. The central tendency sport angler was evaluated to provide an indication of average exposures in the angler population. The high end sport angler was evaluated to provide an upper-range estimate characteristic of avid sport anglers. Assumptions regarding fish ingestion rates, reduction of PCBs due to cooking fish, and portion of fish caught from the contaminated area are different for the central tendency and high end sport anglers. These assumptions are further discussed in Section 3.5.2.

3.3.3 Nearby Residents

Urban, suburban, and rural residential populations exist along stretches of the Kalamazoo River. Development within the 100-year floodplain is restricted; however, despite inclusion of 80 miles of the Kalamazoo River in the study area of the API/PC/KR National Priority List site, residential, commercial, and recreational development along the river outside this floodplain has proceeded unrestricted.

In particular, residential development has occurred adjacent to exposed floodplain soil in the vicinity of the former Trowbridge, Otsego, and Plainwell dams. These areas are completely accessible to the public and, in essence, form the "backyard" for some residents. For these reasons, a residential scenario was evaluated for direct exposure in the three floodplain areas.

3.3.4 Recreationalists

Some parts of the former impounded areas abut neighborhoods and residential property and are completely accessible to children and adults. Other areas are relatively less accessible to children but are accessible to adults who may engage in recreational activities such as bird watching, picnicking, and hunting. In particular, the former impoundment areas near the Trowbridge, Otsego, and Plainwell Dams are accessible for these activities and are large enough to attract frequent visitors. For these reasons, a recreational scenario was evaluated for direct exposure in the floodplain areas.

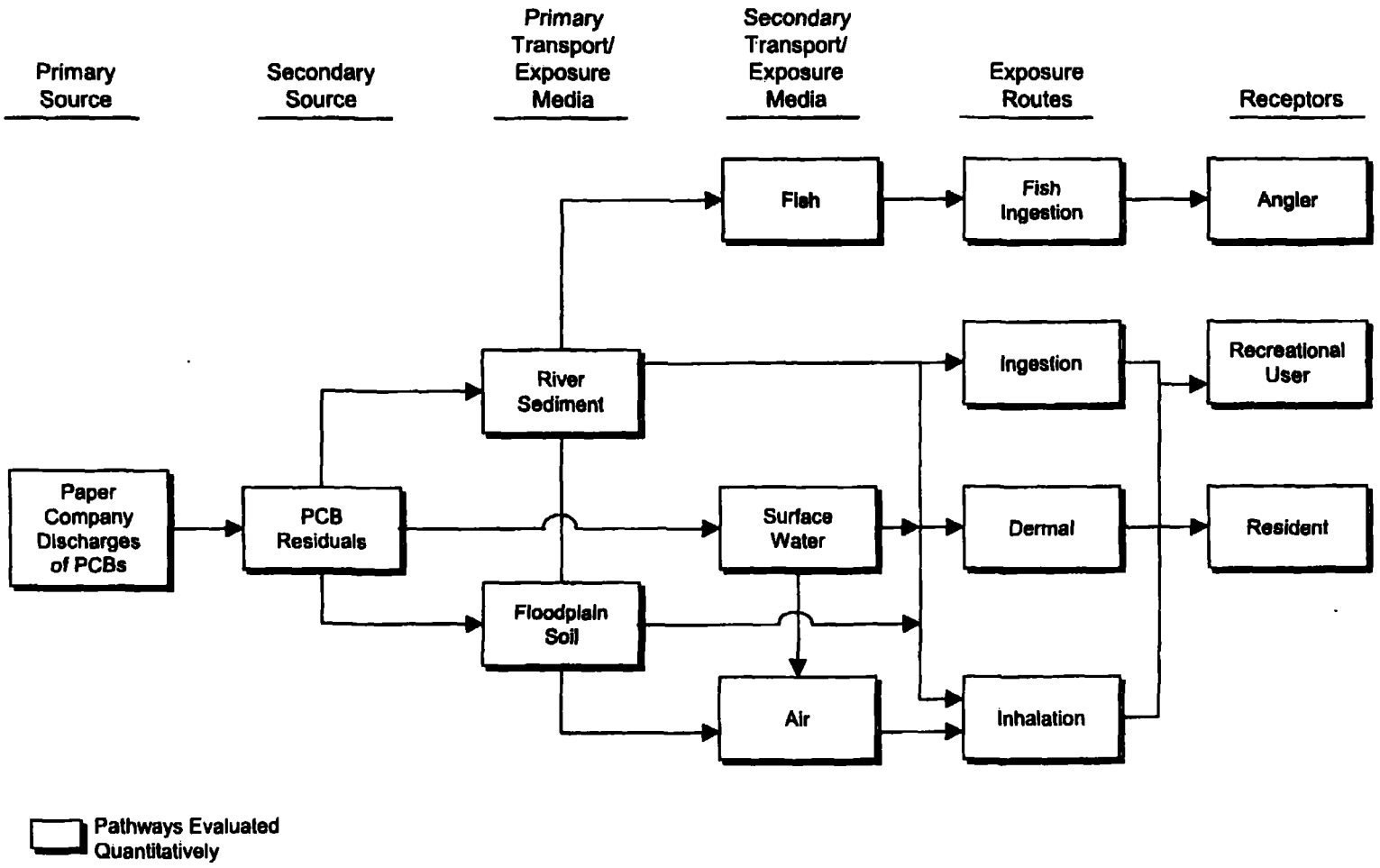
3.4 Exposure Pathways Summary

Figure 3-1 presents a site conceptual model for the API/PC/KR site. The conceptual model identifies potential receptors and exposure pathways. The model is a graphic summary to the preceding pathways and receptor analyses.

As discussed above, exposure pathways are the mechanisms by which people are exposed to chemicals from a site. A pathway is the route between a contaminated medium and a receptor. Some exposure pathways were evaluated qualitatively; i.e., a discussion of the relative insignificance of these pathways was provided to support eliminating them from further consideration. Some pathways were evaluated quantitatively; i.e., numerical estimates of cancer risks and noncancer hazards were generated. Receptors and exposure pathways quantitatively evaluated for this site include:

- Sport anglers - fish ingestion
- Subsistence anglers - fish ingestion
- Residents living adjacent to exposed floodplain soil - incidental ingestion of, dermal contact with, and inhalation of particles and the volatile fractions of floodplain soil
- Recreationalists exposed to floodplain soil - incidental ingestion of, dermal contact with, and inhalation of particles and the volatile fractions of floodplain soil

The Kalamazoo River is used for swimming, boating, and fishing. While a fish consumption advisory has been issued by the MDCH, the advisory is not legally binding, and local health officials and other local government representatives reported observing frequent fishing activity within the contaminated zone of the river (MDCH 1999). Subsistence level consumption of fish from the river cannot be ruled out.



CDM

Figure 3-1
Site Conceptual Model
API/PC/KR Site

NCRKZOO0168533

Fish ingestion is the primary exposure pathway for the API/PC/KR site. PCBs bioaccumulate in the food chain. Ingestion of fish is likely to result in higher exposures and greater risks than direct exposures to sediment and surface water containing PCBs. Exposure to floodplain soils is also considered to be significant, and was evaluated quantitatively due to the close proximity of residential areas to the floodplain soils.

Residents live immediately adjacent to former impoundment areas and may frequently use these areas much as other residents use their backyards. For example, large, well-maintained vegetable gardens have been found in the impoundments. Further, gray paper waste residual materials have been observed in residential yards, suggesting that exposures could take place in some areas outside the floodplain.

The recreational user of the river is likely exposed to instream sediment and surface water during swimming or wading activities or to floodplain soil, including soils near the three former MDNR impoundments, during other recreational activities.

A number of recreational activities are undertaken along the Kalamazoo River including hunting, picnicking, mushroom and berry picking, and bird watching. Hunting seasons for the following animals draw recreationalists to the banks of the Kalamazoo from September through May: rabbit (September 15 through March 31); deer (archery: October 1 through November 14; firearm: November 15 through 30; muzzle-loading: December 10 through 19); grouse (September 15 through November 14 and December 1 through January 1); squirrel (September 15 through January 1); turkey (October 4 through November 9 and April 12 through May 31); woodcock (September 25 through November 8); fox (October 15 through March 1) and raccoon (October 1 through January 31). Exposure to floodplain soil is considered significant for both nearby residents and recreationalists, therefore recreational exposures to floodplain soils was evaluated quantitatively.

The significance of exposures to instream sediment and surface water is considered low due to the relatively low surface water and sediment ingestion rates associated with swimming and wading, the low solubility of PCBs in water, and limited absorption through the skin.

Two exposure pathways have not been fully evaluated in this HHRA due to a lack of data. The Kalamazoo River watershed area is used extensively to hunt duck and other waterfowl. A limited and potentially outdated data set exists to quantitatively evaluate this pathway. It is recommended that additional data be collected to determine the potential risks to hunters who ingest duck and other waterfowl.

Volatilization of PCBs from surface water to air has been evaluated in previous risk assessments conducted on sites similar to the API/PC/KR. In the *Baseline Human Health and Ecological Risk Assessment for the Lower Fox River, Wisconsin* (ThermoRetec Consulting Corporation 1999), risk estimates for this exposure pathway were above the EPA risk thresholds. Maximum and average concentrations in the Kalamazoo

River are higher than those detected in the Fox River, indicating that risks may be higher for the API/PC/KR site. This pathway may be evaluated in an addendum to this HHRA.

3.5 Exposure Assumptions

To estimate risks and hazards to populations, the magnitude and nature of exposures to chemicals must first be characterized. Information and assumptions on frequency of exposure, duration of exposure, and consumption rates are used to estimate exposures received by people who eat contaminated fish or who live, work, or play on contaminated soils. These exposure assumptions result from the evaluation of surveys and studies conducted on the behaviors of individuals and groups such as subsistence and sport anglers, and residents. Some exposure assumptions are also based on EPA and MDEQ guidance.

3.5.1 Generalized Assumptions

Tables 3-3, 3-4, and 3-5 summarize the exposure assumptions for sport and subsistence anglers, residents near floodplain soil, and recreationalists respectively. Many exposure assumptions for anglers are taken from the results of angler surveys specific to the Kalamazoo River area. These assumptions are discussed in more detail in Section 3.5.2. Many other assumptions are more generic and are adopted from regulatory guidance. Exposure assumptions for exposure frequency and duration from recreational exposures are based on professional judgment.

Body weight is a standard exposure factor for adult males specified in the Exposure Factors Handbook (EPA 1997). Soil ingestion rate, dermal contact rate, and inhalation rate are age-adjusted rates for individuals from 1 to 31 years of age. These exposure assumptions, along with exposure frequency and duration for residential exposures, are given as standard default assumptions for the residential scenario in Environmental Response Division Interim Operational Memorandum #18: Generic Soil Direct Contact Criteria (MDEQ 2000). Ingestion of soil by nearby residents is assumed to take place year-round because soil from outdoor sources can be entrained into the indoor environment as indoor dust.

Ingestion of soil by recreationalists is assumed to occur only on days when they are on the site. Dermal exposure is limited to periods during which there is no snow cover preventing contact (MDNR 1995). The number of days of exposure per year is based on the assumption that recreational exposure will be frequent because of the proximity of recreational and residential areas. The number of years of exposure is based on a typical upper-range estimate of time at one residence (EPA 1997), reduced to exclude the youngest children who are not expected to wander far from their yards on a regular basis.

Table 3-3 Exposure Assumptions for Sport and Subsistence Anglers API/PC/KR Site

Assumption	Central Tendency Sport Angler	High End Sport Angler	Subsistence Angler	Reference
Body Weight	70-kg	70-kg	70-kg	EPA 1997
Fish Ingestion Rate	0.015 kg/day (24 meals/year)	0.078 kg/day 125 meals/year	0.11 kg/day (179 meals/year)	West 1993
Fraction from Contaminated Source	1.0	0.5	1.0	Site-Specific
Exposure Frequency	365 days/year	365 days/year	365 days/year	EPA 1997
Exposure Duration	30 years (cancer) 30 years (noncancer) 2-7 years (reproductive)	30 years (cancer) 30 years (noncancer) 2-7 years (reproductive)	30 years (cancer) 30 years (noncancer) 2-7 years (reproductive)	EPA
Species	Smallmouth bass (100%) and Smallmouth bass/Carp (76%) (24%)	Smallmouth bass (100%) and Smallmouth bass/Carp (76%) (24%)	Smallmouth bass (100%) And Smallmouth bass/Carp (76%) (24%)	Site-Specific
Reduction Factor	50%	50%	50%	Zabik 1995
Relative Absorption Efficiency	100%	100%	100%	ATSDR 1996

Table 3-4 Exposure Assumptions for Residents Near Floodplains Soils API/PC/KR Site

Assumption	Resident	Reference
Soil Ingestion	114 mg-yr/kg-day (age adjusted)	MDNR 1995
Dermal Contact Rate	353 mg-yr/kg-day (age adjusted)	MDEQ 2000
Inhalation Rate	7.52 m3-yr/kg-day (age adjusted)	MDNR 1995
Age	1-31 years	EPA 1997
Fraction from Contaminated Source	1.0	Site-Specific
Exposure Frequency	350 days/year (ingestion) 245 days/year (dermal)	MDNR 1995
Exposure Duration	30 years (cancer) 30 years (noncancer) 2-7 years (reproductive)	EPA 1997
Relative Absorption Efficiency	0.14	EPA 1998a

Table 3-5 Exposure Assumptions for Recreationalists on Floodplain Soil

Assumption	Resident	Reference
Soil Ingestion	2.8 mg-yr/kg-day 47 mg-yr/kg-day 34 mg-yr/kg-day	MDNR 1995
Dermal Contact Rate	85 mg-yr/kg-day 61 mg-yr/kg-day	EPA 1997b
Inhalation Rate	1.37 m3-yr/kg-day 1.9 m3-yr/kg-day	EPA 1997b
Age	6 - 31 years	Site-Specific
Fraction from Contaminated Source	1.0	Site-Specific
Exposure Frequency	128 days	Site-Specific
Exposure Duration	2-7 years (reproductive) 24 years (immunological) 24 years (cancer)	EPA 1997b EPA 1997b EPA 1996
Relative Absorption Efficiency	0.14	EPA 1998

For reproductive effects, an exposure duration of 2 to 7 years is used based on toxicity studies that indicate adverse effects on the fetus such as reduced birth weight, reduction in gestational age, and reduced head circumference. Two to seven years is a conservative estimate based on an assumption that continuing exposure over a fairly short time period leading up to conception could result in toxic levels of PCBs in the developing embryo/fetus. In practice, the exposure duration term for noncancer health effects appears in both the numerator and denominator of exposure equations. Thus, when all other parameters are kept constant, changing the exposure duration does not alter hazard estimates. The short exposure duration assumption therefore reflects a qualitative judgment of potential for health effects and does not affect calculated hazards. Section 4 of this report describes the toxicity of PCBs in more detail.

For recreationalists, unitized contact rates are not provided in MDEQ guidance. Soil ingestion for the recreationalist is based on 100 milligrams ingestion for each day of exposure. The unitized ingestion rate is derived as follows:

100 mg / day * exposure duration / 70 kilograms bodyweight

The dermal contact rate for recreationalists assumes exposures of the face, forearms, and hands and a soil adherence factor of 0.07 (MDNR 1995). The unitized dermal contact rate is derived as follows:

2,572 cm^2 * 0.07 * exposure duration / 70 kilograms bodyweight

The inhalation rate for recreationalists assumes an hourly inhalation rate for moderate activities of 1.0 m^3 (EPA 1997). The unitized inhalation rate is derived as follows:

1.0 m^3/hour * 4 hours/day * exposure duration / 70 kilograms bodyweight

An exposure time of 4 hours per day is based on professional judgment. Additional details on the derivation of these assumptions are presented in Section 3.5.2.

3.5.2 Specific Exposure Assumptions

3.5.2.1 Fish Ingestion Rates

A key factor in assessing the risks and hazards associated with ingestion of sport-caught or subsistence-caught fish is the ingestion rates of the sport and subsistence anglers. Two key studies of fish ingestion behaviors of anglers in the Great Lakes region were conducted by Patrick West of the University of Michigan: Michigan Sport Anglers Fish Consumption Survey (1989) and Michigan Sport Anglers Fish Consumption Study (1993). In 1989, West surveyed a stratified random sample of Michigan residents with fishing licenses. Each of 18 cohorts received a questionnaire 1 week apart between January and May 1989. The survey included both a "short-term recall" component and a "usual frequency" component. The respondents were also asked to recall serving size based on comparison with a picture of a cooked 8-ounce fish portion. A total of 2,334 survey questionnaires were delivered and 1,104 were completed and returned giving a 47.3 response rate. Average fish consumption by age group, education level, place, and years of residence were reported. Because the study was conducted in the winter and spring when fishing activity may be relatively low, it may underestimate fish ingestion rates, even though respondents were asked to recall year-round consumption rates.

In 1993, a follow-up survey was conducted by West. A total of 7,000 survey questionnaires were delivered and 2,681 were completed and returned. A response rate of 46.8 was calculated by removing those respondents who could not be located or who had not resided in Michigan for at least 6 months. Estimates of fish consumption were reported by minority status and income status (low-income or non-low-income) for both sport and commercial fish. Respondents were also surveyed on education, species targeted, and cooking methods. The survey period extended for a year, covering all four seasons. The strengths of both of these surveys are sample size and reliance on short-term recall (EPA 1995c).

Minority, low-income respondents were reported to have the highest ingestion rates followed by nonminority low-income respondents. The 95th percentile ingestion rates for minority, low income (109 grams/person/day) and nonminority low-income (78 grams/person/day) respondents were used to represent subsistence and high end sport angler ingestion rates. Ingestion rates are normalized over a 365-day period by multiplying the number of fish meals by the serving size and dividing by 365 days/year. A typical serving size of 8 ounces (225 grams) is used (EPA 1996).

EPA has conducted a statistical validation of the West data showing strong correlation between 7 day recall ingestion rates and long-term recall ingestion rates (EPA 1995b). The Kalamazoo River survey may have resulted in a bias toward populations who only fished during daylight hours when the survey was conducted. The lack of interview data from Hmong anglers has been previously noted and may present a deficiency regarding subsistence fishing patterns. Responses to questions regarding catch and release practices resulted in some apparent inconsistent responses. When asked if they practice "catch and release" only, 73.5 percent of

respondents answered yes, although a total of 44 percent also reported eating fish from the Kalamazoo River and/or Portage Creek. *The Kalamazoo River Angler Survey and Biological Testing Study* (MDCH 1998) was conducted to determine the utilization of the affected portions of Portage Creek and the Kalamazoo River by sport anglers or other persons who regularly eat fish from these waters. Face to face interviews were conducted with 938 individuals in Kalamazoo and Allegan Counties. Fish ingestion rates by age, education, race, gender, smoking, and drinking status were reported. About 75 percent of anglers surveyed reported they eat fish from the river no more than one meal per month (7 grams/person/day). Slightly more than 10 percent reported eating fish more often than one meal per week (32 to 65 grams/person/day). The mean ingestion rate for sport anglers was reported as 24 meals/year.

A second Kalamazoo River Angler Survey was conducted by Dr. Charles Atkin of Michigan State University (Atkin 1994). The survey was conducted via long-distance telephone interviews and included 690 respondents. Interviews were conducted in six counties: Allegan, Barry, Calhoun, Eaton, Kalamazoo, and Ottawa. Thirty-three percent of the study participants were from Kalamazoo and Allegan Counties. While the study's applicability to this HHRA is limited by the fact that less than a dozen people from Kalamazoo County and less than 50 people from Allegan County (the two counties within the KRSS) were actually asked which fish were eaten, and questions exist regarding validity of questions, answers, or data entry, several of the conclusions of the study support the use of a number of assumptions in the HHRA:

- Those who consume fish eat an average of 2.6 meals per week, slightly higher than the 2.4 meals per week used for the sport angler (high end) in the HHRA.
- Average serving size was 8.66 ounces, higher than the 8 ounce assumption used in the HHRA.
- Six percent of those surveyed overall indicated they eat bottom-feeding fish, lending additional support to include a representative bottom-feeder in the HHRA. Regarding consumption of bottom feeders, a slightly greater percentage of participants in Kalamazoo and Allegan Counties, compared to the study group overall, indicated they consume carp, catfish, and suckers.
- Thirty percent of those eating bottom feeding fish reported they sometimes or never remove or puncture the skin and 30 percent of those eating fish reported they sometimes or never trim fat from fish. These results suggest that the reduction factor used to account for trimming and cooking practices may represent more of an average than a high end value. Reduction in PCB exposure due to trimming and cooking may be higher than assumed in this assessment for relatively large number of anglers in the area.

The *Great Lakes Water Quality Initiative Technical Support Document for Human Health Criteria and Values* (EPA 1995) reports a 15 grams/person/day ingestion rate as the mean value for sport anglers in the Great Lakes Basin and as the 90th percentile for

the overall population in the Basin. The value of 15 grams/person/day was derived from a review of several regional studies in Michigan, (West 1989, 1993) Wisconsin (Fiore, et al. 1989), and New York (Connelly, et al. 1990). This fish ingestion rate is used by the MDEQ Surface Water Quality Division to establish surface water quality standards. The 15 grams is divided into the grams of trophic level 3 fish consumed (3.6 grams) and the grams of trophic level 4 fish consumed (11.4 grams) as reported in the West, et al. (1993) survey. This value is also consistent with the Kalamazoo River Angler Survey (MDCH 2000), which reports a mean value for sport anglers of 24 meals/year (24 meals/year * 8 ounces/meal * 28.3 grams/ounce ÷ 1 year/365 days = 15 grams/person/day).

3.5.2.2 Species Consumed

Four species of fish were collected from the API/PC/KR during the Biota Investigation: carp, smallmouth bass, sucker, and golden redhorse. Carp and smallmouth bass were targeted as bottom dwelling fish and sport fish respectively, and representative data from analysis of fillets was available for both species. The following species were reportedly consumed by Kalamazoo River Angler Survey respondents: catfish (83.6 percent); bass (69 percent); panfish (63 percent); walleye (46 percent); bullheads (29.9 percent); carp (27 percent); and suckers (13 percent). West reported 48 percent of individuals consumed smallmouth bass and 7 percent consumed carp. In terms of species consumed, the West data are considered less reliable than the Kalamazoo River Survey because the water bodies covered included fish species not found or not prevalent in the Kalamazoo River.

Two scenarios were evaluated for both sport and subsistence anglers: 1) ingestion of 100 percent smallmouth bass; and 2) ingestion of a combination of 76 percent bass and 24 percent carp based on the percentage of trophic level 3 fish (carp) and trophic level 4 fish (smallmouth bass) reported to be consumed (West 1993). For the first scenario, exposure concentrations were based solely on smallmouth bass data collected from the site. For the second scenario, a combination of smallmouth bass and carp data were used. Total ingestion rates were apportioned across the two species accordingly. Skin-on data were used for bass and skin-off data were used for carp. Skin-on or skin-off reflects preferences found for preparation methods among anglers (West 1993).

3.5.2.3 Reduction Factors

Fish advisories typically include recommendations on trimming and cooking fish that can result in a reduction in the delivered dose of a chemical. The 2000 Michigan Fish Advisory includes the following recommendations:

- Trim fatty areas (removal of the skin, belly fat, lateral, and dorsal fat).
- Remove or puncture skin before cooking allowing the fat to drain off.
- Cook so fat drips away. Bake, broil, or grill on a rack, or poach and do not use the liquid.

- Deep-fry trimmed fillets in vegetable oil.
- Do not pan-fry in butter or animal fat, and do not make fish soups or chowder.

The advisory states that a reduction of 50 percent of the contaminants in fish can be eliminated by following these practices.

In *Protocol for a Uniform Great Lakes Sport Fish Consumption Advisory* (GLFATF 1993), the effects of trimming and cooking are discussed. Fish that contain high concentrations of lipids are likely to have higher concentrations of lipophilic chemicals, such as PCBs. Removal of the fatty portions of fish will reduce the overall ingestion of PCBs. Cooking typically reduces a 1/2-pound raw sample to 1/3-pound cooked weight. The Protocol reports that the contaminant concentration (on a mg/kg basis) after cooking was most often the same as before cooking, though due to the reduced size of the sample, total delivered dose would be lower.

Data reported in the Kalamazoo River Angler Survey indicate that 35 percent of anglers leave the skin on fish prior to cooking. Based on data reported by ethnicity in the 1991-1992 Michigan Sport Anglers Study, between 44 and 84 percent of minority respondents reported not trimming fat from sport fish prior to cooking. Between 23 and 40 percent reported not removing skin prior to cooking. The most popular method of cooking was reported to be pan frying by 56 percent of anglers.

Based on a review of the preparation and cooking practices reported in the Kalamazoo River Angler Survey, the Michigan Anglers Survey, and the Great Lakes Protocol, a cooking reduction factor of 50 percent was incorporated into the equations used to estimate risks and hazards for the high end sport angler and the subsistence angler. No additional reduction was assumed to result from trimming, given the practices reported in the angler surveys. In a study by Zabik and others (Zabik 1995), pesticides and total PCBs were determined in raw and cooked skin-on and skin-off chinook salmon harvested from Lakes Huron and Michigan, as well as in carp fillets harvested from Lakes Erie and Huron. The effects of baking, charbroiling, and canning salmon and pan and deep fat frying carp on contaminant loss were measured. Average losses of total PCBs for carp ranged from 30 to 35 percent (Zabik 1995). A 22 percent reduction in PCBs, expressed as micrograms per fillet in raw and pan fried skin-on carp fillets, was reported. While a 50 percent reduction factor is not in the upper range of probable values for the site, it is a reasonable estimate. Protective exposure estimates can be based on a mix of upper-range and average assumptions (EPA 1997). Using a reduction factor of 50 percent is not likely to cause substantial underestimation of possible exposures.

3.5.2.4 Fraction from Contaminated Source

The high end sport anglers were assumed to frequent different locations to fish. Some of these locations may include water bodies other than the Kalamazoo River. Fifty percent of their total fish ingestion was assumed to come from the API/PC/KR site.

Within the site, it is also possible to fish from different ABSAs, though average risks and hazards would not vary significantly depending on location within the site because detected fish concentrations are relatively consistent from ABSAs 3 through 11.

To be consistent with the MDEQ Surface Water Quality Division, the fraction of exposure from the API/PC/KR site was assumed to be 100 percent for the central tendency angler.

The subsistence angler population was assumed to be more likely to fish from one area. A low-income population may not have ready access to transportation that would allow them to travel to different areas to fish. The fraction of exposure from the API/PC/KR site was also assumed to be 100 percent for the subsistence angler population.

Nearby residents and recreationalists were assumed to receive 100 percent of their exposure to soil from the floodplain soil on days when exposure occurred.

3.5.3 Exposure Point Concentrations

Average and maximum concentrations were used to reflect a range of exposure point concentrations for the angler and nearby resident scenarios. These concentrations are presented on Tables 2-1 and 2-3.

3.5.4 Intake Equations

The intake or dose from the ingestion of fish is calculated using the equation presented on Figure 3-2 (EPA 1989). The equation for intake or dose from the ingestion, dermal, and inhalation of floodplain soil is presented in Figure 3-3 (MDEQ 1995). The values for the variables in these equations are discussed above in Section 3.5.2. Note that EPA equations do not generally present unitized contact rates for soil ingestion, dermal contact, and inhalation rates. Unitized rates, however, are simply combinations of basic parameters such as ingestion and inhalation rates, body surface area, exposure duration, and body weight. All of these parameters are included in standard EPA equations. Thus, equations in Figures 3-2 and 3-3 are exact equivalents of those presented in EPA (1997c).

Figure 3-2
Formula used for The Calculation of Intake
Fish Ingestion

$$I = \frac{C * RF * IR * FI * EF * ED}{BW * AT}$$

Where:

I	=	Intake (mg/kg-day)
C	=	Concentration in Raw Fish Filet (mg/kg) [1]
RF	=	Reduction Factor (unitless)
IR	=	Ingestion Rate (kg/day)
FI	=	Fraction Ingested (unitless)
EF	=	Exposure Frequency (days/year)
ED	=	Exposure Duration (years)
BW	=	Body Weight (kg)
AT	=	Averaging Time (days)

[1] Intakes were estimated using both average and maximum fish tissue concentrations.

Figure 3-3
Formula used for The Calculation of Intake
Floodplain Soils - Ingestion/Dermal Contact/Inhalation

$$I = C * FC \left[\frac{(EF_i * IR_{soil} * AE_i) + (EF_d * DF * AE_d) + (EF_{inhal} * IR_{air} * AE_{inhal} (VF + PEF))}{AT * CF} \right]$$

Where:

I	=	Intake (mg/kg-day)
C	=	Concentration in Soil (µg/kg)
FC	=	Fraction of Soil Contaminated (unitless)
IR_{soil}	=	Ingestion Rate (Soil) (mg-yr/kg-day)
DF	=	Dermal Factor (mg-yr/kg-day)
IR_{air}	=	Inhalation Rate (Air) (m^3-yr/kg-day/day)
EF_i	=	Exposure Frequency (Ingestion) (days/year)
EF_d	=	Exposure Frequency (Dermal) (days/year)
EF_{inhal}	=	Exposure Frequency (Inhalation) (days/year)
AEi	=	Absorption Efficiency (Ingestion) (unitless)
AEd	=	Absorption Efficiency (Dermal) (unitless)
AE_{inhal}	=	Absorption Efficiency (Inhalation) (unitless)
VF	=	Soil to Air Volatilization Factor (mg/m^3-air/mg/kg-soil)
PEF	=	Particulate Emission Factor (mg/m^3-air/mg/kg-soil)
AT	=	Averaging Time (days)
CF	=	Conversion Factor (µg/kg)

Section 4
Toxicity Assessment

PCBs have been associated with both cancer and noncancer health effects. Noncancer health effects include neurotoxicity, reproductive and developmental toxicity, immune system suppression, liver damage, skin irritation, and endocrine disruption (EPA 1996). A toxicity profile summarizing carcinogenic and noncarcinogenic health effects associated with PCBs is included in Appendix E. A brief overview of key studies of human health effects of PCBs is presented below.

4.1 Summary of Health Effects Associated with PCBs

ATSDR and EPA have jointly developed a technical paper, Public Health Implications of Polychlorinated Biphenyls (PCBs) Exposure. Human health studies discussed in this paper indicate that exposure to PCBs have been linked to the following health impacts:

- Effects on reproductive function in women
- Neurobehavioral and development deficits in newborns and school-age children from in utero exposure
- Liver disease, immune function impacts, and thyroid effects
- Increased cancer risks

Several studies have demonstrated a correlation between fish consumption by mothers, and developmental disorders and cognitive deficits in children. In the first of these studies, conducted by Jacobson (Jacobson, et al. 1985, 1990a, 1990b), statistically significant decreases in gestational age, birth weight, and head circumference were observed and continued to be evident 5 to 7 months after birth. Neurobehavioral deficits were observed including depressed responsiveness, impaired visual recognition, and poor short-term memory at 7 months of age, which continued to be present at 4 years of age. While recognized limitations exist in these studies, including the pooling of blood samples, which is no longer a recognized technique, more recent studies have provided supportive evidence of the relationship between PCB exposure and developmental effects.

In a study of prenatal exposure and neonatal behavioral assessment scale (NBAS) performance, cord blood PCBs, DDE, HCB, Mirex, lead, and hair mercury levels were determined for 152 women who reported never consuming Lake Ontario fish and 141 women who reported consuming at least 40 PCB-equivalent pounds of Lake Ontario fish over a lifetime. Past PCB exposure was related to impaired performance on those NBAS clusters associated with fish consumption, namely habituation and autonomic clusters. Results revealed significant linear relationships between the most heavily chlorinated PCBs and performance impairments 25 to 48 hours after birth. Higher prenatal PCB exposure was also associated with nonspecific performance

impairment (Stewart, et al. 2000). Exposure to lower molecular weight PCBs (i.e., PCBs containing fewer chlorine atoms) was unrelated to NBAS performance.

Studies in Japan and Taiwan of PCB exposure from consumption of contaminated rice oil have contributed to evidence of an association between PCBs and neurobehavioral effects. The illnesses were originally referred to as Yusho disease in Japan and Yu-Cheng disease in Taiwan. In earlier studies (Bandiera, et al. 1984; Kunita, et al. 1984; Masuda and Yoshimura 1984; Ryan, et al. 1990; ATSDR 1996) co-contaminants in the rice oil, particularly chlorinated dibenzofurans (CDFs), were considered to be the primary causal agent. Recent studies, however, involving a reexamination of previous studies and newer results from a study of children born later to exposed mothers have demonstrated developmental delays associated with maternal exposure to PCBs and CDFs (Guo, et al. 1995; Chao, et al. 1997).

A study of Inuit women from Hudson Bay indicated an association between levels of PCBs and dichlorodiphenylethene (DDE) in breast milk and a statistically significant reduction in male birth length (Dewailley, et al. 1993a). No significant differences were observed between male and female newborns for birth weight, head circumference, or thyroid-stimulating hormone.

A study of 338 infants of mothers occupationally exposed to PCBs during the manufacture of capacitors indicated a decrease in gestational age (6.6 days) and a reduction in birth weight (153 grams) at birth in infants of mothers directly exposed to PCBs (Taylor, et al. 1984). A follow-up study of 405 women in this population demonstrated that serum total PCB levels in women with direct exposure to PCBs were more than four-fold higher than for women in indirect-exposure jobs. A decrease in birth weight and gestational age was found for the infants of these women (Taylor, et al. 1989).

Immune system effects on persons exposed to PCBs have been reported in several studies. A significant negative correlation between weekly consumption of fish containing PCBs from the Baltic Sea and white cell count was reported (Svensson 1994). Immune system effects were reported in Inuit infants who were believed to have received elevated levels of PCBs and dioxins from their mother's breast milk. Effects included a decline in the ratio of the CD4+ (helper) to CD8+ (cytotoxic) T-cells at ages 6 and 12 months (Dewailley, et al. 1993). Infants examined from birth to 18 months who were exposed to PCBs/dioxins in the Netherlands exhibited lower monocyte and granulocyte counts and increases in the total number of T-cells and the number of cytotoxic T-cells (Weisglas-Kuperous, et al. 1995). An increase in serum PCB levels was associated with a decrease in natural killer cells (Hagamar, et al. 1995).

Effects on the thyroid have been reported in a study of the Dutch population. Higher CDD, CDF, and PCB levels in human milk correlated significantly with lower plasma levels of maternal total triiodothyronine and total thyroxine and higher plasma levels

of thyroid-stimulating hormone in infants during the second and third month after birth (ATSDR 1998).

Occupational studies show some increases in cancer mortality in workers exposed to PCBs. Significant excesses of cancer mortality were found for liver, gall bladder, and biliary tract cancer (Brown 1987), however, co-exposure to other chemicals in the workplace limits the strength of the association to PCBs. Mortality from gastrointestinal tract cancer in males and hematologic neoplasms in females was reported for capacitor workers in Italy (Bertazzi, et al. 1987). Limitations in this study include a small number of cases, short exposure period, and lack of pattern or trend when data were analyzed by duration of exposure. The results of these studies have been evaluated and are considered inconclusive by ATSDR (1996).

Evidence of an association between exposure to PCBs by capacitor workers and mortality from malignant melanoma was reported (Sinks, et al. 1992). The workers were also exposed to various solvents. More deaths were observed than expected for malignant melanoma (8 observed versus 2 expected) and cancer of the brain and central nervous system (5 observed versus 2.8 expected). Limitations include a small number of cases, insufficient monitoring data, unknown contribution of exposure to solvents, and possible bias due to the healthy worker effect. The results of this study have been evaluated and are considered inconclusive by ATSDR.

A recent study of male and female capacitor workers reported mortality from all cancers was significantly below expected for hourly male workers and comparable to expected for female workers (Kimbrough, et al. 1999). Limitations with this study include:

- Exposed and unexposed workers were included as one group diluting any potential cancer findings
- Seventy-six percent of the workers never had exposure to PCBs
- Only 4 percent of the workers had any PCB blood data and only 2 percent worked in jobs with high exposure to PCBs
- Seventy-nine percent of the workers who did die of cancer had PCB exposures less than 1 year

The ATSDR has stated it is untenable to dismiss concerns for carcinogenicity of PCBs. In 1999, the ATSDR convened an Expert Panel Review of the Toxicological Profile for PCBs. The panel concurred that the Kimbrough study of General Electric capacitor workers could not be used to dismiss the carcinogenic potential of PCBs (Bove, et al. 1999).

For reasons such as those above, EPA also concludes that the limitations of the Kimbrough study prevent conclusions to be drawn regarding the carcinogenicity of

PCBs. While all human studies have limitations and confounders, controlled animal studies, such as a long-term bioassay conducted by General Electric (Mayes 1998) provide conclusive evidence that PCBs, including the lower chlorinated forms (i.e., Aroclor 1016 and 1242) cause cancer in experimental animals. For this reason, the International Agency for Research on Cancer and EPA have concluded that the PCBs are probable human carcinogens. These conclusions are independently consistent with the National Toxicology Program's eighth Report on Carcinogens, which lists PCBs as "reasonably anticipated to be human carcinogens."

A recent study demonstrated a strong dose-response relationship between total lipid-corrected serum PCB concentrations and the risk of non-Hodgkin lymphoma (Rothman, et al. 1997). These findings are consistent with another study where residues of PCBs in adipose tissue of non-Hodgkin's lymphoma patients were higher than those of control patients (Hardell, et al. 1996). In studies of capacitor workers, significantly increased risks were reported for lymphatic/hematological malignant (LHM) diseases among female capacitor workers but non-significant increases were found for male workers (Bertazzi, et al. 1987). Two other studies found no evidence of increase in LHM among workers (Brown 1987; Sinks, et al. 1992).

Health Studies in the Great Lakes Basin

Research indicates that the primary pathway of exposure to PCBs in the Great Lakes region is from fish consumption. Recent evidence indicates an association between PCB exposures through fish consumption and reproductive and developmental effects. Newborns of mothers in the high fish consumption category exhibited a greater number of abnormal reflexes, less mature autonomic responses, and less attention to visual and auditory stimuli (Lonky, et al. 1996).

The Lake Michigan Maternal Infant Cohort study was the first epidemiologic investigation to demonstrate an association between the self-reported amounts of Lake Michigan fish eaten by pregnant women and behavioral deficits in their newborns. The 242 infants born to mothers who had eaten the greatest amount of contaminated fish during pregnancy had (1) more abnormally weak reflexes; (2) greater motor immaturity and more startle responses; and (3) less responsiveness to stimulation (ATSDR 1998). A follow-up examination of 212 children indicated that the neurodevelopmental deficits found during infancy and early childhood still persisted at age 11 years (Jacobsen and Jacobsen 1996).

In a study of nervous system dysfunction in adults exposed to PCBs and other persistent toxic substances, motor slowing and attention difficulties were directly related to the frequency of consumption of St. Lawrence Lakes fish (Mergler 1997, 1998).

In an ongoing study of Native Americans in Minnesota, Wisconsin, and Michigan preliminary results indicated elevated serum PCB levels were correlated with self-reported diabetes and liver disease (Dellinger, et al. 1997; Tarvis, et al. 1997;

Gerstenberger, et al. 1997). The average annual fish consumption rate was 23 grams per day.

In a study of the PCB congener profile in the serum of humans consuming Great Lakes fish, an established cohort of persons with robust exposure to contaminants in recreationally caught Great Lakes fish were shown to have significant quantities of serum PCBs still present 15 years after enrollment in the study. The current levels of PCBs in this group were far above those found in enrollees of more recent fish eater studies. Identification of the PCB profile in fisheaters and non-fish eaters revealed the presence of several congeners that have the potential to affect biologic or health outcomes. Investigators are currently in the process of evaluating neuropsychologic function and thyroid function in the Lake Michigan fisheaters for which PCB congener profiles were established (Humphrey, et al. 2000)

The Kalamazoo River Angler Survey (MDCH 2000b) included a second phase, which included a health survey and biological testing. In this second phase, individual self-reported medical information and fish consumption patterns were obtained and chemical analyses for PCBs, DDE, and mercury was performed on blood samples of 151 out of the original 938 survey participants. The study attempted to analyze for possible associations between chemical residue levels and self-reported health problems for fisheaters and compared chemical residue data from this study cohort to other fish eating populations previously studied.

The study reported that "medical problems reported as subjective symptoms (upset stomach, nausea, headache, or dizziness) were not measurable or quantifiable in an objective way. Statistically significant associations were not found between contaminant residues levels and self-reported medical problems. However, those anglers who considered themselves to be in good health appeared to be less likely to have blood PCB levels above median values for the aggregate group than anglers who considered themselves to be in fair/poor health."

Significantly higher levels of PCBs were found in fisheaters compared with non-fish eaters. The geometric mean for fisheaters was 2.1 ppb PCBs in blood and for non-fish eaters was 1.11 ppb PCBs in blood. Increasing residue levels for PCBs suggested a good correlation with age reflecting the persistence of these compounds in human tissues and possible higher past exposures. In contrast to previous studies of sport anglers, the Kalamazoo River Survey appears to indicate lower exposure to PCBs. Lake Michigan open water fisheaters were first evaluated in 1979-1980 and reevaluated in 1989 (Humphrey 1988; Hovinga, et al. 1992). The Lake Michigan fisheaters consumed an annual average of 32 pounds (64 meals per year) of sport-caught fish, whereas the Kalamazoo anglers consumed an annual average of 9 pounds (18 meals per year) of sport-caught fish. The Kalamazoo fisheaters more closely resembled the non-fish eaters in the Lake Michigan study.

In a comparison of Kalamazoo anglers with a survey of anglers on Wisconsin inland lakes and rivers (Fiore 1989), the following was observed: (1) Kalamazoo anglers ate on average less fish than the Wisconsin anglers but had higher PCB levels; (2) 59 of the Wisconsin anglers had no detectable PCBs while only 10 Kalamazoo River anglers were non-detectable; (3) the upper range of serum PCBs (73 ppb) reported in Kalamazoo was more than two and one-half times the upper range seen in Wisconsin (27.1 ppb).

Limitations of Phase II of the Kalamazoo River Angler Survey include: (1) selection bias in that the study group was self-selected; (2) fish consumption within the past 12 months was used as the exposure variable, rather than historic consumption; (3) response bias due to participants knowing the purpose of the study; and (4) biases associated with self-reporting health effects.

4.2 Cancer Dose Response Evaluation

A recent reevaluation of the cancer dose response relationship for PCBs introduced a new approach for evaluating cancer risks associated with PCB exposure. This approach includes a range of cancer slope factors to be used depending on the medium of exposure and the form of the PCBs (persistent PCBs, dioxin-like congeners, and tumor-promoting congeners). Other features of this approach include:

- Upper-bound and central slope estimates, with guidance on when each is appropriate
- A procedure for adjusting exposure duration to include internal exposure, reflecting persistence in the body
- Incorporation of biologically-based modeling results of tumor-promotion and cell dynamics
- Application of new principles from EPA's cancer guideline revisions (EPA 1994a, 1994b)

Three tiers of human slope factors for environmental PCBs have been developed by EPA as presented in Table 4-1. Exposure pathways to be evaluated in the HHRA fall in the high risk and persistence category with the exception of inhalation of volatile PCBs, which is in the low risk and persistence category. The upper bound slope factor (2 mg/kg-d^{-1}) is used to quantify risks for all pathways except for inhalation.

Table 4-1 Range of PCB Slope Factors, API\PC\KR Site

Level of Risk/ Resistance	Slope Factors $(mg/kg\text{-}day)^{-1}$		Criteria for Use
High Risk and Persistence	2.0	1.0	Food chain experiences Sediment or soil ingestion Dust or aerosol inhalation Dermal exposure (if absorption factor) Dioxin-like, tumor-promoting, or persistent congeners Early life exposures
Low Risk	0.4	0.3	Water ingestion Inhalation of Volatile PCBs Dermal exposure (if no absorption factor)
Lowest Risk and Persistence	0.07	0.04	Congeners with more than 4 chlorines comprise less than 0.5 percent of total PCBs

4.3 Noncancer Dose Response Evaluation

EPA has developed reference doses (RfDs) for evaluation of noncancer health effects for two Aroclors - Aroclor 1016 and 1254. Reference concentrations (RfC) have not been developed for evaluation of inhalation exposures. RfDs are therefore used to evaluate ingestion, dermal, and inhalation exposures. The health endpoint for Aroclor 1016 is reproductive effects. The health endpoint for Aroclor 1254 is immunotoxicity (EPA 1999).

Aroclor 1248 is a prevalent contaminant at the site. EPA has not developed an RfD (or other toxicity values) for Aroclor 1248 because a serious health effect, or Frank Effect (death of an offspring), was observed at the lowest dose level received by Rhesus monkeys. In general, Rhesus monkeys have shown adverse effects to PCB mixtures at doses 10-fold lower than in other species. As stated in the *Integrated Risk Information System (IRIS)* file, EPA considers these data inadequate for the derivation of an oral RfD and the chemical is classified as "Non Verifiable." A secondary source of toxicity values, the *Health Effects Assessment Summary Tables* (EPA 1997) does not provide an RfD for Aroclor 1248.

In the absence of an RfD for Aroclor 1248, the RfD for Aroclor 1254 has been used to assess risks associated with exposure to Aroclor 1248. Studies conducted on both mixtures used Rhesus monkeys. The lowest dose administered in the Aroclor 1248 study was 0.03 mg/kg-day. The lowest dose administered in the Aroclor 1254 study was 0.005 mg/kg-day. Observed health effects at the lowest dose in the Aroclor 1254 study included impairment of various immunologic functions. These effects are considered appropriate to determine "lowest observed adverse effects levels" (LOAELS). The RfDs used to evaluate noncancer health effects are presented in Table 4-2.

Table 4-2 Noncancer Toxicity Date – Oral/Dermal/Inhalation, API/PC/KR Site

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD Value	Oral RfD Units	Primary Target Organ	Combined Uncertainty/ Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ [1] (MM/DD/YY)
Aroclor 1254	Chronic	2.0E-05	mg/kg-day	Immune system - decreased antibody (IgG and IgM) response to sheep erythrocyutes	300/1	IRIS	03/08/00
Aroclor 1016	Chronic	7.0E-05	mg/kg-day	Reproductive effects - reduced birth weights	100/1	IRIS	03/08/00

[1] For IRIS values, provide the date IRIS was searched.
For Heast values, provide the date of HEAST
For NCEA values, provide the date of the article provided by NCEA.

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Section 5
Risk Characterization

Risk characterization is the final step in the risk assessment process. In this step, toxicity information is combined with estimates of dose to yield quantitative estimates of cancer risk and noncancer hazard.

5.1 Overview of Noncarcinogenic Hazard Characterization

Noncarcinogenic hazard is measured in terms of a Hazard Quotient (HQ). The HQ is defined by the equation:

$$HQ = ADD / RfD$$

where:

HQ	=	Hazard Quotient associated with the exposure via the specified exposure route (unitless)
ADD	=	Average Daily Dose (in mg/kg/day)
RfD	=	Reference Dose (in mg/kg/day)

or, for inhalation exposures:

$$HQ = [OHM]air / RfC$$

where:

[OHM]air	=	exposure point concentration of the oil or hazardous material in air (in $\mu g/m^3$)
RfC	=	Reference Concentration or substitute toxicity value for chemical (in $\mu g/m^3$)

In evaluating the HQ, potential toxicities of individual chemicals within a mixture are assumed to be additive. Thus, HQs attributable to individual chemicals are generally summed for each receptor to obtain a cumulative hazard index (HI). Such addition is not applicable for this assessment because total PCBs are assessed as a single chemical entity for toxicological purposes.

A cumulative HI also represents the cumulative noncarcinogenic impact that the site has on a particular receptor group. The cumulative HI accounts for exposures that a receptor may receive from multiple chemicals and multiple exposure routes:

$$\text{Total } HI_{route\text{-}specific} = \Sigma\, HQ_{chemical\text{-}specific}$$

$$\text{Cumulative } HI = \Sigma\, HI_{route\text{-}specific}$$

The HQ is a unitless ratio of a receptor's exposure level (or dose) to the "acceptable" (or allowable) exposure level. A HI of 1 or less for exposure via all chemicals and routes, or a HQ of 1 or less in the event that only one contaminant and/or exposure route is/are assessed, indicates that the receptor's exposure is equal to or less than an "allowable" exposure level, and adverse health effects are considered unlikely to occur. When the cumulative HI is less than or equal to 1, a conclusion of "no significant risk of harm to human health" based on noncancer effects is appropriate. Both MDEQ and EPA have HI thresholds of 1. HQs were calculated for the various angler receptors, since only one contaminant (PCBs) and one exposure route (fish ingestion) were considered for this group of receptors. HIs were calculated for the residential and recreational receptors, however, due to the summation of HQs for the individual exposure routes of incidental ingestion, dermal contact, and inhalation of fugitive dust.

5.2 Overview of Cancer Risk Characterization

For potential carcinogens, cancer risks are obtained by the following equation:

$$\textbf{Risk} = \textbf{LADD} \times \textbf{CSF}$$

where:

Risk	=	Excess Lifetime Cancer Risk associated with exposure to the chemical via the specified route of exposure
LADD	=	Lifetime Average Daily Dose (in mg/kg/day)
CSF	=	Cancer Slope Factor (in $[mg/kg/day]^{-1}$)

In evaluating the potential cancer risks, it is assumed that potential toxicity of chemical mixtures is additive.

MDEQ has established a cancer risk target value of 1 in 100,000 (10^{-5}). Where cumulative cancer risks exceed this threshold, MDEQ risk managers may determine that some action to reduce exposure and risk may be necessary. The MDEQ risk target falls in the middle to EPA's risk range of 1 in 1,000,000 (10^{-6}) to 1 in 10,000 (10^{-4}). EPA generally considers risks within this range "acceptable," but considerations such as size of affected population may indicate that some action to reduce risk is appropriate. Above this range, EPA risk managers will ordinarily determine that such action is necessary.

5.3 Estimation of Noncarcinogenic Hazard and Carcinogenic Risk

Estimated HQs and cancer risks for each of the seven study areas and three floodplain soil areas are presented in Figures 5-1 through 5-12 and Tables 5-1 through 5-6. The figures present only the hazard quotients/indices for the immunological endpoint, which were higher than those for the reproductive endpoint. Also, results for ABSAs

1 and 2, located upstream of API/PC/KR site sources, are included on the figures for comparative purposes. Hazard quotients/indices for both endpoints are presented in the tables. Separate estimates are presented for each of the angler scenarios, including:

- Subsistence anglers consuming 100 percent smallmouth bass (average and maximum concentrations)
- Subsistence anglers consuming 76 percent smallmouth bass and 24 percent carp (average and maximum concentrations)
- Sport anglers, high end anglers consuming 100 percent smallmouth bass (average and maximum concentrations)
- Sport anglers, high end anglers consuming 76 percent smallmouth bass and 24 percent carp (average and maximum concentrations)
- Sport anglers, CTE anglers consuming 100 percent smallmouth bass (average and maximum concentrations)
- Sport anglers, CTE anglers consuming 76 percent smallmouth bass and 24 percent carp (average and maximum concentrations)
- Residents and recreationalists living near Trowbridge, Plainwell, and Otsego Dam floodplain soils (average and maximum concentrations)

5.3.1 Subsistence Anglers

5.3.1.1 Cancer Risks

As presented on Tables 5-1 and 5-2 and Figures 5-1 through 5-4, cancer risks to subsistence anglers who ingested either 100 percent smallmouth bass or 76 percent smallmouth bass and 24 percent carp exceeded MDEQ and EPA cancer risk thresholds for both average exposure point concentrations (EPCs) and maximum EPC scenarios for all ABSAs in the API/PC/KR site. Cancer risks were in the range at or above 1 in 10,000 for study areas ABSA 3, 4, 5 (combined), ABSAs 6 and 11 for average concentrations, and ABSA 11 for maximum concentrations. Cancer risks were in the range at or above 1 in 1,000 for both average EPCs and maximum EPC scenarios for all other ABSAs. The highest cancer risks for the single species scenario was in ABSA 9, where cancer risks using maximum concentrations were estimated as 4 in 1,000. The highest cancer risks for the mixed species scenario were in ABSA 3, 4, 5 (combined), where risks using maximum concentrations were 5 in 1,000.

Range of Cancer Risk Estimates by ABSA and by Exposure Scenario Based on Average Concentrations of PCBs in Smallmouth Bass (100% of Consumption)

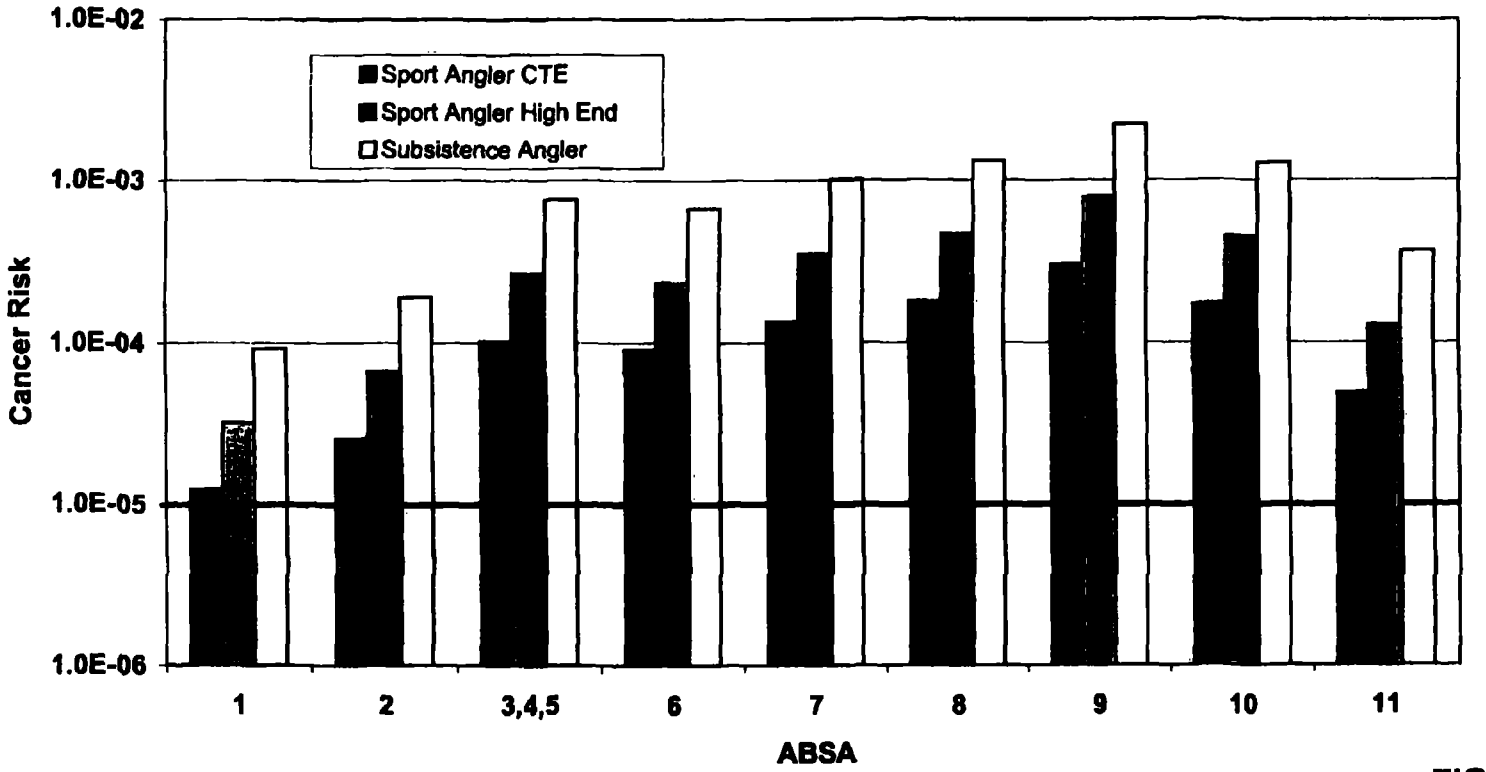

FIGURE 5-1

API/PC/KR SITE

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Range of Cancer Risk Estimates by ABSA and by Exposure Scenario Based on Maximum Concentrations of PCBs in Smallmouth Bass (100% of Consumption)

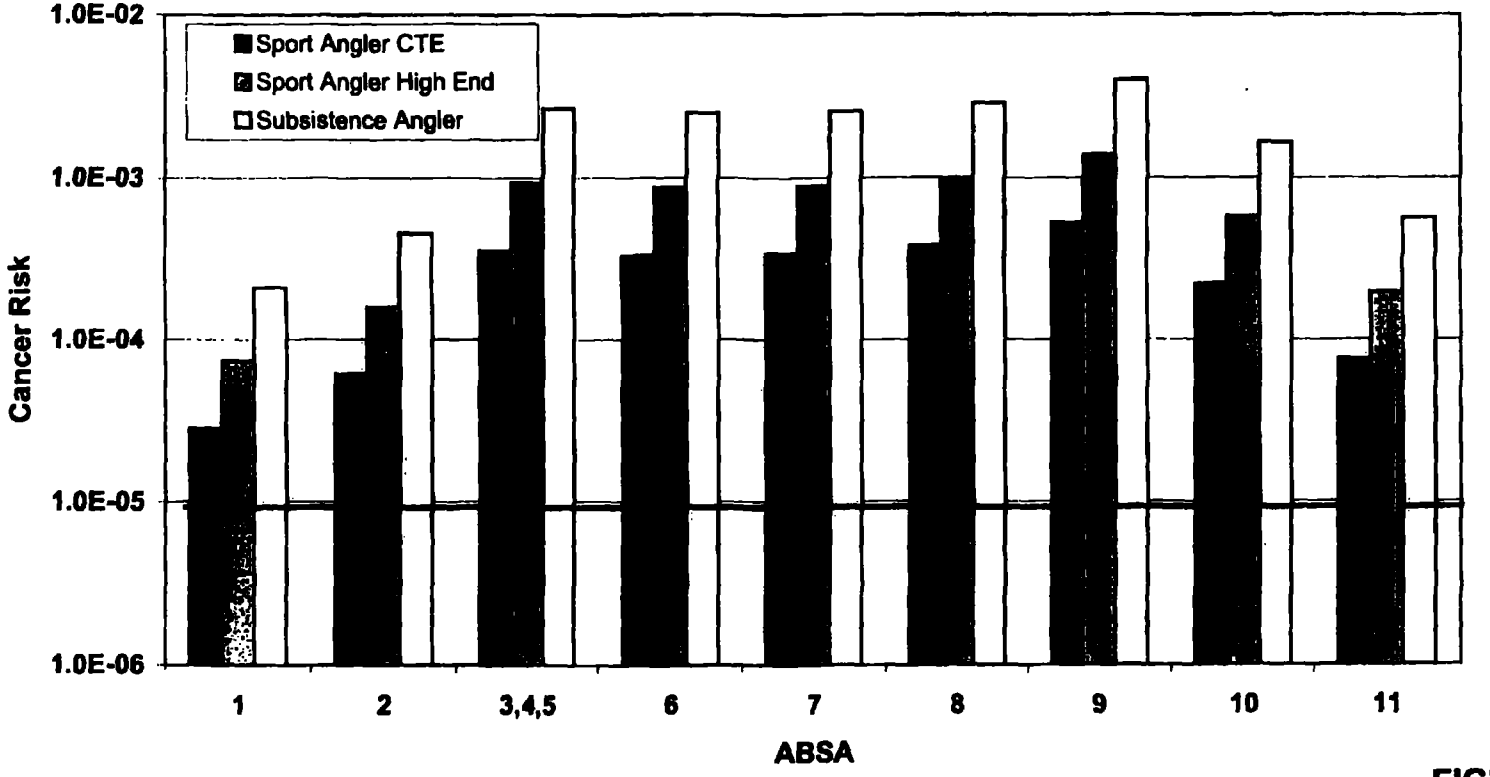

FIGURE 5-2

API/PC/KR SITE

NCRKZOO0168557

Range of Cancer Risk Estimates by ABSA and by Exposure Scenario Based on Average Concentrations of PCBs in Smallmouth Bass (76% of Consumption) and Carp (24% of Consumption)

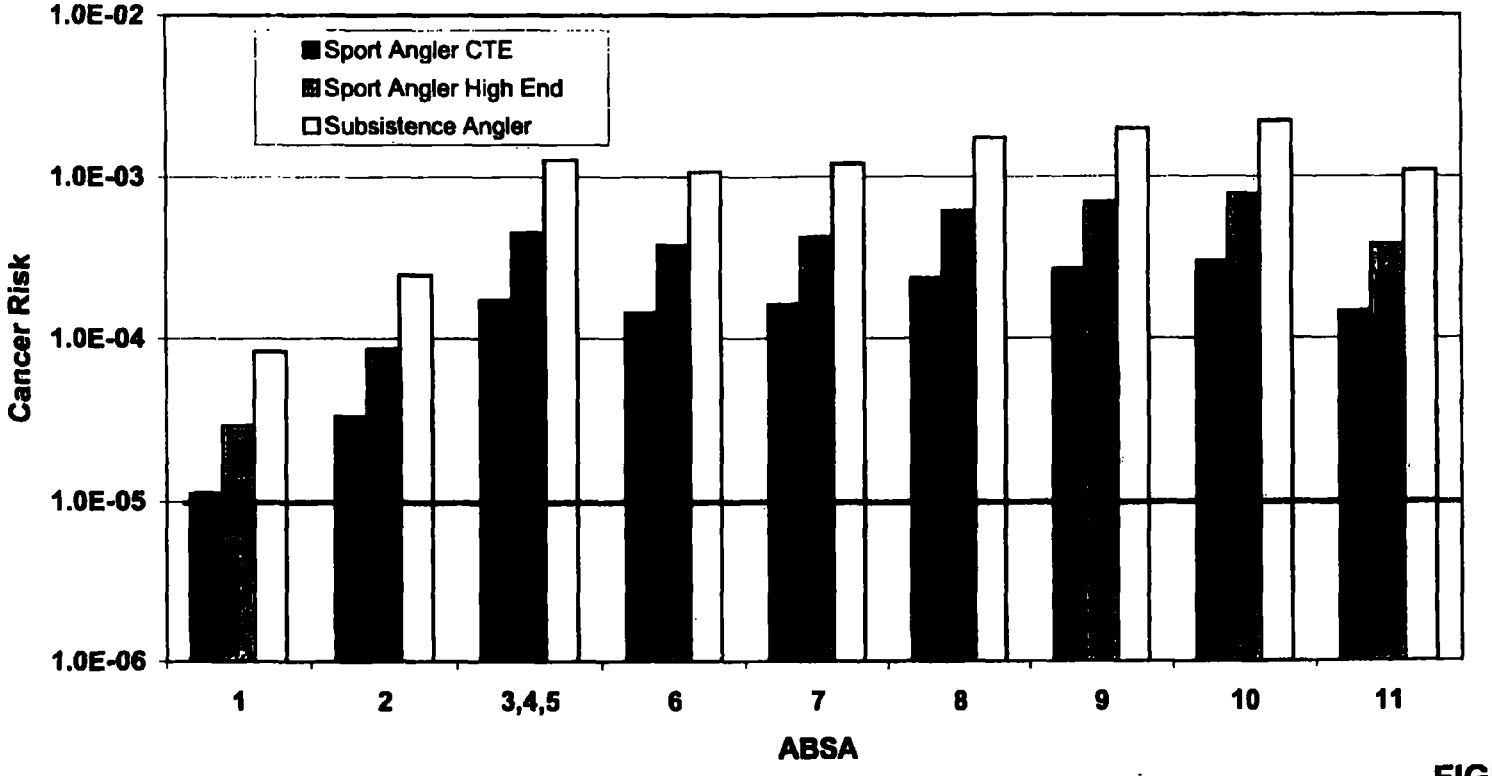

FIGURE 5-3

API/PC/KR SITE

NCRKZOO0168558

Range of Cancer Risk Estimates by ABSA and by Exposure Scenario Based on Maximum Concentrations of PCBs in Smallmouth Bass (76% of Consumption) and Carp (24% of Consumption)

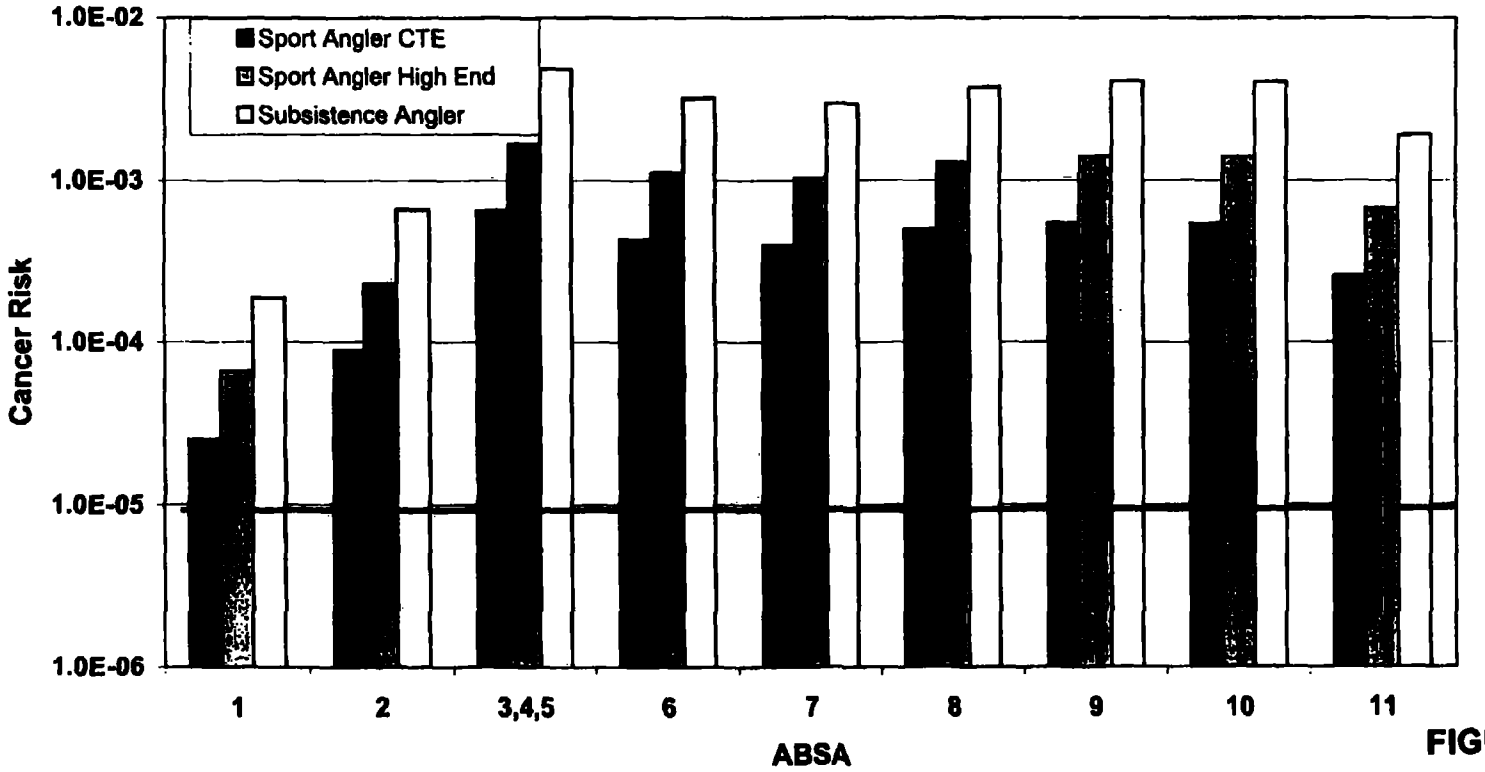

FIGURE 5-4

API/PC/KR SITE

NCRKZOO0168559

Range of Hazard Estimates by ABSA and by Exposure Scenario Immunological Endpoint Based on Average Concentrations of PCBs in Smallmouth Bass (100% of Consumption)

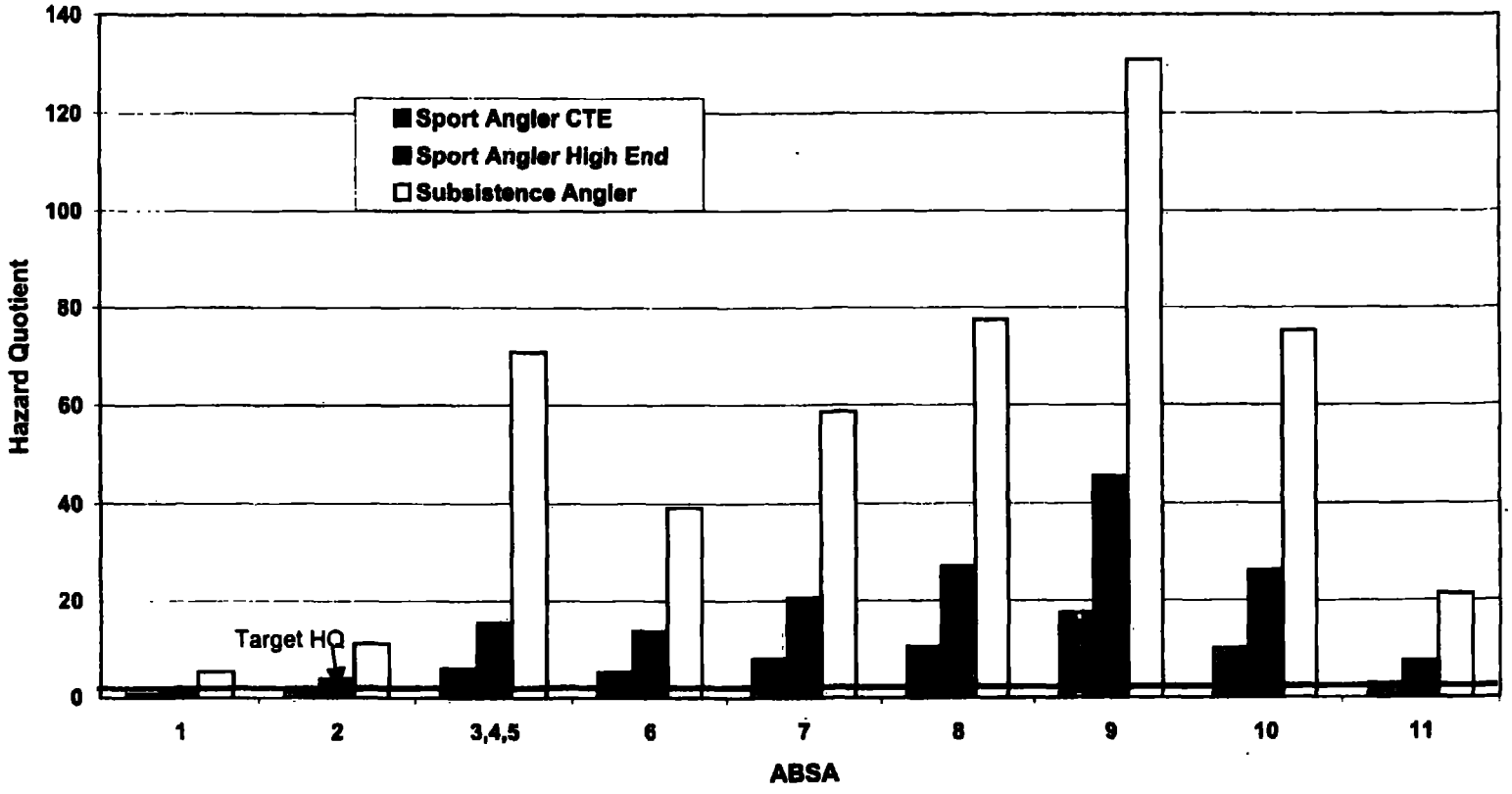

FIGURE 5-5

API/PC/KR SITE

NCRKZOO0168560

Range of Hazard Estimates by ABSA and by Exposure Scenario Immunological Endpoint Based on Maximum Concentrations of PCBs in Smallmouth Bass (100% of Consumption)

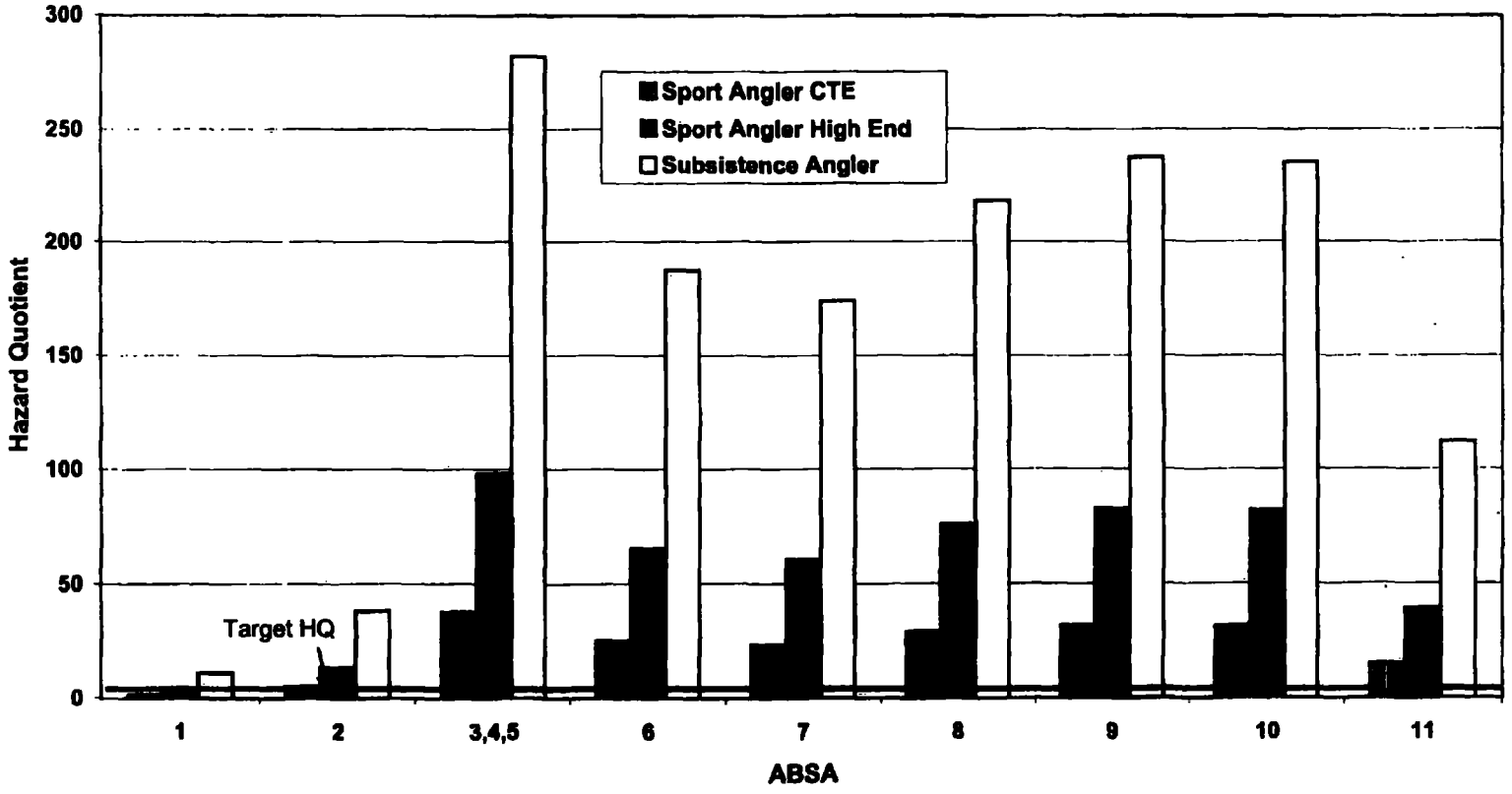

FIGURE 5-6

API/PC/KR SITE

NCRKZOO0168561

Range of Hazard Estimates by ABSA and by Exposure Scenario Immunological Endpoint Based on Average Concentrations of PCBs in Smallmouth Bass (76% of Consumption) and Carp (24% of Consumption)

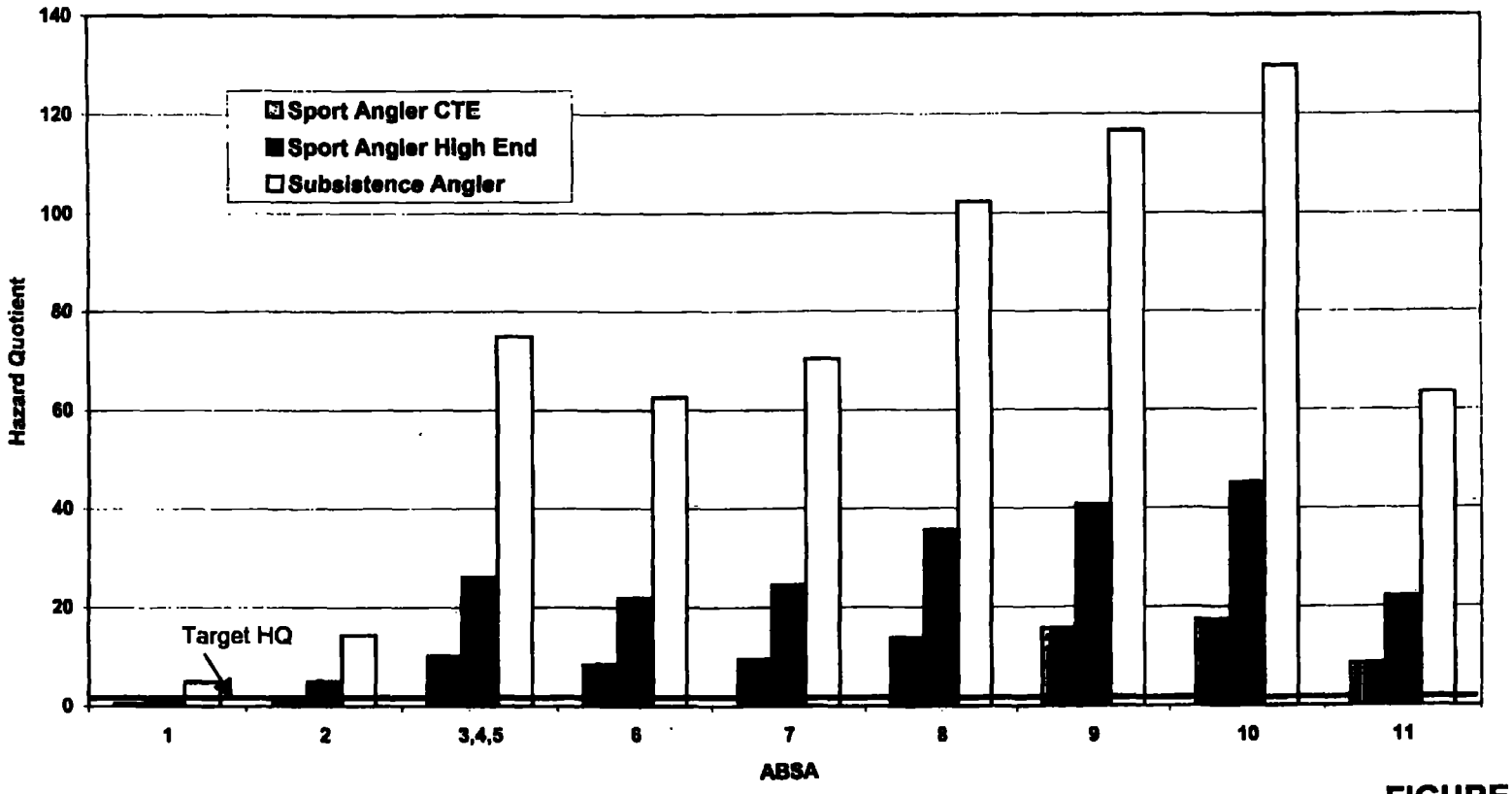

FIGURE 5-7

API/PC/KR SITE

NCRKZOO0168562

Range of Hazard Estimates by ABSA and by Exposure Scenario Immunological Endpoint Based on Maximum Concentrations of PCBs in Smallmouth Bass (76% of Consumption) and Carp (24% of Consumption)

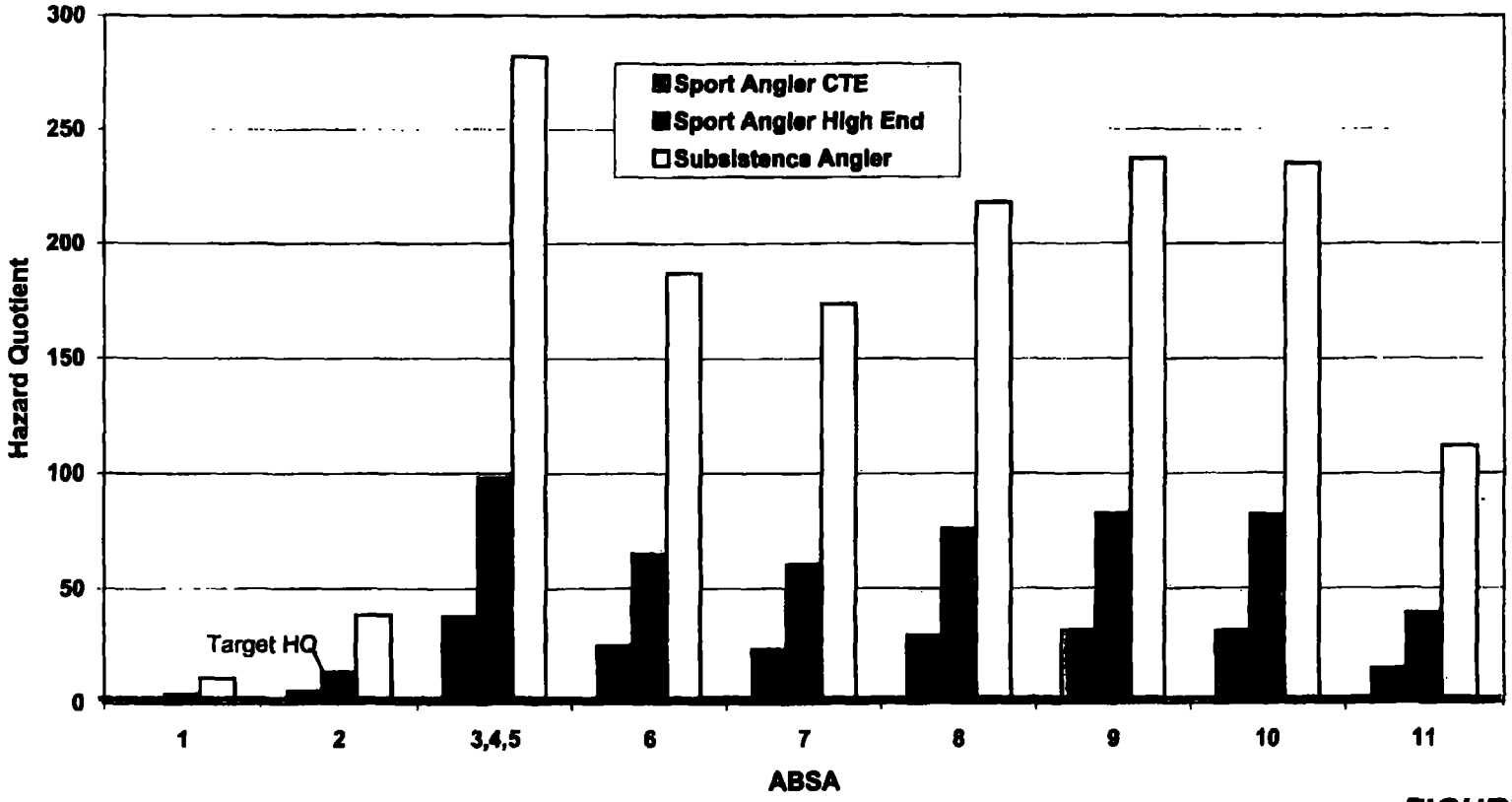

FIGURE 5-8

API/PC/KR SITE

NCRKZOO0168563

Estimated Cancer Risks For Former Impoundment Areas
Residential Exposure Scenario

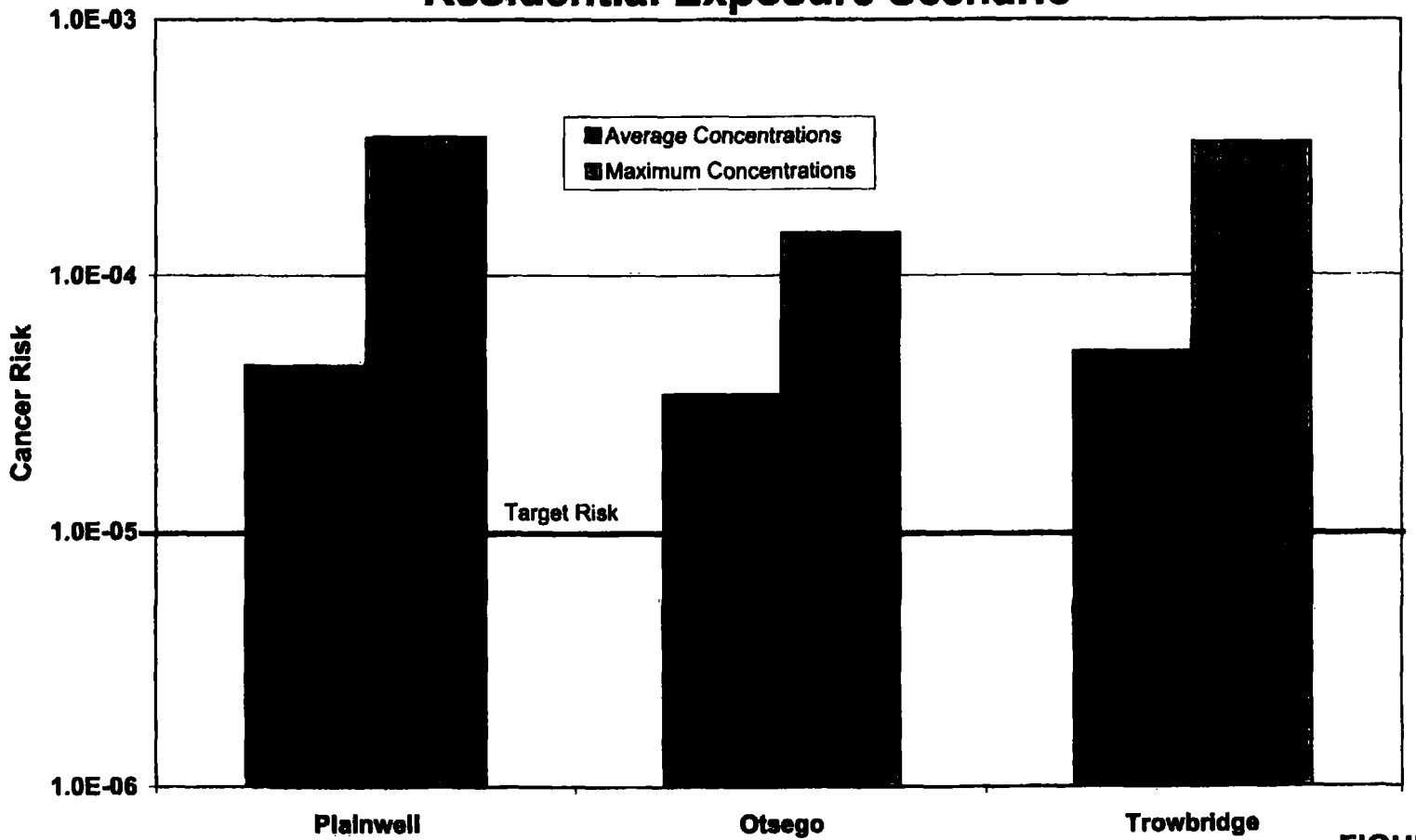

FIGURE 5-9

AP/PC/KR SITE

NCRKZOO0168564

Estimated Non-Cancer Hazards for Former Impoundment Areas
Residential Exposure Scenario

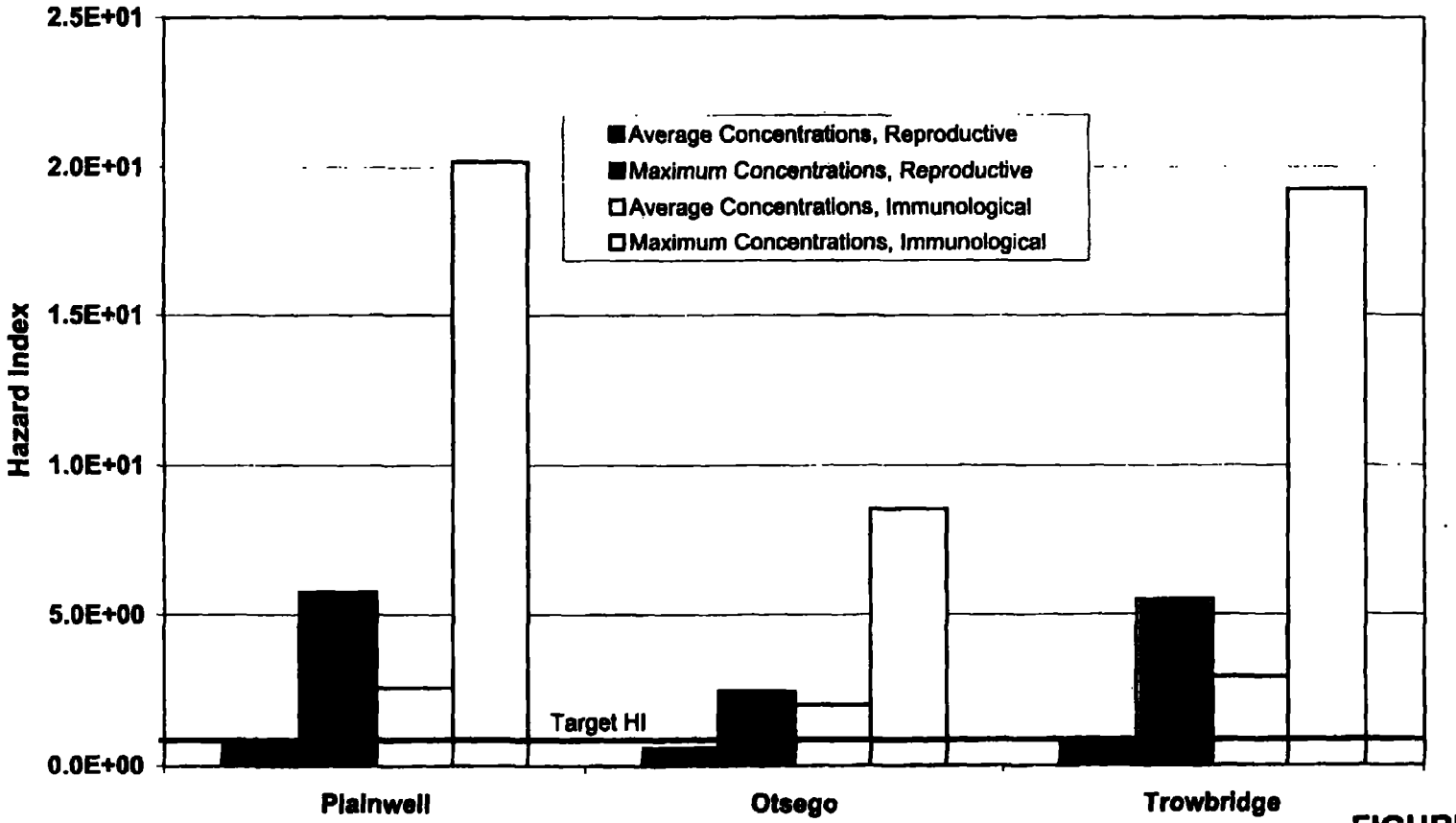

FIGURE 5-10

AP/PC/KR SITE

NCRKZOO0168565

Estimated Cancer Risks for Former Impoundment Areas
Recreational Exposure Scenario

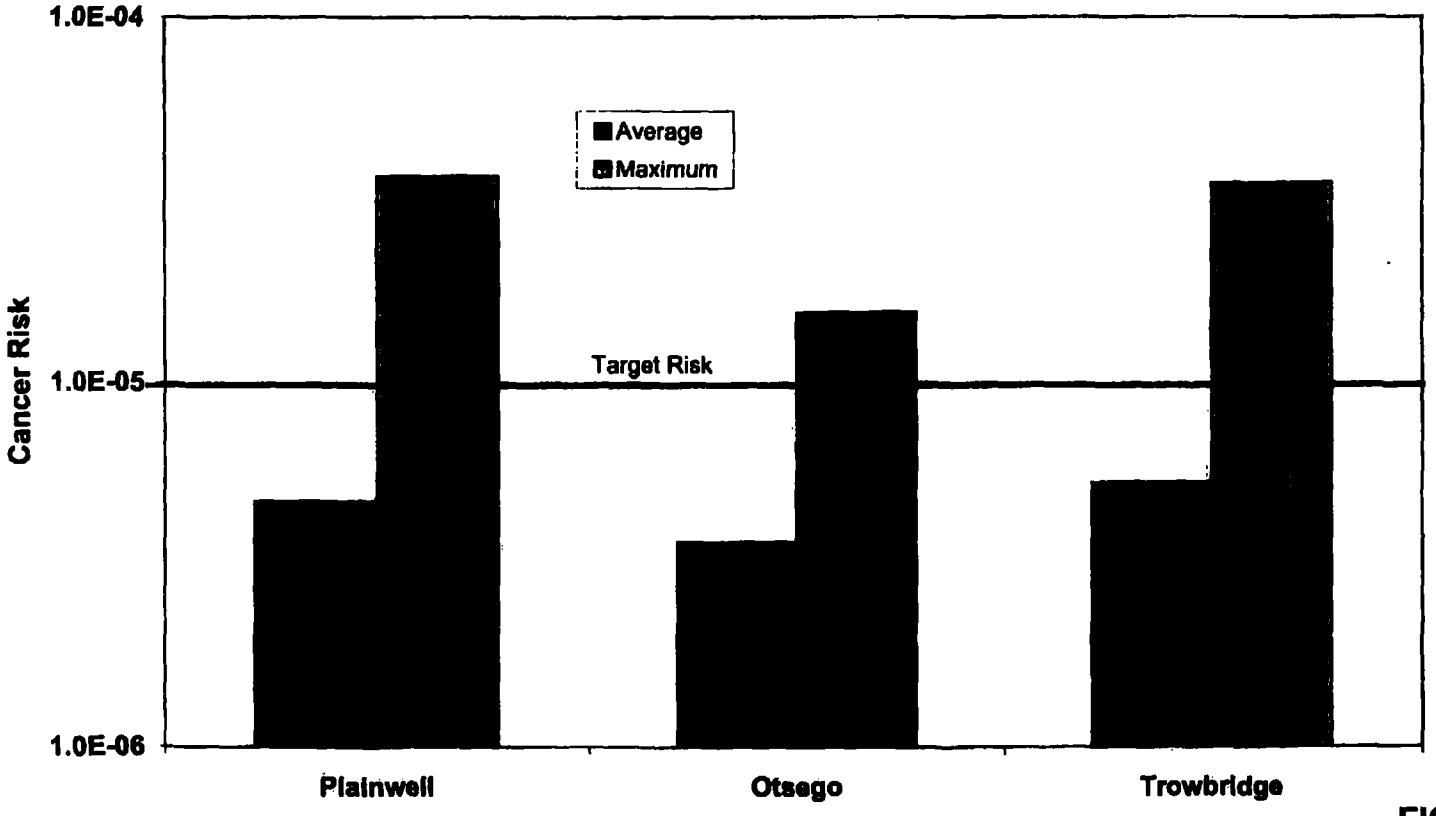

FIGURE 5-11

AP/PC/KR SITE

NCRKZOO0168566

Estimated Non-Cancer Hazards for Former Impoundment Areas
Recreational Exposure Scenario

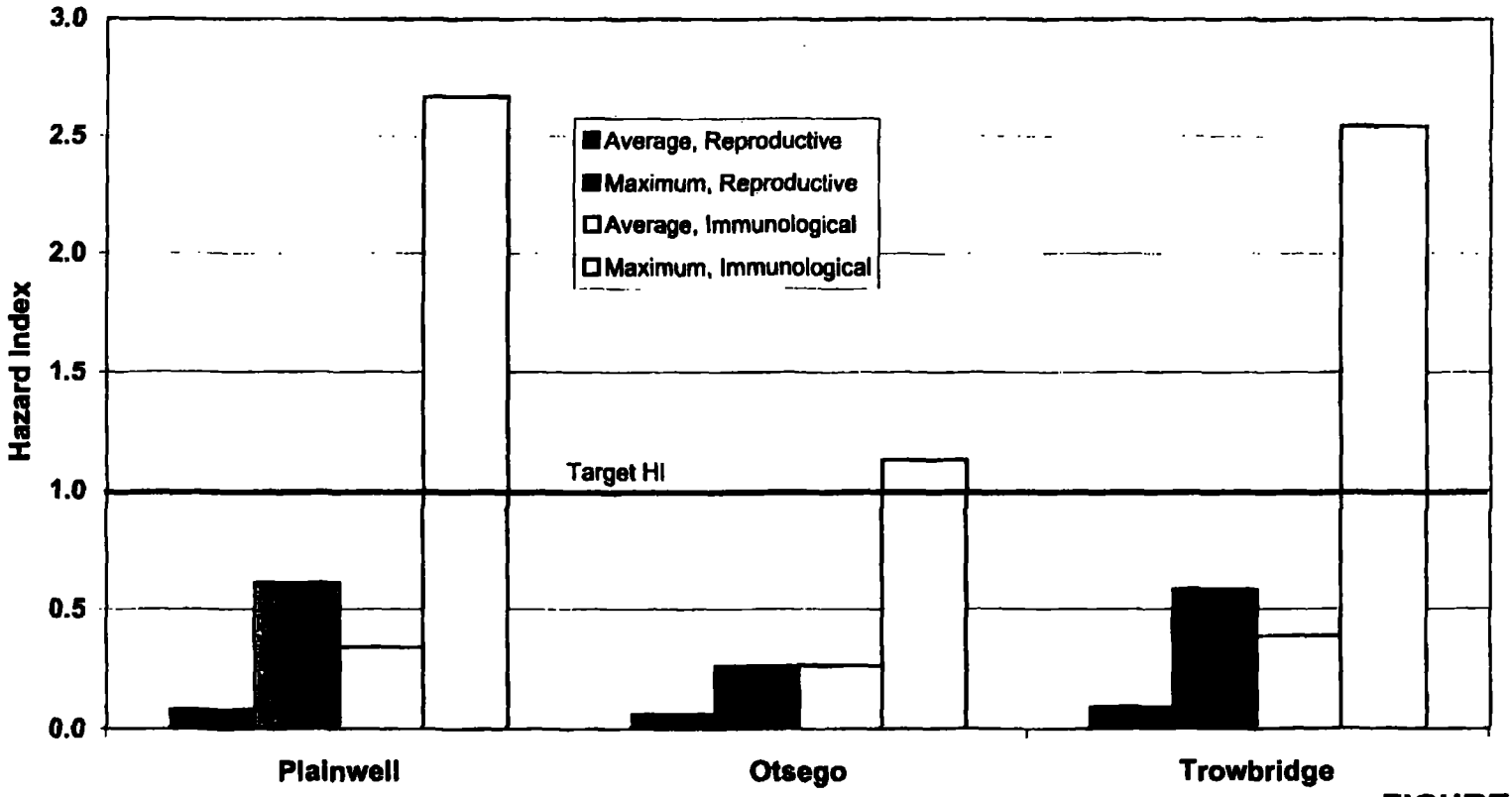

FIGURE 5-12

AP/PC/KR SITE

NCRKZOO0168567

Table 5-1 Summary of Risks and Hazards for Subsistence and Sport Anglers Average Concentrations API/PC/KR Site

Source Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk from Ingestion of Fish					
				Subsistence		Sport - Central Tendency		Sport - High End	
				100% SMB	76% SMB/ 24% CARP	100% SMB	76% SMB/ 24% CARP	100% SMB	76% SMB/ 24% CARP
Fish	Fish	ABSA 3,4,5 (Combined)	Total PCBs	7.6E-04	1.3E-03	1.0E-04	1.7E-04	2.7E-04	4.5E-04
		ABSA 6	Total PCBs	6.7E-04	1.1E-03	9.0E-05	1.4E-04	2.3E-04	3.7E-04
		ABSA 7	Total PCBs	1.0E-03	1.2E-03	1.4E-04	1.6E-04	3.5E-04	4.2E-04
		ABSA 8	Total PCBs	1.3E-03	1.8E-03	1.8E-04	2.4E-04	4.6E-04	6.1E-04
		ABSA 9	Total PCBs	2.2E-03	2.0E-03	3.0E-04	2.7E-04	7.8E-04	7.0E-04
		ABSA 10	Total PCBs	1.3E-03	2.2E-03	1.7E-04	3.0E-04	4.5E-04	7.8E-04
		ABSA 11	Total PCBs	3.7E-04	1.1E-03	4.9E-05	1.5E-04	1.3E-04	3.8E-04

Notes: Target cancer risk range: 1E-06 to 1E-04 (EPA); 1E-05 (MDEQ)

Source Medium	Exposure Medium	Exposure Point	Chemical	Noncarcinogenic Hazard Quotient from Ingestion of Fish					
				Subsistence		Sport - Central Tendency		Sport - High End	
				100% SMB	75% SMB/ 25% CARP	100% SMB	75% SMB/ 25% CARP	100% SMB	75% SMB/ 25% CARP
Fish	Fish	ABSA 3,4,5 (Combined)	Total PCBs	13 (R) 71 (I)	21 (R) 75 (I)	1.7 (R) 5.9 (I)	2.9 (R) 10 (I)	4.4 (R) 15 (I)	7.5 (R) 26 (I)
		ABSA 6	Total PCBs	11 (R) 39 (I)	18 (R) 63 (I)	1.5 (R) 5.3 (I)	2.4 (R) 8.4 (I)	3.9 (R) 14 (I)	6.2 (R) 22 (I)
		ABSA 7	Total PCBs	17 (R) 59 (I)	20 (R) 70 (I)	2.3 (R) 7.9 (I)	2.7 (R) 9.4 (I)	5.9 (R) 21 (I)	7.0 (R) 25 (I)
		ABSA 8	Total PCBs	22 (R) 77 (I)	29 (R) 100 (I)	3.0 (R) 10 (I)	3.9 (R) 14 (I)	7.7 (R) 27 (I)	10 (R) 36 (I)
		ABSA 9	Total PCBs	37 (R) 130 (I)	33 (R) 120 (I)	5.0 (R) 18 (I)	4.5 (R) 16 (I)	13 (R) 46 (I)	12 (R) 41 (I)
		ABSA 10	Total PCBs	21 (R) 75 (I)	37 (R) 130 (I)	2.9 (R) 10 (I)	5.0 (R) 17 (I)	7.5 (R) 26 (I)	13 (R) 45 (I)
		ABSA 11	Total PCBs	6.1 (R) 21 (I)	18 (R) 63 (I)	.82 (R) 2.9 (I)	2.4 (R) 8.5 (I)	2.1 (R) 7.5 (I)	6.3 (R) 22 (I)

Notes: Target hazard quotient: 1.0 (EPA and MDEQ)
(R): Reproductive endpoint
(I): Immunological endpoint

Table 5-2 Summary of Risks and Hazards for Subsistence and Sport Anglers Maximum Concentrations API/PC/KR Site

				Carcinogenic Risk from Ingestion of Fish					
				Subsistence		Sport - Central Tendency		Sport - High End	
Source Medium	Exposure Medium	Exposure Point	Chemical	100% SMB	76% SMB/ 24% CAR	100% SMB	76% SMB/ 24% CAR	100% SMB	76% SMB/ 24% CAR
Fish	Fish	ABSA 3,4,5 (Combined)	Total PCBs	2.7E-03	4.8E-03	3.6E-04	6.5E-04	9.3E-04	1.7E-03
		ABSA 6	Total PCBs	2.5E-03	3.2E-03	3.3E-04	4.3E-04	8.7E-04	1.1E-03
		ABSA 7	Total PCBs	2.5E-03	3.0E-03	3.4E-04	4.0E-04	8.9E-04	1.0E-03
		ABSA 8	Total PCBs	2.9E-03	3.7E-03	3.8E-04	5.0E-04	1.0E-03	1.3E-03
		ABSA 9	Total PCBs	4.0E-03	4.1E-03	5.3E-04	5.5E-04	1.4E-03	1.4E-03
		ABSA 10	Total PCBs	1.6E-03	4.0E-03	2.2E-04	5.4E-04	5.8E-04	1.4E-03
		ABSA 11	Total PCBs	5.7E-04	1.9E-03	7.6E-05	2.6E-04	2.0E-04	6.7E-03

Notes: Target cancer risk range: 1E-06 to 1E-04 (EPA); 1E-05 (MDEQ)

				Noncarcinogenic Hazard Quotient from Ingestion of Fish					
				Subsistence		Sport - Central Tendency		Sport - High End	
Source Medium	Exposure Medium	Exposure Point	Chemical	100% SMB	75% SMB/ 25% CARP	100% SMB	75% SMB/ 25% CAR	100% SMB	76% SMB/ 24% CAR
Fish	Fish	ABSA 3,4,5 (Combined)	Total PCBs	44 (R) 150 (I)	80 (R) 280 (I)	5.9 (R) 21 (I)	11 (R) 38 (I)	15 (R) 54 (I)	28 (R) 98 (I)
		ABSA 6	Total PCBs	42 (R) 150 (I)	53 (R) 190 (I)	5.6 (R) 20 (I)	7.2 (R) 25 (I)	15 (R) 51 (I)	19 (R) 65 (I)
		ABSA 7	Total PCBs	42 (R) 150 (I)	50 (R) 170 (I)	5.7 (R) 20 (I)	6.7 (R) 23 (I)	15 (R) 52 (I)	17 (R) 61 (I)
		ABSA 8	Total PCBs	48 (R) 170 (I)	62 (R) 220 (I)	6.4 (R) 22 (I)	8.4 (R) 29 (I)	17 (R) 58 (I)	22 (R) 76 (I)
		ABSA 9	Total PCBs	66 (R) 230 (I)	68 (R) 240 (I)	8.8 (R) 31 (I)	9.1 (R) 32 (I)	23 (R) 81 (I)	24 (R) 83 (I)
		ABSA 10	Total PCBs	27 (R) 96 (I)	67 (R) 240 (I)	3.7 (R) 13 (I)	9.0 (R) 32 (I)	9.6 (R) 34 (I)	23 (R) 82 (I)
		ABSA 11	Total PCBs	9.4 (R) 33 (I)	32 (R) 110 (I)	1.3 (R) 4.4 (I)	4.3 (R) 15 (I)	3.3 (R) 12 (I)	11 (R) 39 (I)

Notes: Acceptable hazard quotient: 1.0 (EPA and MDEQ)
(R): Reproductive endpoint
(I): Immunological endpoint

Table 5-3 Summary of Risks and Hazards for Residents Living Near Exposed Floodplain Soils Average Concentrations API/K/KR Site

Source Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk	Chemical	Noncarcinogenic Hazard Index
				Exposure Routes Total		Exposure Routes Total
Floodplain Soils	Floodplain Soils	Trowbridge	Total PCBs	5.0E-05	Total PCBs	0.84 (R) 2.9 (I)
Floodplain Soils	Floodplain Soils	Otsego	Total PCBs	3.4E-05	Total PCBs	0.57 (R) 2.0 (I)
Floodplain Soils	Floodplain Soils	Plainwell	Total PCBs	4.4E-05	Total PCBs	0.74 (R) 2.6 (I)

Notes: Target cancer risk range: 1E-06 to 1E-04 (EPA); 1E-05 (MDEQ)
Acceptable hazard index: 1.0 (EPA and MDEQ)
(R): Reproductive endpoint
(I): Immunological endpoint

Table 5-4 Summary of Risks and Hazards for Residents Living Near Exposed Floodplain Soils Maximum Concentrations API/PC/KR Site

Source Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk	Chemical	Noncarcinogenic Hazard Index
				Exposure Routes Total		Exposure Routes Total
Floodplain Soils	Floodplain Soils	Trowbridge	Total PCBs	3.3E-04	Total PCBs	5.5 (R) 19 (I)
Floodplain Soils	Floodplain Soils	Otsego	Total PCBs	1.5E-04	Total PCBs	2.4 (R) 8.5 (I)
Floodplain Soils	Floodplain Soils	Plainwell	Total PCBs	3.5E-04	Total PCBs	5.8 (R) 20 (I)

Notes: Target cancer risk range: 1E-06 to 1E-04 (EPA); 1E-05 (MDEQ)
Acceptable hazard index: 1.0 (EPA and MDEQ)
(R): Reproductive endpoint
(I): Immunological endpoint

Table 5-5 Summary of Risks and Hazards for Recreational Visitors to Exposed Floodplain Soils Average Concentrations API/K/KR Site

Source Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk	Chemical	Noncarcinogenic Hazard Index
				Exposure Routes Total		Exposure Routes Total
Floodplain Soils	Floodplain Soils	Trowbridge	Total PCBs	5.3E-06	Total PCBs	0.008 (R) 0.39 (I)
Floodplain Soils	Floodplain Soils	Otsego	Total PCBs	3.6E-06	Total PCBs	0.006 (R) 0.26 (I)
Floodplain Soils	Floodplain Soils	Plainwell	Total PCBs	4.7E-06	Total PCBs	0.008 (R) 0.34 (I)

Notes: Target cancer risk range: 1E-06 to 1E-04 (EPA); 1E-05 (MDEQ)
Acceptable hazard index: 1.0 (EPA and MDEQ)

Table 5-6 Summary Of Risks And Hazards For Recreational Visitors To Exposed Floodplain Soils Maximum Concentrations API/PC/KR Site

Source Medium	Exposure Medium	Exposure Point	Chemical	Carcinogenic Risk Exposure Routes Total	Chemical	Noncarcinogenic Hazard Index Exposure Routes Total
Floodplain Soils	Floodplain Soils	Trowbridge	Total PCBs	3.5E-05	Total PCBs	0.58 (R) 2.5 (I)
Floodplain Soils	Floodplain Soils	Otsego	Total PCBs	1.5E-05	Total PCBs	0.26 (R) 1.1 (I)
Floodplain Soils	Floodplain Soils	Plainwell	Total PCBs	3.7E-05	Total PCBs	0.61 (R) 2.7 (I)

Notes: Target cancer risk range: 1E-06 to 1E-04 (EPA); 1E-05 (MDEQ)
Acceptable hazard index: 1.0 (EPA and MDEQ)

Note that risks were relatively high for ABSAs 1 and 2, although still much lower than those for site ABSAs (3 through 11). These areas, upstream of the source areas associated with the API/PC/KR site, may be influenced by non-site related sources of PCBs. Fish from ABSA 2, which includes Morrow Lake behind Morrow Pond Dam, have higher average and maximum PCB concentrations than fish taken from areas further upstream.

5.3.1.2 Noncancer Hazard

Noncancer hazards to subsistence anglers were estimated for both reproductive and immunological effects. As presented in Tables 5-1 and 5-2 and Figures 5-5 through 5-8, HQs for both endpoints for all scenarios using both average and maximum EPCs exceed the regulatory HQ threshold of 1 for all ABSAs in the API/PC/KR site.

The HQ for the average exposure point scenario ranged between 6 and 37 for the reproductive endpoint and 21 and 130 for the immunological endpoint for single species ingestion. For mixed species ingestion, the HQ ranged from 18 to 37 for the reproductive endpoint and from 63 to 130 for the immunological endpoint.

The HQ for the maximum exposure point scenario ranged between 9 and 66 for the reproductive endpoint and 33 and 230 for the immunological endpoint for single species. For mixed species, the HQ ranged from 32 to 80 for the reproductive endpoint and from 110 to 280 for the immunological endpoint.

As discussed in Section 5.3.1.1, HQs for upstream ABSAs 1 and 2 are relatively high, suggesting some non-site related sources of PCBs above. HQs for ABSA 2 exceed the threshold of 1, although these HQs remain many times lower than those calculated for exposure in ABSAs 3 through 11.

5.3.2 Sport Anglers - High End

5.3.2.1 Cancer Risks

As presented on Tables 5-1 and 5-2 and Figures 5-1 through 5-4, cancer risks to high end sport anglers exceeded both EPA and MDEQ cancer risk thresholds for all ABSAs in the API/PC/KR site for both the average EPC and maximum EPC scenarios for both single and multiple species. Cancer risks for average EPCs ingesting single species were all at or above 1 in 10, 000. Cancer risks to high end sport anglers using maximum EPCs ingesting single species were all at or above 1 in 10,000 except for ABSAs 8 and 9, where risks exceeded 1 in 1,000. Cancer risks to sport anglers ingesting multiple species were in the 1 in 10,000 or higher range using average EPCs and 1 in 1,000 or higher using maximum EPCs. The highest cancer risk for high end anglers ingesting single species were estimated for ABSA 9 using average and maximum EPCs with estimated risks of 8 in 10,000 and 1 in 1,000, respectively. For multiple species ingestion, the highest cancer risks were estimated for ABSA 10 using average EPCs, and in ABSA 11 using maximum EPCs with estimated risks of 8 in 10,000 and 7 in 1,000, respectively.

As discussed in Section 5.3.1.1, risks were relatively high for ABSAs 1 and 2, although still much lower than those for site ABSAs (3 through 11). These areas, upstream of the source areas associated with the API/PC/KR site, may be influenced by non-site related sources of PCBs. Fish from ABSA 2, which includes Morrow Lake behind Morrow Pond Dam, have higher average and maximum PCB concentrations than fish taken from areas further upstream.

5.3.2.2 Noncancer Hazard

As presented in Tables 5-1 and 5-2 and Figures 5-5 through 5-8, scenarios exceeded a HQ of 1 for both the immunological and reproductive endpoints. The HQ for the average EPC scenario ranged from 2 to 13 for the reproductive endpoint and 7.5 to 46 for the immunological endpoint for single species ingestion. For mixed species, the HQ ranged between 6 and 13 for the reproductive endpoint, and 22 and 45 for the immunological endpoint for multiple species.

The HQ for the maximum EPC scenario ranged from 3 to 23 for the reproductive endpoint and from 12 to 81 for the reproductive endpoint. For mixed species, the HQ for the reproductive endpoint ranged from 11 to 28, and for the immunological endpoint ranged from 39 to 98.

As discussed in Section 5.3.1.1, HQs for upstream ABSAs 1 and 2 are relatively high, suggesting some non-site related sources of PCBs above. HQs for ABSA 2 exceed the threshold of 1, although these HQs remain many times lower than those calculated for exposure in ABSAs 3 through 11.

5.3.3 Sport Anglers - Central Tendency

5.3.3.1 Cancer Risks

As presented on Tables 5-1 and 5-2 and Figures 5-1 through 5-4, cancer risks to central tendency sport anglers exceeded both EPA and MDEQ cancer risk thresholds for both the average and maximum EPC scenarios for both single and multiple species for all ABSAs in the API/PC/KR site with two exceptions. For the single species scenario using average EPCs, cancer risks were all at or above 1 in 10,000, except for ABSAs 6 and 11 where cancer risks were at or above 1 in 100,000. For the single species scenario, cancer risks using maximum EPCs ranged from 8 in 100,000 to 5 in 10,000. For the multiple species scenario using average EPCs, cancer risks were all in the 1 in 10,000 range. For the multiple species scenario using maximum EPCs, cancer risks were all also in the 1 in 10,000 range. For the multiple species scenario, cancer risks using maximum EPCs ranged from 3 in 10,000 to 6.5 in 10,000.

As discussed in Section 5.3.1.1, risks were relatively high for ABSAs 1 and 2, although still much lower than those for site ABSAs (3 through 11). These areas, upstream of the source areas associated with the API/PC/KR site, may be influenced by non-site related sources of PCBs. Fish from ABSA 2, which includes Morrow Lake behind Morrow Pond Dam, have higher average and maximum PCB concentrations than fish taken from areas further upstream.

5.3.3.2 Noncancer Hazard

As presented on Tables 5-1 and 5-2 and Figures 5-5 through 5-8, all scenarios using both average and maximum EPCs exceeded a HQ of 1 for both the immunological and reproductive endpoints, except for ABSA 11 where the HQ for the reproductive endpoint was 0.8. The HQ for the average exposure point scenario ranged between 0.8 and 5 for reproductive endpoint and 3 and 18 for the immunological endpoint for single species. For mixed species, the HQ ranged between 2 and 5 for the reproductive endpoint and 8 and 17 for the immunological endpoint.

HQs for the maximum exposure point scenario ranged between 1 and 9 for the reproductive endpoint and 4 and 31 for the immunological endpoint for single species. For mixed species, HQs ranged between 4 and 11 for the reproductive endpoint and 15 and 38 for the immunological endpoint.

As discussed in Section 5.3.1.1, HQs for upstream ABSAs 1 and 2 are relatively high, suggesting some non-site related sources of PCBs above. HQs for ABSA 2 exceed the threshold of 1, although these HQs remain many times lower than those calculated for exposure in ABSAs 3 through 11.

5.3.4 Nearby Residents

5.3.4.1 Cancer Risks

As presented on Tables 5-3 and 5-4 and Figure 5-9, cancer risks for nearby residents in all three floodplain soil areas were in the 1 in 100,000 range using average EPCs and

in the 1 in 10,000 or higher range using maximum EPCs. Estimates using maximum EPCs exceeded both MDEQ and EPA cancer risk thresholds; estimates using average EPCs exceeded MDEQ thresholds but were within EPA target cancer risk range. The highest risks using average EPCs were estimated for the Trowbridge area at 5 in 100,000; the highest risks using maximum EPCs were estimated for the Plainwell area at 3.5 in 10,000.

5.3.4.2 Noncancer Hazard

As presented on Tables 5-3 and 5-4 and Figure 5-10, noncancer HIs for the immunological endpoint in all three areas exceeded 1 using average and maximum EPCs. HIs using average EPCs ranged from 2 to 3 for the immunological endpoint and 0.6 to 0.8 for the reproductive endpoint. Estimates using maximum EPCs ranged from 8.5 to 20 for the immunological endpoint and from 2 to 6 for the reproductive endpoint.

5.3.5. Recreationalists

5.3.5.1 Cancer Risks

As presented on Tables 5-5 and 5-6 and Figure 5-11, cancer risks for recreationalists in all three floodplain areas were in the 1 in 1 million or higher range using average concentrations and in the 1 in 100,000 or higher range using maximum concentrations. Estimates using average concentrations were within EPA target risk range and below MDEQ threshold. Estimates using maximum concentrations were within EPA target risk range, but exceeded MDEQ threshold. The highest risks using average concentrations were estimated for the Trowbridge area at 5 in 1 million. The highest risks using the maximum concentrations were estimated for the Plainwell area at 4 in 100,000.

5.3.5.2 Noncancer Hazard

As presented on Tables 5-5 and 5-6 and Figure 5-12, using average EPCs, noncancer HIs for both the immunological and reproductive endpoints were below EPA and MDEQ threshold of 1. Using maximum EPCs, HQs for the reproductive endpoint were also all below the threshold of 1. Using maximum EPCs, HIs for the immunological endpoint exceeded the threshold of 1 for Plainwell (3), Otsego (1), and Trowbridge (2.5) areas.

5.4 Summary

Risks and hazard quotients/indices for the API/PC/KR site can be summarized as follows:

- Cancer risks and HQs in both central tendency and high end sport and subsistence anglers exceed EPA and/or MDEQ risk limits for all scenarios in all ABSAs in the API/PC/KR site using both average and maximum EPCs (with the exception of CTE sport anglers consuming 100 percent bass from ABSA 11 for which the calculated HQ based on average PCB concentrations was 0.8).

- Cancer risks for residents living near the floodplain soil behind the three MDNR impoundments exceed MDEQ thresholds using both average and maximum EPCs.

- Cancer risks for residents living near the floodplain soils behind the three MDNR impoundments are within EPA target cancer risk range but above the MDEQ threshold for the average scenario.

- Cancer risks for residents living near the floodplain soils behind the three MDNR impoundments are outside MDEQ and EPA target cancer risk range using maximum EPCs.

- HIs for residents living near the floodplain soils behind the three MDNR impoundments exceed MDEQ and EPA threshold of 1 for the immunological endpoint using both average and maximum EPCs. HQs for the reproductive endpoint do not exceed a HI of 1 using average EPCs. HIs using maximum EPCs exceed MDEQ and EPA threshold of 1.0 for the Trowbridge (5.5), Otsego (2), and Plainwell (6) areas.

- Cancer risks for recreationalists on the floodplain soil behind the three MDNR impoundments are within the EPA target risk range and less than MDEQ threshold using **average EPCs**.

- Cancer risks for recreationalists on the floodplain soil behind the three MDNR impoundments are within the EPA target risk range and exceed MDEQ threshold using **maximum EPCs**.

- HIs for recreationalists on the floodplain soil behind the three MDNR impoundments are less than EPA and MDEQ threshold of 1 for both the reproductive and immunological endpoints using average concentrations.

- HIs for recreationalists on the floodplain soil behind the three MDNR impoundments are less than EPA and MDEQ threshold of 1 for the reproductive endpoint using maximum EPCs. HIs for the immunological endpoint exceeded the threshold of 1 for the Trowbridge (2.5), Otsego (1), and Plainwell (3) areas using maximum EPCs.

- Some elevated cancer risk and hazard estimates were calculated for anglers in upstream ABSAs 1 and 2. These risks and hazards were many times less than those for ABSAs 3 through 11, but still suggest some smaller sources of PCBs above the Superfund site boundaries. Risks and hazards were highest for ABSA 2, which includes Morrow Lake behind Morrow Pond Dam.

Section 6
Determination of Risk-Based Sediment and Floodplain Soil Concentrations

Risk and hazard estimates associated with ingestion of fish and contact with floodplain soils have been developed and are presented in Section 5. Based on these estimates, risk-based fish concentrations (RBC_{fish}) and sediment concentrations (RBC_{sed}) for PCBs were developed to be protective of sport and subsistence anglers. Further, risk-based floodplain soil concentrations (RBC_{soil}) were developed to be protective of residents living near or recreating on exposed floodplain soil. RBCs were developed for both cancer and noncancer endpoints. Risk-based concentrations were developed using an allowable cancer risk of 1 in 100,000 and a noncancer hazard quotient/index of 1.0.

6.1 Calculation of Risk-Based Fish Concentrations

RBC_{fish} were developed using the same risk and hazard algorithms used to derive risk and hazard estimates (Figures 3-2 and 3-3). To derive RBCs, the algorithm is reversed to solve for the concentration in fish associated with a specified cancer risk or hazard quotient, in this case 1 in 100,000 cancer risk or a hazard of 1.0. RBC_{fish} were derived using the same assumptions regarding ingestion rates, reduction factors, exposure frequencies, and duration. Table 6-1 presents estimated RBC_{fish}. Appendix B provides spreadsheets for all RBC calculations.

Table 6-1 Risk-Based Fish Fillet Concentrations (RBC_{fish}) [1] API/PC/KR Site

Receptor	RBC_{fish} Protective of 1E-05 Cancer Risk for PCBs (mg/kg)	RBC_{fish} Protective of 1.0 Hazard Quotient for PCBs (mg/kg)
Sport Angler - Central Tendency Assumes 24 meals/year 0.015 kg/day	0.109	0.187
Sport Angler - High End Assumes 125 meals/year 0.078 kg/day [2]	0.042	0.072
Subsistence Angler Assumes 179 meals/year 0.11 kg/day	0.015	0.025

[1] Concentrations protective of both carp and smallmouth bass. Hazard quotient for immunological endpoint. Because RBC_{fish} based on immunological toxicity are lower than those based on reproductive toxicity, only RBC_{fish} for the immunological endpoint are presented.

[2] Value includes source fraction of 0.5. Central tendency and subsistence anglers are assumed to take all fish from the Kalamazoo River.

The RBC_{fish} protective of the central tendency sport angler consuming approximately 24 meals/year of fish, or an average daily ingestion rate of 0.015 kilograms/day (kg/day), is 0.109 mg/kg in fish fillet for the cancer endpoint and 0.187 for the noncancer endpoint (immunological). The RBC_{fish} protective of the high-end sport angler consuming up to 125 meals/year, or an average daily ingestion rate of

0.078 kg/day, is 0.042 mg/kg for the cancer endpoint and 0.072 for the noncancer endpoint. The RBC_{fish} protective of the subsistence angler consuming up to 179 meals/year, or an average daily ingestion rate of 0.11 kg/day, is 0.015 mg/kg protective for the cancer endpoint and 0.025 for the noncancer endpoint.

The MDCH has established criteria for placing fish on the Michigan Sport Fish Consumption Advisory. For the general population, when between 11 and 49 percent of samples exceed 2 mg/kg in fish, a one-meal/week advisory is issued; when greater than 50 percent of fish samples exceed 2 mg/kg, a no consumption advisory is issued. For women of childbearing age and children under 15 years of age, at concentrations greater than 0.05 mg/kg up to 0.2 mg/kg of PCBs in fish, a one-meal/week advisory is issued. At concentrations greater than 0.2 mg/kg, up to 1 mg/kg of PCBs in fish, a one-meal/month advisory is issued. At concentrations greater than 1.0 mg/kg up to 1.9 mg/kg of PCBs in fish, a six-meal/year advisory is issued. At concentrations above 1.9 mg/kg, a no consumption advisory is issued.

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/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, who have been reported to consume between three to four meals/week, the RBC_{fish} developed in this HHRA indicate that concentrations in the range of 0.015 mg/kg (cancer) and 0.025 mg/kg (noncancer) are needed to be protective of health. The differences between the derivations of the two noncancer values are listed in Table 6-2:

Table 6-2 Comparison of MDCH and HHRA Exposure Parameters

	MDCH	HHRA
Meals/year	225	179
Average daily fish consumption (kg)	0.14	0.11
Reduction by cleaning/cooking (%)	50	50
Weight of subject (kg)	70	70
Target dose, HPV or RfD (µg/kg/day)	0.05	0.02
PCB level in fish (mg/kg)	0.05	0.015

Most of the difference between the two results can be attributed to the difference between the health protection value (HPV) used by the MDCH (0.05 µg/kg/day) and the EPA RfD used in the HHRA (0.02 µg/kg/day). These values were derived from the same data by different methodologies. The Great Lakes Fish Advisory Task Force used a "weight of evidence" approach to derive the HPV used by the MDCH from data on a wide range of health effect endpoints. EPA derives RfDs from data on specific endpoints with uncertainty and modifying factors added.

The MDCH Division of Environmental Epidemiology has reviewed this document and considers it to be adequately consistent with the MDCH protocol for issuing fish consumption advisories. Although differences exist between RBC_{fish} and the MDCH first Level of Concern as cited above, MDCH considers that parameters and

assumptions used in the two derivations are reasonable, the resulting levels to be reasonably close, and the RBC_{fish} levels to be more protective than the MDCH Level of Concern. MDCH acknowledges EPA and MDEQ's authority to establish the cleanup levels to be used at any site.

6.2 Calculation of Risk-Based Sediment Concentrations

The RBC_{fish} were used to develop RBC_{sed}. RBC_{sed} represent sediment concentrations protective of fish that are consumed at the ingestion rates specified for sport and subsistence anglers. In 1994, EPA Region V completed a draft guidance document, which presented an overview of available methods for developing RBCs and recommended the biota-to-sediment accumulation factor (BSAF) method. Three methods, the bioconcentration factor (BCF) method, the bioaccumulation factor (BAF) method, and the BSAF were evaluated. The BCF and BSAF methods relate fish tissue concentrations to water column concentrations and prey consumption whereas the BSAF method relates fish concentrations to sediment (Pelka 1998). Methods were tested by comparing predicted fish concentrations with actual fish data for four locations: Saginaw, Michigan; Buffalo, New York; Ontario, Canada; and Manistique, Michigan. EPA Region V determined that the BSAF approach consistently gave the most reliable estimates of fish concentration relative to other methods.

Guidance provided by EPA Region V on the BSAF approach was used to develop the risk-based concentrations for sediment. This approach has been described in Bioaccumulation Models and Applications: Setting Sediment Cleanup Goals in the Great Lakes (*Proceedings of the National Sediment Bioaccumulation Conference*, September 11-13, 1996, presented by Amy Pelka, EPA, Region V. EPA 823-R-98-002) and in other technical memorandum.

BSAFs and RBC_{sed} were calculated for each of seven ABSAs and site wide. BSAFs were based on lipid normalized fish fillet PCB concentrations and organic carbon normalized sediment concentrations. RBC_{sed} were calculated based on a range of RBC_{fish} developed in the HHRA. To understand the uncertainty associated with the normalized data, and to estimate 95% confidence limits, a "bootstrapping" approach was used (Efron 1982). This approach involved random sampling with replacement from the underlying data on an ABSA-by-ABSA (or reach by reach) and species fillet basis and calculation of the BSAF and RBC_{sed} for each of these data subsets. This process was repeated 5,000 times to generate an estimate of the sampling distribution of BSAFs and RBC_{sed} by fish species, river reach, and site wide. This method used data only when PCB and TOC data were available for the same sediment sample, and PCB and % lipid from the same fish fillet. Tables 6-3 and 6-4 present the results of this analysis along with applicable summary statistics for smallmouth bass and carp.

The tables present the results on an ABSA-by-ABSA basis as well as a sitewide basis. No biological, physical, or chemical basis has been identified that would suggest that BSAFs would be greatly different among ABSAs for the BSAF to vary greatly among stream reaches. Differences in BSAF probably represent variability in measurements

and uncertainties in the BSAF model. Thus, for risk assessment purposes, pooled data from all areas was used for final calculations of RBC_{sed}. The full analysis and description of the bootstrapping algorithm are presented in Appendix A.

Table 6-3 Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Human Health Risk Assessment Biota/Sediment Accumulation Factors, Bootstrap Distributions of BSAF for Smallmouth Bass

ABSA	BSAF[1]	Bootstrap BSAF Distribution			
		Mean	Median	LCL95	UCL95
3	0.296	0.314	0.301	0.182	0.515
4	0.604	0.669	0.620	0.343	1.261
5	0.432	0.638	0.443	0.194	1.916
6	0.092	0.208	0.099	0.028	0.891
7	0.371	0.470	0.393	0.183	1.161
8	2.296	2.590	2.373	1.303	5.148
9	0.708	0.755	0.723	0.438	1.249
Sitewide Average of ABSAs	0.686	0.806	0.707	0.382	1.735
Sitewide Average all fish and sediment pooled	0.444	0.456	0.449	0.307	0.643

1 BSAF calculated as ($PCB_{fish\ fillet}$/ % lipid)/ (PCB_{sed}/ % TOC)

Table 6-4 Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Human Health Risk Assessment Biota/Sediment Accumulation Factors, Bootstrap Distributions of BSAF for Common Carp

ABSA	BSAF[1]	Bootstrap BSAF Distribution			
		Mean	Median	LCL95	UCL95
3	0.523	0.557	0.536	0.302	0.939
4	1.113	1.235	1.155	0.636	2.298
5	0.313	0.466	0.332	0.143	1.455
6	0.202	0.463	0.219	0.068	1.954
7	0.275	0.341	0.288	0.124	0.861
8	3.437	3.854	3.506	1.807	7.990
9	0.935	0.991	0.950	0.554	1.677
Sitewide Average of ABSAs	0.971	1.130	0.998	0.519	2.453
Sitewide Average all fish and sediment pooled	0.641	0.661	0.651	0.439	0.949

1 BSAF calculated as ($PCB_{fish\ fillet}$/ % lipid)/ (PCB_{sed}/ % TOC)

Sitewide BSAFs for carp and smallmouth bass were calculated for the API/PC/KR site. Using synoptic data for fish and sediment, BSAFs of 0.456 and 0.661 were derived for smallmouth bass and carp, respectively (Spectrum Consulting Services 2001). BSAFs were calculated as

$$BSAF = (PCB_{fish\ fillet} / \%\,lipid) / (PCB_{sed} / \%\,TOC)$$

Using site-specific BSAFs, the following equation can be used to derive RBC_{sed}:

$$\text{Concentration}_{sediment} = (toc * RBC_{fish}) / (BSAF * \%\,lipid)$$

Where: Sitewide TOC (total organic carbon) = 0.0279%
Sitewide BSAF 0.444 (bass); 0.641 (carp)
Sitewide lipid 0.013 (bass); 0.0358 (carp)
Risk-based fish concentrations =
0.109 (mg/kg) central tendency sport
0.042 (mg/kg) high end sport anglers
0.015 (mg/kg) subsistence anglers
Hazard-based fish concentrations, based on immunological endpoint =
0.187 (mg/kg) central tendency sport anglers
0.072 (mg/kg) high end sport anglers
0.025 (mg/kg) subsistence

RBC_{sed} are presented in Table 6-5. RBCs are different depending on the species consumed. For the central tendency sport angler, if ingestion of only smallmouth bass is assumed, the RBC_{sed} is 0.51 mg/kg for the cancer endpoint and 0.88 mg/kg for the noncancer endpoint (immunological). If ingestion of a combination of smallmouth bass and carp is assumed, the RBCsed is 0.30 mg/kg for the cancer endpoint and 0.52 mg/kg for the noncancer endpoint.

For the high end sport angler, if ingestion of smallmouth bass is assumed, the RBC_{sed} is 0.20 mg/kg for the cancer endpoint, 0.34 mg/kg for the noncancer endpoint. If ingestion of a combination of smallmouth bass and carp is assumed, the RBCsed is 0.12 mg/kg for cancer endpoints and 0.20 for the noncancer endpoint.

Table 6-5 Risk-Based Sediment Concentration (RBC_{sed}) API/PC/KR SITE

Scenario	RBC_{sed} Protective of Fish Ingestion at 1E-05 Cancer Risk for PCBs (mg/kg)		RBC_{sed} Protective of Fish Ingestion at 1.0 Hazard Quotient for PCBs (mg/kg)	
	Bass	Bass/Carp	Bass	Bass/Carp
Sport Angler - Central Tendency	0.51	0.30	0.88	0.52
Sport Angler - High End	0.20	0.12	0.34	0.20
Subsistence Angler	0.07	0.04	0.12	0.07

For the subsistence angler, if ingestion of smallmouth bass is assumed, the RBC_{sed} is 0.07 mg/kg for the cancer endpoint and 0.12 mg/kg for the noncancer endpoint. If ingestion of a combination of smallmouth bass and carp is being protected, the RBC_{sed} is 0.04 for the cancer endpoint and 0.07 mg/kg for the noncancer endpoint.

6.3 Calculation of Risk-Based Soil Concentrations

The risk-based floodplain soil concentration (RBC_{soil}) were derived in the same manner as the RBC_{fish}, i.e., the risk and hazard algorithms were reversed and were

solved using a cancer risk of 1 in 100,000 and a hazard index of 1.0. The same exposure assumptions used to estimate risk and hazard were used to derive RBC_{soil}.

Table 6-6 presents RBC_{soil} protective of residents. RBC_{soil} protective of residents for the cancer endpoint is 2.5 mg/kg. For noncancer endpoints, RBC_{soil} is 15 mg/kg for the reproductive endpoint and 4 mg/kg for the immunological endpoint.

Table 6-6 Risk-Based Floodplain Soil Concentrations (RBC_{soil}) Protective of Residents API/PC/KR Site

Receptor	RBC_{soil} Protective of 1E-05 Cancer Risk (mg/kg)	RBC_{soil} Protective of 1.0 Hazard Index (mg/kg)
Resident	2.5	15 (R) 4.0 (I)

Notes (R) = Reproductive endpoint
(I) = Immunological endpoint

Table 6-7 presents the RBC_{soil} protective of recreationalists. For the cancer endpoint the RBC_{soil} is 23 mg/kg. For noncancer endpoints, the RBC_{soil} is 139 mg/kg for the reproductive endpoint and 32 mg/kg for the immunological endpoint.

Table 6-7 Risk-Based Floodplain Soil Concentrations (RBC_{soil}) Protective of Recreational Visitors API/PC/KR Site

Receptor	RBC_{soil} Protective of 1E-05 Cancer Risk (mg/kg)	RBC_{soil} Protective of 1.0 Hazard Index (mg/kg)
Resident	23	139 (R) 32 (I)

Notes: (R) = Reproductive endpoint
(I) = Immunological endpoint

Appendix A presents the spreadsheets used to derive RBCs.

6.4 Applicability of RBC_{sed}

RBC_{sed} calculated for protection of angler assume that sediments are in-stream, or could reasonably become in-stream due to erosion or flooding. RBC_{sed} also assume a wide range of fish consumption for the three angle scenarios. Different angler scenarios could conceivably apply to different stream reaches, since angling success may vary significantly among ABSAs. For example, ABSA 9, Lake Allegan, appears to be a poorer fishery than other reaches of the river system. Data do not appear to be available, however, to allow a quantitative approach to different fishing behavior in different stream reaches.

RBC_{sed} calculated to protect residents might apply most directly to those areas immediately adjacent to former impoundment areas that could be visited on an almost daily basis by people living on the edge of the floodplain. Observations for

some homes and yards that are located on adjacent to floodplain soils indicate the potential for ongoing exposure.

RBC_{sed} may be applicable anywhere in the floodplain where exposed soils/sediments contaminated with paper waste exist. The focus of the risk assessment for recreational exposures was on the former impoundment areas, and these areas may well represent most of the more attractive recreational areas with exposed contaminated soils/sediments within the site. However, RBC_{sed} for recreational exposures would be equally applicable to accessible sites where contaminated exposed soils/sediments exist anywhere along the river.

6.5 Comparison of RBC Based on Human Health and Ecological Risk

CDM (2001) prepared a comprehensive ecological risk assessment (ERA), based on many of the same site data, as a companion to this HHRA. This ERA also develop a range of RBC for several important receptors. The range of RBC based on protection of riverine and upland species, is not greatly different than the range of RBC developed based on risks and hazards to human health. For all sediments that can be assumed to be part of the aquatic environment, RBCs based on protection of mink range from 0.5 to 0.6 mg/kg (Figure 6-1). The range in Table 6-4, from 0.04 mg/kg (subsistence angler, cancer endpoint, bass/carp diet) to 0.88 mg/kg (sport angler CTE, immunological endpoint, bass only diet), overlaps substantially with this range. Protection of both human and ecological receptors can apparently be achieved for pathways associated with contamination of aquatic habitats using much the same target sediment values.

Similarly, the range of RBC for protection of upland species (great horned owl, robin, mouse, and fox) range from 2.9 to 63 mg/kg (Figure 6-2). Again this range overlaps to a great extent with the range of values in Tables 6-5 and 6-6 (2.5 to 139 depending on receptor and toxicological endpoint). If a decision is made to manage risk for exposed floodplain soil on some basis other than as a source to river sediment, again, protection of human and ecological receptors might be achieved with similar target soil/sediment concentrations.

Figure 6-1

Figure 6-2

Protective Threshold Sediments/Surface Water PCB Concentrations for Mink

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

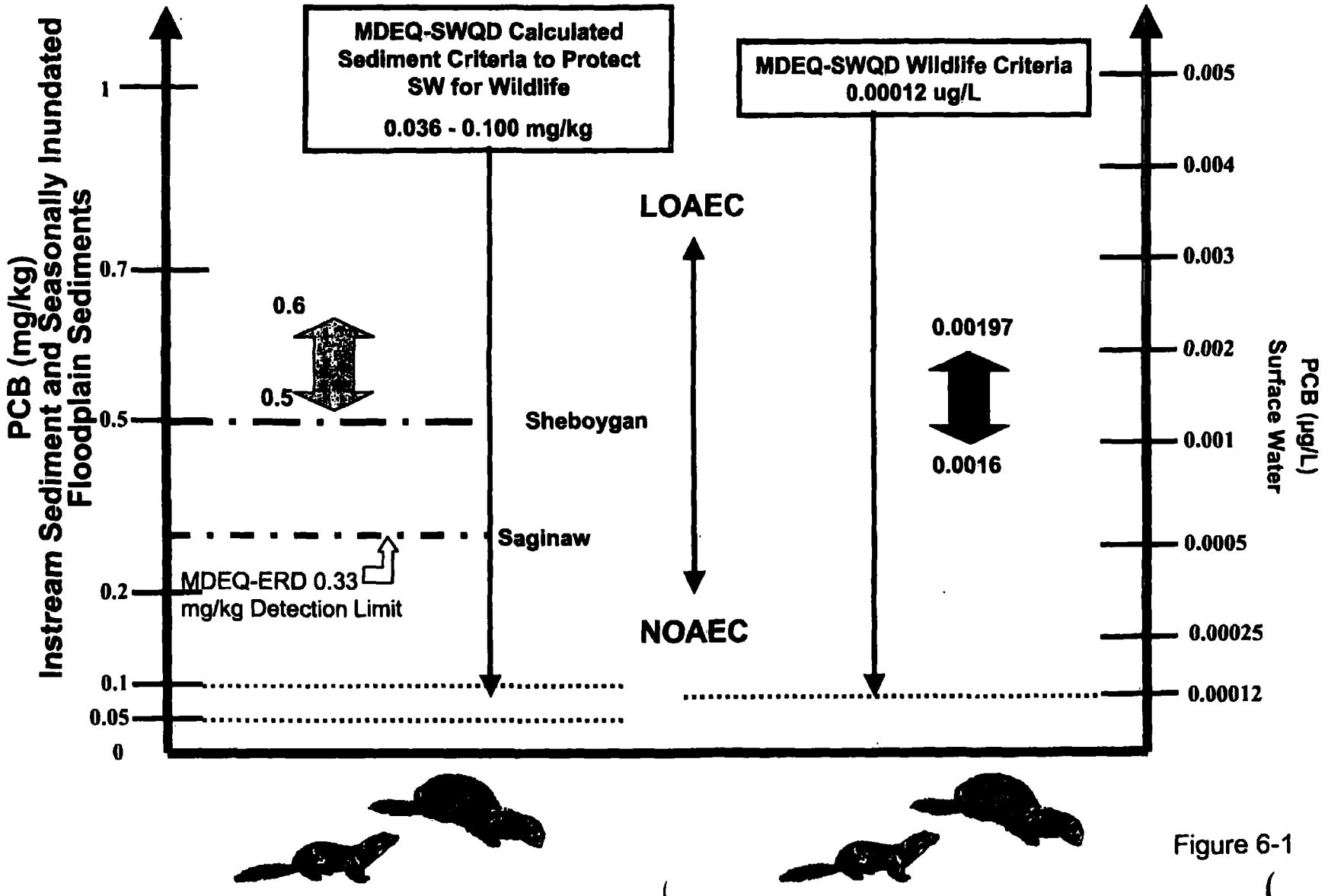

Figure 6-1

NCRKZOO0168585

Protective Threshold PCB Surface Soil Concentrations (Range for NOAEC – LOAEC) for Ecological Receptors

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

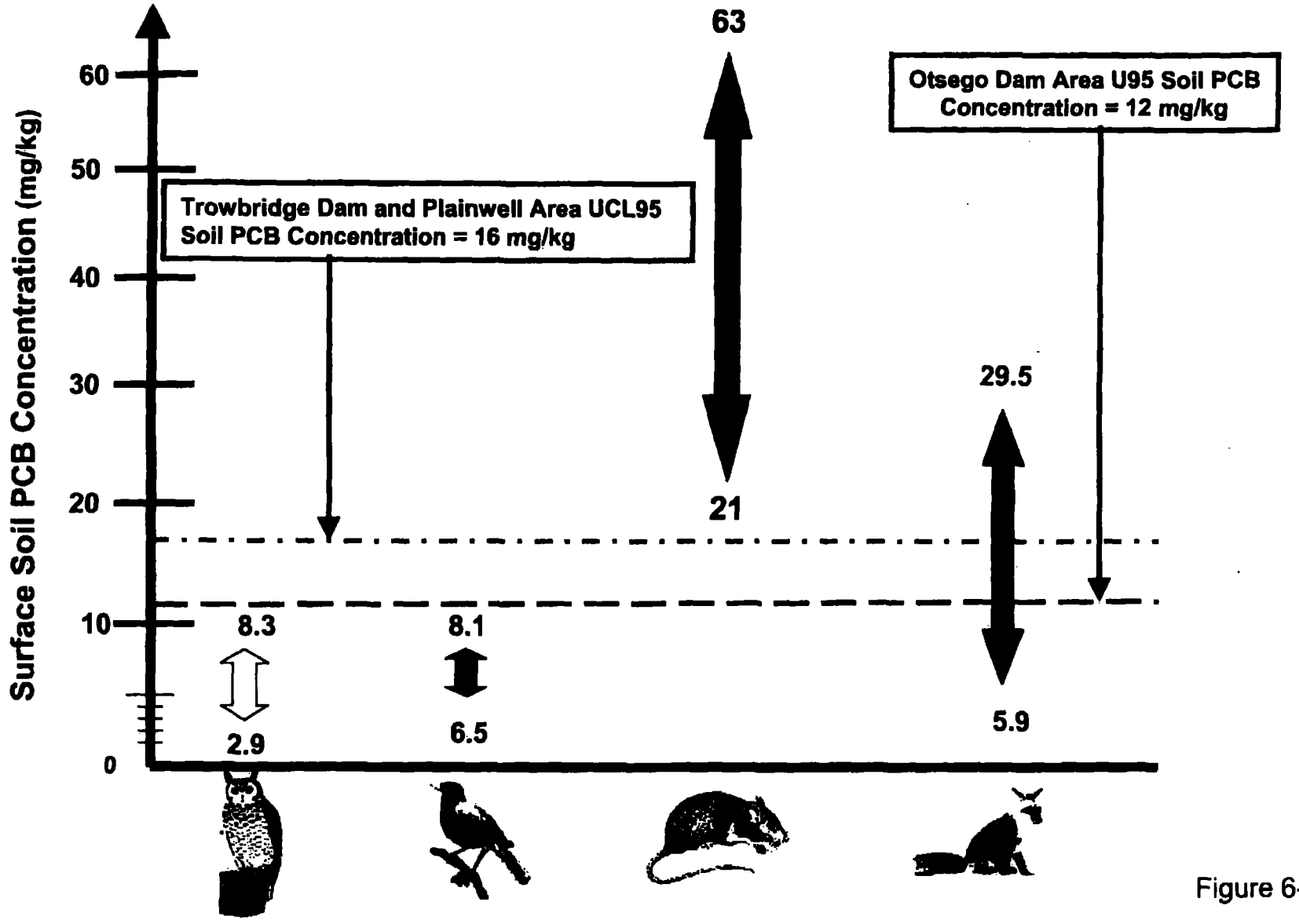

Figure 6-2

NCRKZOO0168586

Section 7
Uncertainty Assessment

Uncertainties can arise from several sources in a human health risk assessment including data collection and interpretation, assumptions used to characterize exposures, and toxicity values. To compensate for uncertainty surrounding input variables, conservative assumptions are often made that tend to overestimate rather than underestimate risk. In cases where data are limited, assumptions may be based on professional judgment or subjective estimates that may under or over estimate risks.

7.1 Types of Uncertainty

Three primary sources of uncertainty include:

- Scenario uncertainty
- Parameter uncertainty
- Model uncertainty

Scenario uncertainty results from missing or incomplete information needed to fully define exposure and dose. This uncertainty may include errors or gaps in site characterization, professional judgment, assumptions regarding exposed populations, and steady-state conditions. Sources of parameter uncertainty include measurement and sampling errors, inherent variability in environmental and exposure-related parameters, and the use of generic surrogate data or default assumptions when site-specific data are not available. Parameter uncertainty often leads to model uncertainty. One source of modeling uncertainty is relationship errors, such as errors in correlations among chemical properties or limitations in mathematical expressions used to define environmental processes. Errors due to the use of mathematical or conceptual models as simplified representations of reality are also sources of modeling uncertainty.

Often analysis of uncertainties is divided in "true uncertainty" and "variability." The former is uncertainty due to lack of knowledge of data. Variability is uncertainty due to unresolvable variation in physical, chemical, and biological process, human behavioral patterns, seasonal changes, and data for site characterization. An example of uncertainty in this HHRA involves selection of an exposure frequency for recreational site users. No site-specific information is available and this parameter is based on professional judgment.

An example of variability in this HHRA involves BSAF estimates derived from sediment, TOC, fish fillet, and percent lipid data. These estimates are based on a large amount of site-specific data and are likely to reflect unresolvable variation in this parameter.

These three types of uncertainty have been identified in each of the four parts of this risk assessment: data evaluation, toxicity assessment, exposure assessment, and risk characterization. Uncertainty within each of these components is discussed below.

7.2 Data Evaluation

Uncertainty is present in the data before it is even evaluated for risk assessment. This includes potential sampling bias, errors in laboratory extraction and analysis, and the protocol employed to assess contaminants identified as nondetected. A higher level of confidence is placed on the analytical results. Sampling errors and biases and assumptions for use of nondetect data are almost always more important from uncertainty considerations.

Fish data used to assess risks were collected in 1993 and 1997, and exposed floodplain data were collected in 1994. Because one of the primary sources of PCBs to the River is erosion of material from the riverbanks, and this source is ongoing, levels of PCBs detected in aquatic biota may have not significantly declined in the intervening period. Further, based on the persistence of PCBs, and in the absence removal actions, significant chemical degradation or other means of PCBs is not expected to be significant for floodplain soil. For these reasons, the data used to characterize the risk and hazards associated with ingestion of fish and contact with floodplain soil are deemed appropriate. The use of these data is unlikely to have resulted in a significant underestimation or overestimation of risks and hazards. Still, data are scant or absent for evaluating these assumptions.

Data for two media were deemed inadequate to conduct a quantitative risk evaluation. Turtle consumption is a confirmed exposure pathway for the Kalamazoo River; however, turtle consumption is expected to be less than fish consumption for the majority of people. The risks and hazards associated with fish ingestion provide a conservative estimate of the risks and hazards associated with turtle consumption. The absence of quantified risks and hazards resulting from turtle ingestion likely results in an underestimation of total site risks and hazards.

Air data have not been collected in the immediate vicinity of the River or exposed floodplain areas. Data collected from the Willow Boulevard/A-Site operable unit are not representative of the conditions in the immediate vicinity of the floodplain where soils are unvegetated and prone to entrainment. Concentrations of volatile emissions and particulates above the floodplain soil have been estimated using a simplified model and risks and hazards associated with this pathway were quantified. In the absence of actual air data, whether risks and hazards are underestimated or overestimated cannot be determined.

Air quality above surface water has not been characterized. Inhalation of volatile emissions above surface water was found to be associated with significant risks for the Lower Fox River Site (ThermoRetec 1999). In the absence of actual data and

quantitative estimates of risks and hazards for this pathway, total site risks and hazards are likely underestimated.

Data from another site were used to verify that exposures to surface water would not result in significant risks or hazards. Uncertainties associated with these data also apply to the API/PC/KR Site. Since these data have been thoroughly evaluated, uncertainties are assumed to be manageable. More recent data indicate surface water quality data reported in Technical Memorandum 16 – Surface Water Investigation (BB&L) were comparable to data collected from the Lower Fox River.

A concern exists relative to the overall site characterization in terms of whether the appropriate number of samples was taken in the appropriate areas (geospatial relationships of PCBs in sediments and exposed soils). In this risk assessment, mean sediment concentration is a critical input to the HHRA. There are three important issues related to site characterization that could affect the HHRA:

1. Are there adequate data to reliably estimate mean PCB concentrations in surficial sediment?

2. What is the best estimator of mean PCB concentration in sediment?

3. Is bootstrap sampling a valid approach to estimate the sampling distributions of BSAF and RBCs?

These issues are discussed in detail below.

1. Surficial sediment samples from a total of 630 individual locations were used to estimate TOC normalized PCB concentrations at the site. The sample locations were based on 120 transects across the floodplain. The transects show that the concentrations of PCBs vary widely throughout the floodplain. For reach-specific calculations, sample sizes ranged from more than approximately 30 locations to *over 160 locations. These data provide adequate sample size to estimate reach-*specific and sitewide average PCB concentration.

2. The sample average was used to estimate the spatial average of PCB concentration in surficial sediment. This is justified because the best estimator of the spatial average, among all unbiased linear estimators, is the ordinary block kriging estimator (Cressie 1991, p. 124) and when sample data are either systematically sampled, or uncorrelated, the block kriging estimator simplifies to the usual sample average (i.e., each of the samples receive equal weights). Because the sampling design for instream sediment at the Kalamazoo River is reasonably systematic, and because the data are very weakly autocorrelated, the sample mean is appropriate to estimate the spatial mean of PCB concentration in surface sediments. Although other unbiased estimators are possible, they will be less precise (i.e., less reliable sampling distributions). Using block kriging to estimate spatial means over large areas was first discussed by Journel and Huijbregts

(1973). Kern and Coyle (2000) compare the block kriging and sample average estimators for autocorrelated data and also discuss algorithms and software to estimate the block kriging estimator for large data sets on irregularly shaped areas such as rivers. Most commonly available software packages do not provide such routines.

3. The bootstrap analysis used for the estimation of RBCs, as presented in Section 6, requires that either the sample data are statistically independent in a model based sense (i.e., little or no autocorrelation among sample locations), or that the data were sampled using a randomized design (regardless of the autocorrelation in underlying data), such as a systematic sample with a random starting point or a simple random sample. The sediment data were not collected using a randomized design; however, the design is reasonably close to systematic. Variogram analysis conducted as part of the geostatistical pilot study (Technical Memorandum 10) indicate that sample locations on adjacent transects located one to several thousand feet apart are uncorrelated, and that samples at adjacent locations on a single transect may be very weakly correlated. Given the large sample sizes, the bootstrap algorithm is expected to be robust to the minor departure from assumptions associated with weak spatial dependence. The systematic nature of the sampling design is nearly adequate to justify the bootstrap algorithm even for strongly autocorrelated data. As previously stated, the concentrations of PCBs vary widely across and among transects, justifying the use of bootstrapping.

Other issues related to site characterization such as documentation of extent, estimation of volume, and small-scale patterns in PCB distribution are not likely to affect estimates of human health risk. Data used to prepare this report are adequate both in terms of location and number of samples to estimate risk to human health. EPA is planning to conduct additional sampling in one or two areas of the river to validate the current data set. However, it is unlikely that the results of this sampling effort will substantially affect the final estimates of human health risks and hazards.

7.3 Dose-Response Assessment

The dose-response section involves the estimation of the toxicological effects of a compound on humans usually based upon laboratory animal studies. A potentially significant source of uncertainty occurs when dose-response relationships in humans are derived from animal to human extrapolation. These associates often result from high-dose to low-dose extrapolations as well. Health effects criteria are derived with margins of safety relative to the degree of uncertainty in the value.

Noncancer toxicity values and cancer slope factors have been derived from studies of commercial mixtures. After release into the environment, PCB mixtures change over time so their composition differs from commercial mixtures. Through partitioning, different fractions of the original mixture appear in the air, water, sediment, soil, and biota due to different rates of volatilization, solubility, and adsorption for the congeners. (EPA 1996). Bioaccumulation through the food chain tends to concentrate

congeners of higher chlorine content, producing residues that are considerably different from the original aroclors (Cogliano 1998). Both humans and animals retain persistent congeners that are resistant to metabolism and elimination (Oliver and Niimi 1988). Mink fed Great Lakes fish contaminated with PCBs showed liver and reproductive toxicity comparable to mink fed Aroclor 1254 at quantities three times greater (Hornshaw 1983). PCBs tested in the laboratory were not subject to prior selective retention of persistent congeners through the food chain. For exposures through the food chain in most environmental situations, risks are probably higher than those estimated using toxicity values and cancer slope factors based on commercial mixtures (EPA 1996). Risk and hazard estimates for the fish ingestion pathway are likely underestimated. However, congener-specific data are not available to determine the magnitude of effects due to differing environmental fates of various PCB congeners.

7.4 Exposure Assessment

The exposure assessment step involves many assumptions about "typical people" and "typical exposure scenarios" to arrive at an average daily dose. For example, a body weight of 70 kg is used for residents and anglers. Body weight ranges for each individual, so these assumptions likely overestimate or underestimate the true dose that people are likely to receive.

Many exposure factors were chosen to err on the side of protectiveness for human health. Exposure duration, frequency, and time were set at reasonable maximum exposure values. They likely overestimate the exposures that typically occur.

The computation of the exposure point concentration for chemicals in a number of media may have resulted in an overestimate or underestimate of risks and hazards. Averages of site data exposure point concentrations may underestimate risks and hazards for some receptors while use of the maxima from site data exposure point concentration may overestimate risks and hazards for some receptors. Risks and hazards from both types of EPCs are provided in this assessment to try to bracket potential site-related impacts.

Another assumption made in this assessment is that exposure to study chemicals in various media remains constant over time. This suggests there is a nondiminishing source of contamination and that concentrations will remain at present levels for up to 30 years. In reality, soil, sediment, surface, and groundwater migrate. This would produce an exposure significantly less than that calculated in this assessment.

Another assumption made in the assessment is that a target hazard quotient of 1.0 (HI is not applicable, since only one contaminant, PCBs, and one exposure route, ingestion of fish, was considered for angler receptors) was used to calculate the RBC_{fish}. This is a deviation from MDEQ Surface Water Quality Division guidance, which specifies that a hazard index of 0.8 be used to calculate the RBC_{fish}. The MDEQ guidance is intended to be protective of noncancer endpoints based on a relative

source contribution factor of 0.8. The relative source contribution factor accounts for the fact that exposures to PCBs may occur from activities other than those which are site-related. The difference between a hazard index of 1.0 and 0.8 is minimal and should not greatly influence the RBC values.

The exposure assumption with the greatest influence on risk and hazard is the fish ingestion rate. Three ingestion rates were chosen to reflect the central tendency sport angler, the high-end sport angler, and cancer risk estimates and hazard quotient estimates. The lowest ingestion rate of 15 grams/person/day, which was used to characterize risks and hazards to the central tendency sport angler, was derived from the Great Lakes Water Quality Initiative Technical Support Document for Human Health Criteria and Values (EPA 1995b). This ingestion rate is consistent with the mean ingestion rate for anglers reported in both the Kalamazoo River Angler Survey (MDCH 1998), and Fish Consumption Estimates Based on the 1991-1992 Michigan Sport Anglers Fish Consumption Survey (EPA 1995c). A significant number of anglers ingest greater quantities of fish, therefore, the central tendency estimates under-represent risks and hazards to these individuals. Fish consumption advisories are intended to reduce the ingestion of contaminated fish. If fish consumption advisories are reducing consumption, reported consumption levels will be suppressed from their normal levels (West 1993). Of a total of 1,347 respondents to the Michigan sport anglers consumption study, 46.8 percent reported to have eaten less fish in response to advisory warnings. In the Kalamazoo River Anglers Survey, 25 percent of respondents indicated they would make more trips to the River and fewer to other locations if the River was cleaned up to the point that fish advisories were removed; 15 percent of respondents indicated they would increase fishing in the Kalamazoo River without reducing trips to other bodies of water. This consumption suppression effect can result in an underestimate of risks and hazards for assumed baseline conditions, i.e., in the absence of remediation or risk reduction measures such as fish advisories.

Figures 7-1 and 7-2 show relative impacts of composition of fish (bass only versus a combination of bass and carp) consumed by anglers on cancer risk estimates and hazard quotient estimates for the high-end sport angler. These figures also illustrate the relationship between risk and hazard based on maximum and average fish fillet concentrations. Cancer risks for consumption of both bass and carp (trophic level 4 and 3 fish respectively), show a variety of patterns among different ABSA. For ABSAs 3,4 and 5, 10 and 11, consumption of both bass and carp is associate with significantly higher risk and hazard than consumption of bass only. In contrast, much smaller differences are seen for ABSA 6, 7, and 8. For ABSA 9, Lake Allegan, almost no difference is noted. These results probably reflect variability in data, but could also reflect differences in habitat that produce different levels of exposure for fish in different ABSAs. Data are insufficient to resolve such issues at present.

Comparison of Cancer Risks Based on Maximum and Average Fillet Concentrations for Bass Only and Bass/Carp Consumption High End Sport Angler

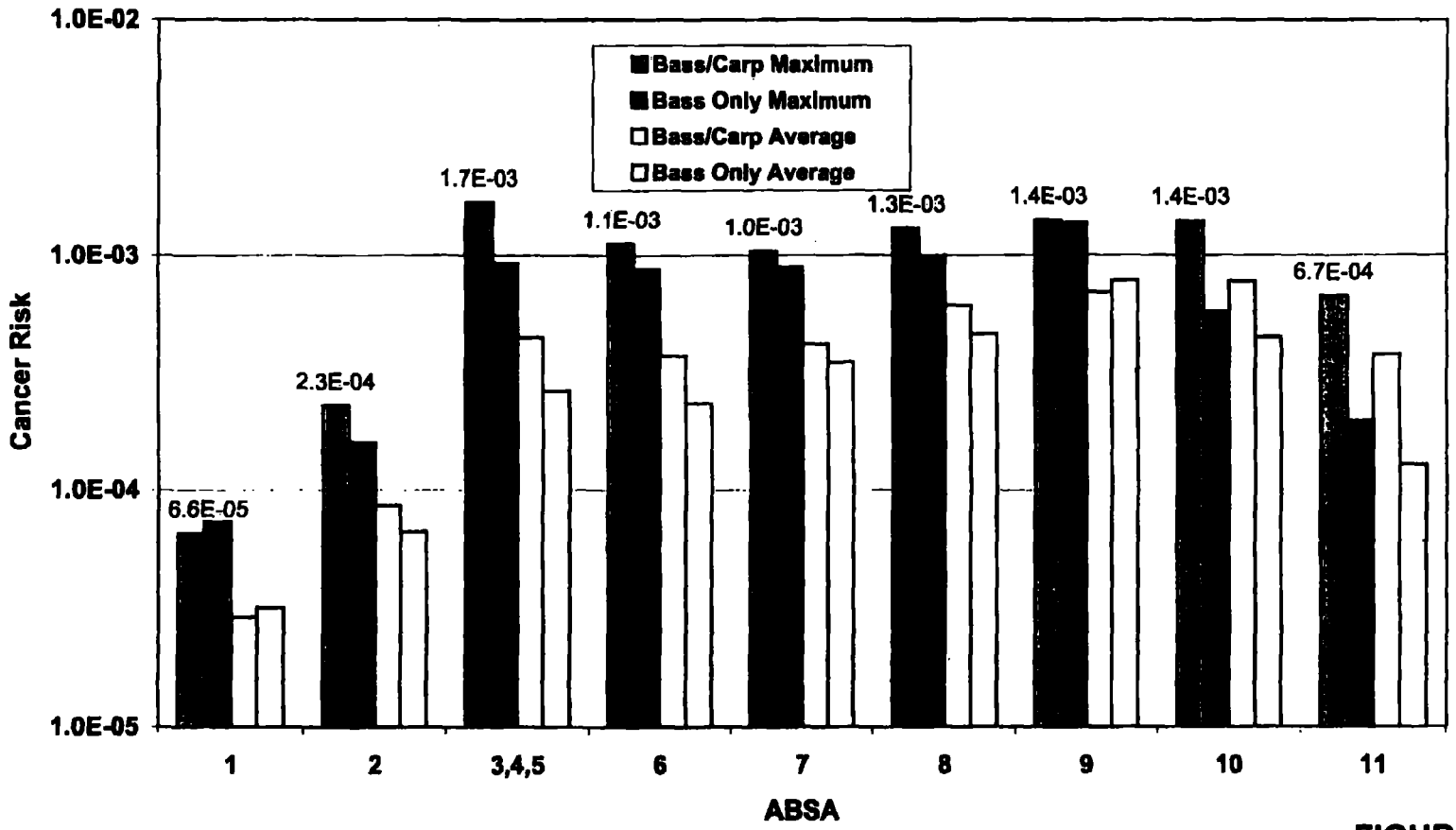

FIGURE 7-1

API/PC/KR SITE

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Comparison of Hazard Quotients Based on Maximum and Average Fillet Concentrations for Bass Only and Bass/Carp Consumption High End Sport Angler

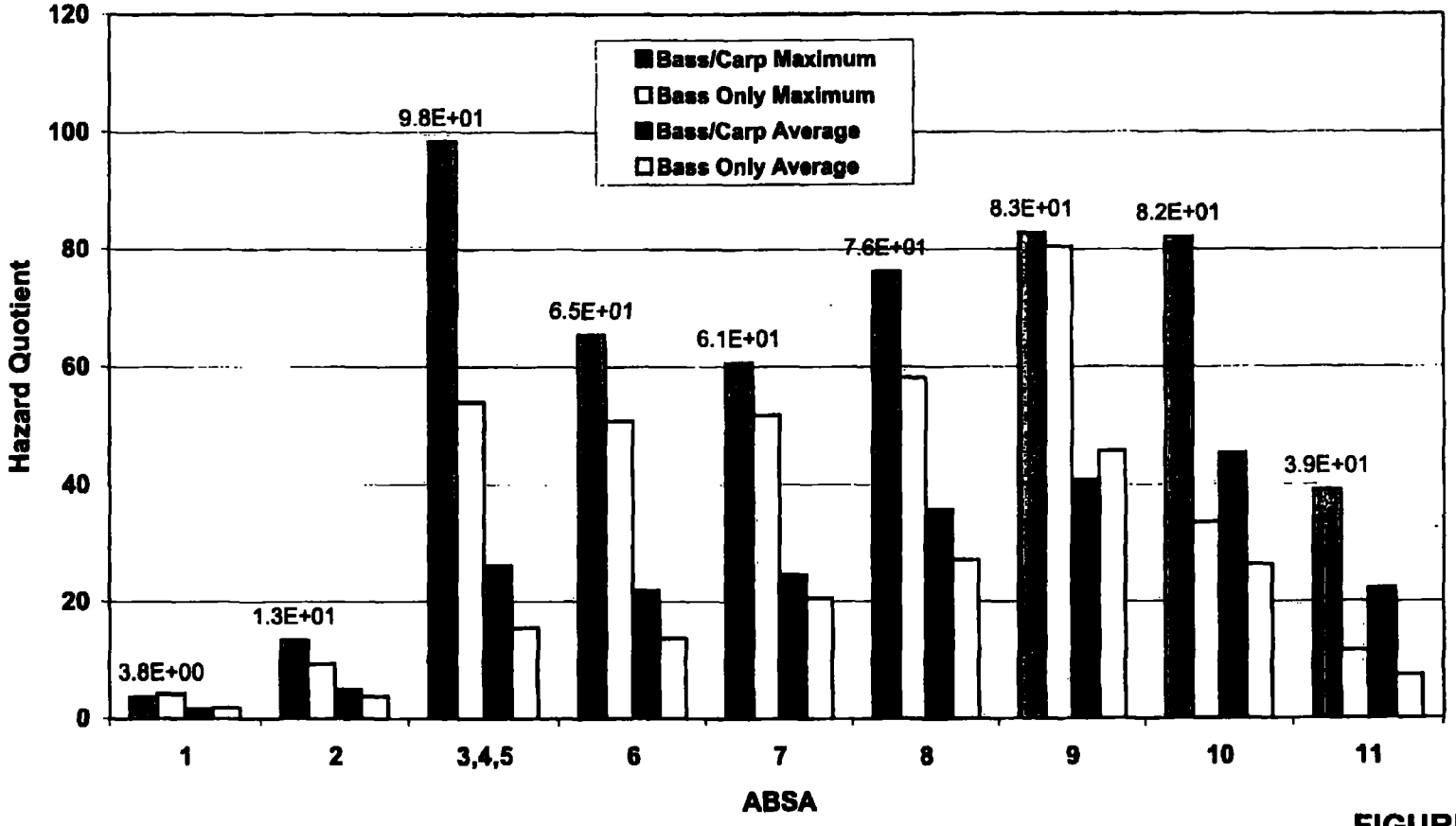

FIGURE 7-2

API/PC/KR SITE

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Figures 7-1 and 7-2 also illustrate differences between average and maximum concentrations of PCB in fish fillets. Generally, these two values are substantially different, and risk management decisions based on one or the other value could result in different actions for the site. At present the small sample sizes (generally 11 fish of each species per ABSA) are not sufficient to provide long term estimates of average concentrations. Long-term averages would best reflect potential exposure for the scenarios addressed in this assessment. Currently, trends in fish tissue concentrations are being analyzed; these analyses may help address the issue of the applicability of risk estimates based on average and maximum concentrations.

The second most influential assumption for the fish ingestion scenario is the portion of fish caught from the contaminated source. For central tendency high-end sport anglers and subsistence anglers it was assumed that all of the fish ingested came from a particular ABSA. For high end sport anglers it was assumed half of the fish ingested came from a particular ABSA. Risks and hazards could be underestimated for those high-end anglers who catch all of their fish from different locations within the API/PC/KR site.

A reduction factor was used to account for the loss of PCBs when fish is cooked. This reduction factor did account for PCB losses during trimming fish and removing fat. Data reported in the Kalamazoo River Anglers Survey indicates that about 65 percent reported some trimming and skin removal prior to cooking.

The Michigan Sport Anglers Study also reported that between 44 and 84 percent of anglers did trim the fat from sport fish prior to cooking. For these reasons, use of a 50 percent overall reduction factor is believed to be appropriate for a large fraction of the population.

Residential exposure assumptions could overestimate risk for impoundment areas that are not readily accessible to residents. A recreational exposure scenario has been developed in an attempt to quantify exposure in hard-to-reach areas. However, application of the residential and recreational exposure scenarios is subject to a variety of considerations, including: (1) future risk is generally considered, and residential development may expand beyond current boundaries decreasing the area to which a recreational scenario would apply; and (2) the dynamic nature of the river system makes application of conservative assumptions appropriate. Periodic flooding may transport sediments from one area of an impoundment to another. Soils to which a recreational scenario is applied could be transported to an area where residential exposure is likely.

7.5 Risk Characterization and Calculation of RBCs

Assumptions are made using best professional judgment and the scientific literature on site risk assessments. In general, assumptions made throughout this risk assessment are conservative in that they tend to overestimate exposure and resultant risk rather than underestimate it. The overall risk to public health attributable to the

site is an upper-bound probability of adverse health effects. True health effects may be lower. However, it should be noted that the individual errors from different sources might be propagated into larger errors by mathematical manipulation in the risk assessment.

Some quantification of variability associated with estimated RBC_{sed} can be developed using the results of the bootstrapping procedure discussed in Section 6.2. Bootstrapping was used to estimate both mean and upper and lower 95 percent confidence limits for BSAF. Mean BSAF estimates were used to calculate RBC_{sed} developed in Section 6.2. RBC_{sed} can also be calculated using upper and lower confidence limits to provide an indication of the range of RBC that could be considered in risk management of the site. Figures 7-3 and 7-4 illustrate these ranges for RBC_{sed} for cancer and noncancer (immunological) endpoint respectively.

Confidence intervals for RBC_{sed} based on cancer risk overlap for the Sport Angler - CTE and Sport Angler - High End, and for the Sport Angler - High End and Subsistence Angler (Figure 7-3). One might reasonably conclude that selection of a target clean-up level within the regions of overlap could be protective for many or most anglers in either category.

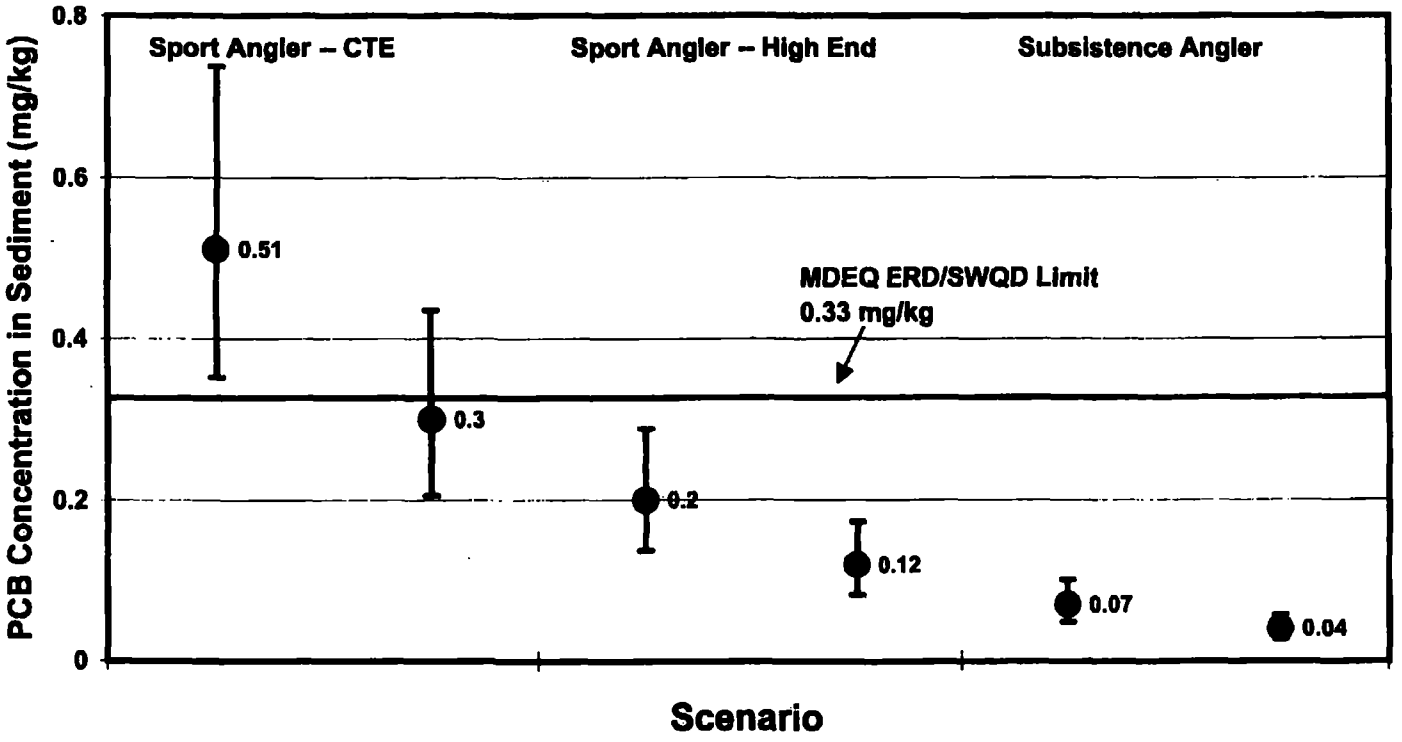
RBC_{sed} and associated confidence limits are generally lower than the MDEQ ERD/ SWQD "detection limit" of 0.33 mg/kg for sediment. Actually, lower detection limits can be achieved in many samples; 0.33 is considered by the State to be a detection limit than can be reliably achieved in virtually all samples with PCB concentrations in the range of those commonly seen in riverine systems.

RBC_{sed} and associated confidence intervals are somewhat higher when based on noncancer (immunological) health concerns (Figure 7-4). Confidence intervals still overlap among scenarios. However, RBC_{sed} are higher than the MDEQ ERD/SWQD limit of 0.33 mg/kg in many cases. In fact, only ranges of RBC_{sed} for the subsistence angler are not higher than, or overlapping with this limit.

Variability in BSAF does suggest a range of estimated RBC_{sed} that represents possible protective clean-up targets for the API/PC/KR Site. One should note, however, that confidence intervals illustrated in Figures 7-3 and 7-4 do not consider many sources of uncertainty other than those associated with BSAF estimation. If these sources of uncertainty (many of which are discussed above) were evaluated quantitatively, confidence intervals about RBC_{sed} would widen. Widening of confidence intervals would increase overlap of possible clean-up targets among scenarios. One should not, therefore, assume that a target clean-up goal that exceeds the upper confidence limit for RBC_{sed} for any angler population would necessarily be nonprotective for all members of the population.

Risk assessment guidance (EPA 1989) stresses the importance of considering uncertainties in interpreting and applying results of any risk assessment. Thus, RBC_{sed} with associated confidence intervals as presented in Figures 7-3 and 7-4 may be the most appropriate for consideration in risk management for the site.

Confidence Intervals for Risk-Based Concentrations Based on Variability in BSAF
RBC_{sed} Based on Cancer Risk Target of 1 in 100,000



Note: RBC for Bass Only Consumption in Blue; RBC for Bass/Carp Consumption in Green

FIGURE 7-3

API/PC/KR SITE

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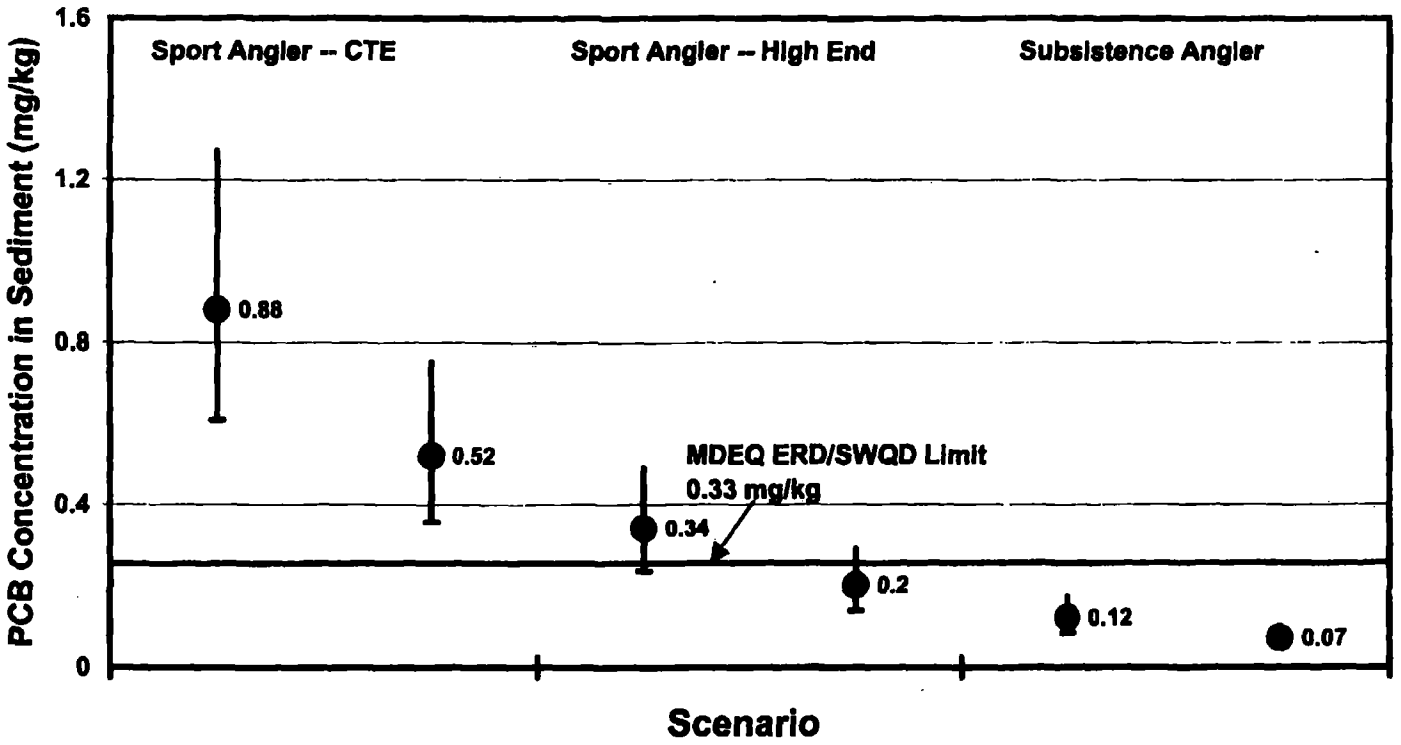
Confidence Intervals for Risk-Based Concentrations Based on Variability in BSAF
RBC_{sed} Based on Hazard Quotient Target of 1



Note: RBC for Bass Only Consumption in Blue; RBC for Bass/Carp Consumption in Green

FIGURE 7-4

API/PC/KR SITE

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Section 8
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Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

Baseline Ecological Risk Assessment

Prepared for:

Michigan Department of Environmental Quality
Environmental Response Division

CORNELIUS
DEPOSITION
EXHIBIT #3
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June 1999

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Contents

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Executive Summary

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EXECUTIVE SUMMARY

This Executive Summary presents an overview of the Ecological Risk Assessment (ERA) for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (API/PC/KR) in Southwestern Michigan. The primary purpose of this ERA is to identify and describe actual or potential onsite conditions that can result in unacceptable risks to exposed organisms. 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.

BACKGROUND AND SITE DESCRIPTON

Due to the PCB contamination, in August 1990 the site was placed on the Superfund or National Priorities List (NPL). The NPL Study Area (API/KR/PC) defined in the Michigan Environmental Response Act 307 includes three miles of Portage Creek, from Cork Street to its confluence with the Kalamazoo River, and 80 miles of the Kalamazoo River, from Morrow Lake Dam downstream to Lake Michigan. Also included in the site are five paper residual disposal areas and five paper mill properties.

The Michigan Department of Community Health has issued a species-specific no consumption fish advisory annually since 1977 for the Kalamazoo River portion of this site due to PCB contamination. The Kalamazoo River and Portage Creek also have 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), due to PCB contamination. The Kalamazoo River and Portage Creek have been identified as an Area of Concern by the International Joint Commission on the Great Lakes due to the detrimental impact the release of PCBs have on Lake Michigan.

GENERAL APPROACH TO ERA

This ERA follows EPA guidance for conducting ERAs. The major components of the ERA include Problem Formulation, Analysis, and Risk Characterization. The Problem Formulation phase of this ERA establishes the goals and describes the scope and focus of the assessment. In addition, this phase considers site-specific regulatory and policy issues and requirements and preliminarily identifies potential stressors and ecological resources potentially at risk. The outcome of Problem Formulation is the site-specific conceptual model, which describes potential exposure pathways and the relationship between remedial action objectives, assessment endpoints and measurement endpoints.

Uncertainties associated with this phase of the ERA are included at the end of this section.

The Analysis phase of the ERA describes the nature and extent of contamination (Exposure Assessment) and identifies appropriate and relevant threshold concentrations, standards, or criteria for contaminants of concern (Effects Assessment). Uncertainty analysis related to this phase of the ERA is also included.

The final major component of the ERA, Risk Characterization, considers the information gathered in Problem Formulation and integrates Exposure and Effects data to estimate risks to ecological receptors. Also included in Risk Characterization is a discussion of ecological significance, risk summary, and uncertainty analysis.

This ERA also includes an additional section on Remediation Issues in which preliminary risk-based remediation or clean up goals are developed.

This ERA uses several lines of evidence to increase confidence in risk estimates and ERA conclusions. These include the use of simple hazard quotients that compare a single selected exposure concentration to a single selected effects concentration to derive a quotient. This is a common screening level approach for identifying issues of most concern. Supplementing this approach is a comparison of multiple media-specific exposure concentrations for specific site locations to multiple effects concentrations that include site-specific and literature-based values. This approach reduces the uncertainties in relying on single exposure and effects concentrations and contributes to the weight-of-evidence. Also included in this ERA is a food chain model that estimates PCB dose via ingestion pathways for key receptor species or groups. Finally, this ERA considers field observations and other qualitative data as a check on risk estimates and conclusions.

REPRESENTATIVE RECEPTORS

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).

ERA-RELATED GOALS AND OBJECTIVES

ERA-related remedial action goals and objectives for the API/PC/KR have been determined by MDEQ, and include: (1) the establishment and maintenance of a healthy and diverse aquatic and riparian cosystems in and adjacent to the API/PC/KR, and (2) reductions in PCB concentrations in fish and wildlife such that human consumption restrictions can be lifted.

SITE CONCEPTUAL MODEL

The site conceptual model (SCM) is the primary output of the Problem Formulation phase of the ERA, and is used to develop a series of null hypotheses for the API/PC/KR, primarily those regarding potential exposure scenarios and the relationship between selected assessment and measurement endpoints. The null hypotheses for the API/PC/KR are defined as follows:

- The levels of contaminants in water, sediment, and biota are not sufficient to cause adverse alterations to the structure or function of the fish populations in the Kalamazoo River and Portage Creek System.
- The levels of contaminants in water, sediment, and biota are not sufficient to cause adverse effects on the long-term health and reproductive capacity of aquatic receptors utilizing the Kalamazoo River and Portage Creek system.
- The levels of contaminants in water, sediment, soil, and biota are not sufficient to cause adverse effects on the long-term health and reproductive capacity of mammalian receptors utilizing the Kalamazoo River and Portage Creek system.
- The levels of contaminants in water, sediment, and biota are not sufficient to cause adverse effects on the long-term health and reproductive capacity of avian receptors utilizing the Kalamazoo River and Portage Creek system.

SUMMARY OF CONCLUSIONS

Hazard Quotient-based Risks

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.

Overall Risk Summary

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 indirectly but potentially greatly 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 less sensitive piscivorous predators, such as bald eagles, may be at risk if fish are the predominant prey item consumed and if 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 are in general considered to be low to moderate, depending on species.

  — Carnivorous terrestrial species (represented by the red fox) are unlikely to be at significant risk unless foraging is concentrated in riparian areas with contaminated floodplain sediment and diet consists of prey that (1) reside in PCB-contaminated areas, and (2) have taken up substantial amounts of PCBs.

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

  — Omnivorous birds (represented by the robin) that consume a substantial amount of vegetation, would be at significant risk only if PCB uptake in plants approached the predicted uptake rate used in the ERA. The

predicted uptake rate for terrestrial plants in dry environments is believed to be over-estimated to some extent. Consumption of terrestrial invertebrates such as earthworms is expected to contribute more to total PCB intake than ingestion of plants. Diets high in contaminated invertebrates would increase risks for omnivorous birds.

— 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 ERA presents overwhelming evidence that, despite uncertainties identified in the ERA, the proposed null hypotheses can be rejected with little reservation. The ecosystem associated with the API/PC/KR portion of the Kalamazoo River has been and is currently being adversely affected by PCBs originating from past industrial activities. This evidence by the distribution of PCBs in biota at all trophic levels within the API/PC/KR.

REMEDIATION ISSUES

The selection of the most appropriate methods for achieving remediation goals is not a risk assessment issue but is a risk management issue to be addressed in the feasibility study (FS) for this API/PC/KR. The application of cleanup values is also considered a risk management decision. 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 API/PC/KR. For example, it is probably most appropriate to use a single point cleanup value as an average media-specific post-remediation concentration goal within a specific area. Alternatively, a single point cleanup value can be considered a "never to exceed" value for any onsite sample, but such an application might result in needlessly exceeding remediation goals and costs in most areas within the site. It is most appropriate for risk managers rather than risk assessors to decide how to best apply cleanup values recommended in the risk assessment.

The proposed cleanup levels for various media for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site are presented below.

- **Surface water total PCB concentrations should not exceed 0.00038 ug/L** to protect mink, the most sensitive of all animals tested to date.

- **Streambed sediment total PCB concentrations should not exceed 0.12 mg/kg** to protect mink, the most sensitive of all animals tested to date.

- **Surface soil and in some cases floodplain sediment PCB concentrations should not exceed 0.7 mg/kg** to protect omnivorous songbirds such as robins, the most sensitive omnivorous terrestrial species evaluated in this ERA.

1 Section One

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Section 1
Introduction

This document presents the baseline ecological risk assessment (ERA) for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (API/PC/KR) in Southwestern Michigan. This assessment uses site-related chemical concentrations. exposure potential, and toxicity information to characterize potential risks to ecological receptors from releases of polychlorinated biphenyls (PCBs) to the Kalamazoo River ecosystem. Risks are estimated assuming no remedial action has occurred at the site, and are intended to assist the risk manager in determining the acceptable clean-up levels to protect ecological receptors.

1.1 Report Objectives

ERAs evaluate the likelihood that adverse ecological effects may occur or are occurring at a site as a result of exposure to single or multiple chemical or physical stressors (EPA 1992a). Risks result from contact between ecological receptors and stressors that are of sufficiently long duration and of sufficient intensity to elicit adverse effects (EPA 1992a). The primary purpose of this ERA is to identify and describe actual or potential onsite conditions that can result in adverse effects to present or future ecological receptors. Sufficient recent site-specific information is available to allow this ERA to focus on the primary ecological stressors present at this site. These primary stressors have been identified as polychlorinated biphenyls (PCBs). This ERA focuses on comparing measured or estimated PCB exposures with observed or predicted biological effects. This ERA also provides information that can help establish remedial priorities and serve as a scientific basis for regulatory and remedial actions for the API/PC/KR.

1.2 Report Organization

The approach used to conduct this ERA is based on site-specific information and on recent EPA guidance, primarily The Framework for Ecological Risk Assessment (Framework Document, EPA 1992a), supplemented by more recent guidance including the Guidelines for Ecological Risk Assessment (EPA 1998) and Ecological Risk Assessment for Superfund: Process for Designing and conducting Ecological Risk Assessments (EPA 1997). EPA (1989; 1992a, 1997, 1998) and others (e.g., Barnthouse, et al. 1986) recognize that methods for conducting ERAs must be site-specific, and guidance for conducting ERAs are therefore not intended to serve as detailed, specific guidance documents. As much as practicable, the methods, recommendations, and terminology of the Guidelines for Ecological Risk are used to conduct this ERA. The organization of this ERA follows the format presented in this document, with some modifications made for site-specific considerations and readability. Following this introduction, a short description of the site is presented in Section 2. The primary components of this ERA are: Problem Formulation (Section 3) which describes the goals, scope and focus of the ERA; the Analysis Phase (Section 4) which evaluates the data used to assess exposures for local flora and

fauna; and the Risk Characterization (Section 5) which discusses the risks identified by this ERA. Additionally, Section 5 describes remedial goals for PCBs in sediments, surface water and floodplain soils associated with the Kalamazoo River. References for all sections are provided in Section 6.

2 Section Two

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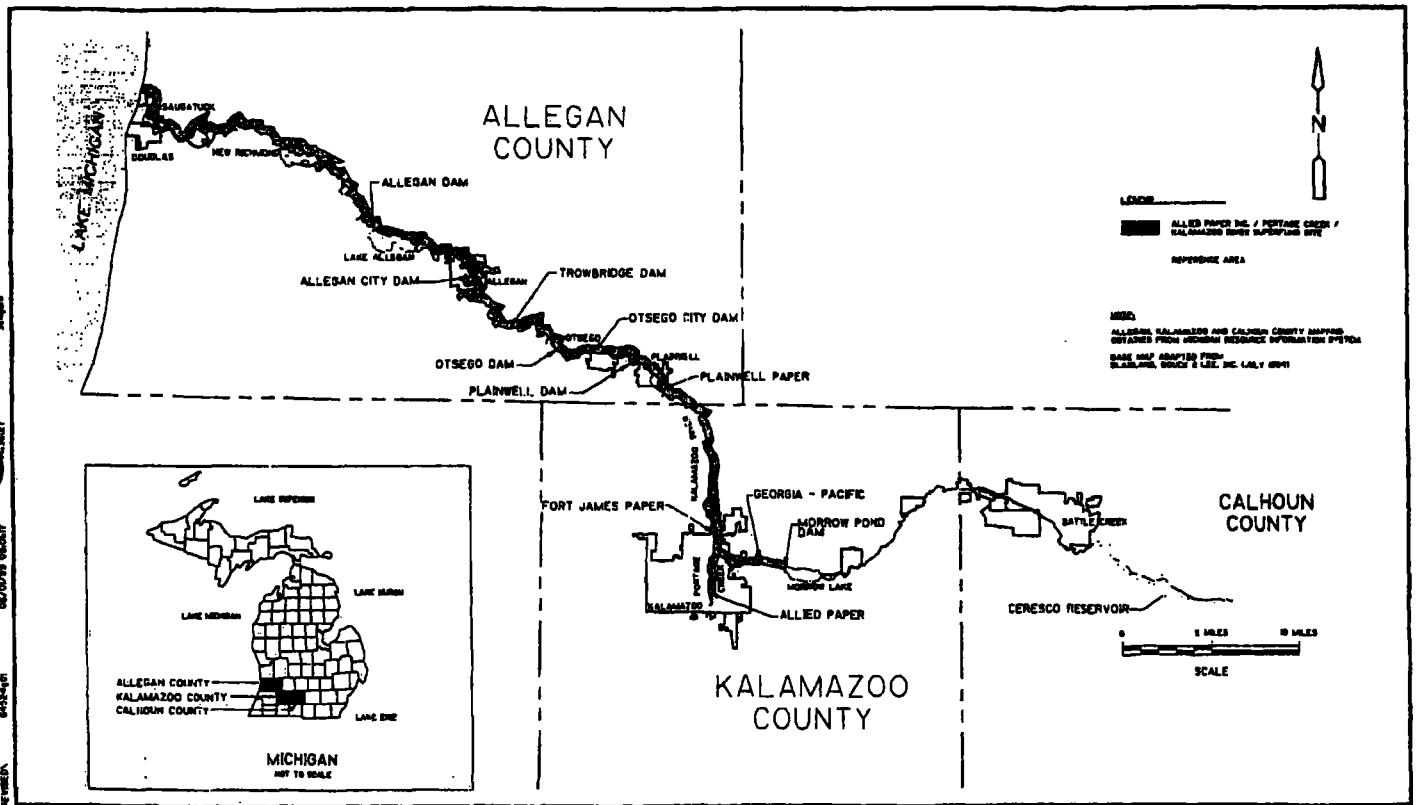
Section 2
Site Description

The Kalamazoo River drainage basin encompasses approximately 2,000 square miles. The main stem of the Kalamazoo River begins in Albion, Michigan at the confluence of the North and South Branches of the Kalamazoo River, and flows northwesterly for 123 miles through Calhoun, Kalamazoo, and Allegan Counties to Lake Michigan at Saugatuck. The Kalamazoo River is fed by more than 400 miles of tributaries, including Portage Creek. Portage Creek begins in Portage, Michigan and including its west fork, flows a distance of approximately 18.5 miles.

Due to the PCB contamination, in August 1990 the site was placed on the National Priorities List (NPL) in accordance with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 1980 PL 96-510 as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986 also known as Superfund. The NPL Study Area defined in Michigan Environmental Response Act 307 (also known as the API/KR/PC) includes three miles of Portage Creek, from Cork Street to its confluence with the Kalamazoo River, and 80 miles of the Kalamazoo River, from Morrow Lake Dam downstream to Lake Michigan (**Figure 2-1**). Also included in the site are five paper residual disposal areas and five paper mill properties. Paper residuals (residuals) are the waste material produced by the paper mill during the paper making process. The Michigan Department of Community Health has issued a species specific no consumption fish advisory annually since 1977 for the Kalamazoo River portion of this site due to the PCB contamination. The Kalamazoo River and Portage Creek also have 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), due to PCB contamination. The Kalamazoo River and Portage Creek have been identified as an Area of Concern by the International Joint Commission on the Great Lakes due to the detrimental impact the release of PCBs have on Lake Michigan as well.

The Kalamazoo River is an alternating series of free flowing sections and impoundments formed by low level dams. The Plainwell, Otsego, and Trowbridge Dams have been removed to their sill levels, exposing approximately 507 acres of



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

KALAMAZOO RIVER ECOLOGICAL RISK ASSESSMENT
STUDY AREA

CDM
environmental engineers, scientists, planners, & management consultants

KB61400021

Figure No. 2 - 1

former sediments as floodplain soils (Blasland, Bouck & Lee, Inc. 1992). Since these impoundments are all located downstream of the paper mills and landfills which are the PCB sources, they serve as natural sinks for PCB-contaminated sediments. The former dams continue to impound water but to a lesser extent. Michigan Department of Natural Resources (MDNR) owns these three dams and their goal is to remove the remaining structures and return the river to its natural channel. The Otsego City Dam, Allegan City Dam, and the Allegan Lake Dam are still intact. The latter two dams are used to produce hydroelectric power (Blasland, Bouck & Lee, Inc. 1992).

The NPL identified PCBs as the primary contaminant of concern at the API/PC/KR. PCBs were introduced to the environment as a result of using of the river for discharging . The primary industrial activity associated with PCB releases into the API/PC/KR environment was the recycling of PCB-containing carbonless copy paper at several area paper mills. In the process of de-inking and re-pulping recycled paper, paper mills produce substantial quantities of waste residuals. During the period from 1957 to 1971, carbonless copy paper contained PCBs as an ink solvent. Kalamazoo-area paper mills that de-inked or re-pulped the PCB-containing carbonless copy paper thereby incorporated PCBs in their waste streams. These paper mills disposed of their wastes in several ways that resulted in releases of PCBs to the environment, including direct discharge of wastes to Portage Creek and the Kalamazoo River and placement of wastes in disposal areas (landfills) from which PCBs are leached or eroded. The paper wastes also included kaolinite clays which concentrate PCBs like other organic materials. These clays have been deposited in the API/PC/KR and when concentrated, they appear as spongy, light grey clay layers. In addition, PCBs are persistent in the environment and degradation via chemical oxidation, hydrolysis, and photolysis in soil or aquatic systems is generally insignificant (Blasland, Bouck & Lee, Inc. 1992). PCBs are continually being released to the river from erosion of floodplain soils that exist behind the impounded areas and from instream sediments. Therefore, PCBs are a persistent problem at the API/PC/KR. Similar river systems such as the Fox River (WDNR 1993) and the Hudson River (Brown, et al. 1985) have PCB contaminated sediments that are the major supplier of PCBs to the ecosystem once direct discharges have been eliminated.

Figure 2-1A, in *Description of the Current Situation Report* (Blasland, Bouck & Lee, Inc. 1992) provides a more detailed description of the physical settings and characteristics of the API/PC/KR. Much of the abiotic data used in this ERA, were obtained from this report.

In 1993, Camp Dresser & McKee (CDM) prepared a Biota Sampling Plan (CDM 1993) that outlined sampling activities for the collection of biotic data within the study area. Sampling of biota was conducted to determine current levels of PCBs in resident biota. Based upon these field studies a site-specific model was developed to evaluate bioaccumulation and risk, upon which remedial activities may be based. Field sampling was conducted by Blasland, Bouck & Lee, Inc. with oversight by CDM and the Michigan Department of Environmental Quality (MDEQ) or as by the MDEQ. Biological tissue and corresponding abiotic media data collected in the study area were used in this ecological risk assessment.

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Final (Revised)
Baseline Ecological Risk Assessment
Allied Paper, Inc. / Portage Creek / Kalamazoo River Superfund Site

Michigan Department of Environmental Quality
Remediation and Redevelopment Division

April 2003

REGULATORY AGENCY NOTICE:

The Michigan Department of Environmental Quality (MDEQ) was the lead agency for the preparation of the Baseline Ecological Risk Assessment (BERA) for the Kalamazoo River. The United States Environmental Protection Agency (EPA) has worked jointly with MDEQ in the development of this BERA and concurs with the results and conclusions presented herein.

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NCRKZOO0556824

NCRKZOO0556825

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NCRKZOO0556829

Executive Summary

This Executive Summary presents an overview of the Revised (JANUARY 2003) Final Baseline Ecological Risk Assessment (BERA) for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (API/PC/KR) in Southwestern Michigan. The revisions forming the basis of this (JANUARY 2003) revised final document address comments[1] on the

- Revised Final BERA (JANUARY 2002),
- Final BERA (June 1999), and
- the Addendum to the BERA (August 15, 2000).

KRSG comments were identified in various letters, data summaries, and technical memorandums received by MDEQ from 1999 through late 2001. A July 19, 1999 letter from KRSG to MDEQ contained comments from Giesy Ecotoxicology, Inc.; A September 11, 2000 letter from M.P. Brown to J. Brian von Gunten summarized similar comments. EPA and FWS concerns and comments were identified in several meetings and telephone conversations throughout summer and fall 2000. The Revised (January 2002) Final BERA addressed all the comments presented in these correspondences. An October 11, 2001 transmittal from M.P. Brown (Blasland, Bouck & Lee, INC.) to J.B. von Gunten (Michigan Department of Environmental Quality-Emergency Response Division (MDEQ-ERD) presented a report of the findings-to-date of Dr. J. Giesy's studies of ecological exposure and risks for the site. Concerns and issues presented in the Giesy report have been addressed with this Revised (JANUARY 2003) Final BERA.

The primary purpose of this ERA is to identify and describe actual or potential onsite conditions that can result in unacceptable risks to exposed organisms. 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.

Background and Site Description

Due to the PCB contamination, in August 1990 the site was placed on the Superfund or National Priorities List (NPL). The NPL Study Area (API/KR/PC) includes 3 miles of Portage Creek, from Cork Street to its confluence with the Kalamazoo River, and 80 miles of the Kalamazoo River, from Morrow Lake Dam downstream to Lake Michigan. Also included in the site are five paper residual disposal areas and five paper mill properties.

[1] U.S. Environmental Protection Agency (EPA), the U.S. Fish and Wildlife Service (FWS), and the Kalamazoo River Study Group (KRSG)

The Michigan Department of Community Health has issued a species-specific no consumption fish advisory annually since 1977 for the Kalamazoo River portion of this site due to PCB contamination. The Kalamazoo River and Portage Creek have 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), due to PCB contamination. The Kalamazoo River and Portage Creek have also been identified as an Area of Concern by the International Joint Commission on the Great Lakes due to the detrimental impact the ongoing release of PCBs has on Lake Michigan.

General Approach to ERA

This ERA follows EPA guidance for conducting ERAs, primarily Ecological Risk Assessment Guidance for Superfund (EPA 1997) and Guidelines for Ecological Risk Assessment (EPA 1998). The major components of the ERA include Problem Formulation, Analysis, and Risk Characterization. The Problem Formulation phase of this ERA establishes the goals and describes the scope and focus of the assessment. In addition, this phase considers site-specific regulatory and policy issues and requirements and preliminarily identifies potential stressors and ecological resources potentially at risk. The outcome of Problem Formulation is the site-specific conceptual model, which describes potential exposure pathways and the relationship between remedial action objectives, assessment endpoints, and measurement endpoints. Uncertainties associated with this phase of the ERA are included at the end of this Section.

The Analysis phase of the ERA describes the nature and extent of contamination (Exposure Assessment) and identifies appropriate and relevant threshold concentrations, standards, or criteria for contaminants of concern (Effects Assessment). Uncertainty analysis related to this phase of the ERA is also included.

The final major component of the ERA, Risk Characterization, considers the information gathered in Problem Formulation and integrates Exposure and Effects data to estimate risks to ecological receptors. Also included in Risk Characterization is a discussion of ecological significance, risk summary, and uncertainty analysis.

This ERA also includes an additional section on Remediation Issues in which preliminary risk-based remediation goals (PRGs) are developed.

This ERA uses several lines of evidence to increase confidence in risk estimates and ERA conclusions. These include the use of simple hazard quotients that compare a single selected exposure concentration to a single selected effects concentration to derive a quotient. This is a common screening level approach for identifying issues of most concern. Supplementing this approach is a comparison of multiple media-specific exposure concentrations for specific site locations to multiple effects concentrations that include site-specific and literature-based values. This approach reduces the uncertainties in relying on single exposure and effects concentrations and contributes to the weight-of-evidence. Also included in this ERA is a food chain

model that estimates PCB dose via ingestion pathways for key receptor species or groups. Finally, this ERA considers field observations and other qualitative data as a check on risk estimates and conclusions.

Representative Receptors

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).

ERA-Related Goals and Objectives

ERA-related remedial action goals and objectives for the API/PC/KR have been determined by MDEQ, and include: (1) the establishment and maintenance of a healthy and diverse aquatic and riparian co-systems in and adjacent to the API/PC/KR, and (2) reductions in PCB concentrations in fish and wildlife such that human consumption restrictions can be lifted.

Site Conceptual Model

The site conceptual exposure model (SCEM) is the primary output of the Problem Formulation phase of the ERA, and is used to develop a series of null hypotheses for the API/PC/KR, primarily those regarding potential exposure scenarios and the relationship between selected assessment and measurement endpoints. The null hypotheses for the API/PC/KR are defined as follows:

1. *The levels of contaminants in water, sediment, and biota are not sufficient to adversely affect the structure or function of the fish populations in the Kalamazoo River and Portage Creek System.*

2. *The levels of contaminants in water, sediment, and biota are not sufficient to adversely affect the survival, growth, and reproduction of plant and animal aquatic receptors utilizing the Kalamazoo River and Portage Creek system.*

3. *The levels of contaminants in water, sediment, soil, and biota are not sufficient to adversely affect the survival, growth, and reproduction of mammalian receptors utilizing the Kalamazoo River and Portage Creek system.*

4. *The levels of contaminants in water, sediment, and biota are not sufficient to adversely affect the survival, growth, and reproduction of avian receptors utilizing the Kalamazoo River and Portage Creek system.*

Summary of Conclusions

Hazard Quotient-based Risks

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.

Overall Risk Summary

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 qualitative evidence that mink populations are declining or are reduced.

  - Other piscivorous predators, such as bald eagles, are at substantial 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). Preliminary data suggest both these assumptions are valid. 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) 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 ERA presents overwhelming evidence that, despite uncertainties identified and discussed in the ERA, two and possibly three of the four proposed null hypotheses can be rejected with little reservation.

The first null hypothesis is accepted because there is no direct evidence that fish communities are being affected by PCB contamination. The impaired fish community of Lake Allegan is comprised primarily of stunted and often malformed carp. The cause of these findings cannot be determined from the available data. It is noted, however, that PCBs cause a wasting syndrome in several mammalian species. There is insufficient site-specific data to determine if fish communities in the Kalamazoo River are being directly affected by PCB contamination.

The second null hypothesis is conditionally rejected. This is based on the finding that at some locations the maximum detected surface water PCB concentrations exceed or closely approach the lowest chronic value for freshwater fish or aquatic plants.

The last two null hypotheses are rejected because risks to mammalian (e.g., mink) and avian predators (e.g., bald eagle), especially those that consume fish, are unacceptable. These conclusions are based primarily on the very high levels of PCB concentrations in fish, other biota, and abiotic media (e.g., floodplain sediments).

The ecosystem associated with the API/PC/KR portion of the Kalamazoo River has been and is currently being adversely affected by PCBs originating from past industrial activities. This evidence by the distribution of PCBs in biota at all trophic levels within the API/PC/KR.

Remediation Issues

The selection of the most appropriate methods for achieving remediation goals is not a risk assessment issue but is a risk management issue to be addressed in the feasibility study (FS) for this API/PC/KR. The application of cleanup values is also considered a risk management decision. This risk assessment derives and recommends threshold PCB concentrations ("cleanup values") for each media type. These values are not necessarily intended to be applied to all locations within the API/PC/KR or within a sub-area of the API/PC/KR. For example, it is probably most appropriate to use cleanup values as average media-specific post-remediation concentration goals within a specific area. Alternatively, a cleanup value can be considered a "never to exceed" value for any onsite sample, but such an application might result in needlessly exceeding remediation goals and costs in most areas within the site. It is most appropriate for risk managers rather than risk assessors to decide how to best apply cleanup values recommended in the risk assessment. 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 0.0016 to 0.00197 µg/L (based on mink, the most sensitive of all animals tested to date).**

- **Range of protective total PCB concentrations in INSTREAM SEDIMENT AND FLOODPLAIN SEDIMENT associated with aquatic or semi-aquatic ecosystems is 0.5 to 0.6 mg/kg (based on mink, the most sensitive of all animals tested to date).**

- **Range of protective total PCB concentrations in SURFACE SOILS AND FLOODPLAIN SEDIMENTS associated with terrestrial ecosystems is 6.5 to 8.1 mg/kg (based on omnivorous songbirds such as robin). To protect carnivorous mammals such as red fox, the range is 5.9 to 29.5 mg/kg.**

Section 1
Introduction

This document presents the Revised Final Baseline Ecological Risk Assessment (BERA) for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (API/PC/KR) in Southwestern Michigan. The revisions forming the basis of this revised final document address recent comments on the Final (Revised) BERA (January 2002), the Final BERA (June 1999) and the Addendum to the BERA (August 15, 2000); comments were submitted by the U.S. Environmental Protection Agency (EPA), the U.S. Fish and Wildlife Service (FWS), and the Kalamazoo River Study Group (KRSG).

KRSG comments (and those of Giesy Ecotoxicology, Inc.) were presented in letters (July 19, 1999 and September 11, 2000) from KRSG to the Michigan Department of Environmental Quality (MDEQ). In addition, a Technical Memo and letter (October 11, 2001) from KRSG to MDEQ summarized preliminary data obtained by KRSG. Included in this document were preliminary data, evaluations, and conclusions potentially relevant to information presented in the Final (Revised) BERA, dated January 2002. Some of the information presented by the KRSG resulted in a more intensive review of toxicity literature associated with the derivation of appropriate dose-based TRVs for mink and birds. PCB exposure data presented in the October 11, 2001 KRSG document were considered preliminary, and therefore are not included in this revised final BERA. Data such as these may be considered in the future.

EPA and FWS comments were identified in several meetings and telephone conversations throughout summer and fall 2000. Additional comments were received from EPA in spring and summer 2001 through meetings in Benton Harbor and Chicago. The MDEQ has worked closely with EPA from 2001 to 2003 to finalize this risk assessment document.

This assessment uses site-related chemical concentrations, exposure potential, and toxicity information to characterize potential risks to ecological receptors from releases of polychlorinated biphenyls (PCBs) to the Kalamazoo River ecosystem. Risks are estimated assuming no remedial action has occurred at the site, and are intended to assist the risk manager in determining the acceptable clean-up levels to protect ecological receptors.

1.1 Report Objectives

ERAs evaluate the likelihood that adverse ecological effects may occur or are occurring at a site as a result of exposure to single or multiple chemical or physical stressors (EPA 1992a). Risks result from contact between ecological receptors and stressors that are of sufficiently long duration and of sufficient intensity to elicit adverse effects (EPA 1992a). The primary purpose of this ERA is to identify and describe actual or potential onsite conditions that can result in adverse effects to present or future ecological receptors. Sufficient recent site-specific information is

available to allow this ERA to focus on the primary ecological stressors present at this site. These primary stressors have been identified as polychlorinated biphenyls (PCBs). This ERA focuses on comparing measured or estimated PCB exposures with observed or predicted biological effects. This ERA also provides information that can help establish remedial priorities and serve as a scientific basis for regulatory and remedial actions for the API/PC/KR.

1.2 Report Organization

The approach used to conduct this ERA is based on site-specific information and on recent EPA guidance, primarily Ecological Risk Assessment for Superfund: Process for Designing and conducting Ecological Risk Assessments (EPA 1997), supplemented by The Framework for Ecological Risk Assessment (Framework Document, EPA 1992a). EPA (1989, 1992a, 1997) and others (e.g., Barnthouse, et al. 1986) recognize that methods for conducting ERAs must be site-specific, and guidance documents for conducting ERAs are therefore not intended to serve as detailed, specific guidance. As much as practicable, the methods, recommendations, and terminology of the 1997 guidelines for ecological risk are used to conduct this ERA. The organization of this ERA follows the format presented in this document, with some modifications made for site-specific considerations and readability. Following this introduction, a short description of the site is presented in Section 2. The primary components of this ERA are:

- Problem Formulation (Section 3) which describes the goals, scope and focus of the ERA;
- the Analysis Phase (Section 4), which evaluates the data used to assess exposures for local flora and fauna;
- and the Risk Characterization (Section 5), which discusses the risks identified by this ERA. Additionally, Section 5 describes remedial goals for PCBs in sediments, surface water, and floodplain soils associated with the Kalamazoo River.
- References for all sections are provided in Section 6.

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REPLY TO THE ATTENTION OF
SR-6J

August 22, 2003

Mr. Paul Bucholtz
Remediation and Redevelopment Division
Michigan Department of Environmental Quality
Constitution Hall
525 West Allegan Street
Lansing, Michigan 48909-7957

Re: Approval of Final (Revised) Human Health and Ecological Risk Assessment Reports
Allied Paper/Portage Creek/Kalamazoo River Superfund Site, Michigan

Dear Mr. Bucholtz:

The United States Environmental Protection Agency (EPA) has received the Final (Revised) Human Health Risk Assessment and the Final (Revised) Baseline Ecological Risk Assessment Reports dated April 2003, for the Allied Paper/Portage Creek/Kalamazoo River Superfund Site in Michigan. The reports were prepared by the Michigan Department of Environmental Quality. As you know, our Agency reviewed these reports and provided comments to your office. Our review indicates the final reports incorporate our mutually agreed upon changes. Therefore, EPA formally approves the Final (Revised) Human Health Risk Assessment and the Final (Revised) Baseline Ecological Risk Assessment Reports dated April 2003.

If you have any questions, please do not hesitate to contact me at (312) 886-6151.

Sincerely,

Shari Kolak

Shari Kolak
Remedial Project Manager
Superfund Division

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Five-Year Review Report

First Five-Year Review Report

For

Allied Paper, Inc./Portage Creek/Kalamazoo River Site

Allegan and Kalamazoo Counties, Michigan

October, 2007

PREPARED BY:

United States Environmental Protection Agency
Region 5
Chicago, Illinois

Approved by: Date:

10/18/07

for Ralph Dollhopf, Acting
Superfund Division Director
U.S. EPA

KZ00167169

Exhibit 3078

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Appendices

Appendix A Copy of Newspaper Public Notice

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List of Acronyms

AOC	Administrative Order on Consent
BRA	Baseline Risk Assessment
BERA	Baseline Ecological Risk Assessment
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
CY^3	Cubic yards
FS	Feasibility Study
FYR	Five-Year Review
HHRA	Human Health Risk Assessment
ICs	Institutional Controls
KRSG	Kalamazoo River Study Group
KSSS	King Street Storm Sewer
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
MDOT	Michigan Department of Transportation
NCP	National Contingency Plan
NREPA	Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994PA 451
NPL	National Priorities List
O&M	Operation & Maintenance
OU	Operable Unit
PCB	Polychlorinated biphenyl
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
RA	Remedial Action
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
Site	Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site
SMOA	Superfund Memorandum of Agreement
U.S. EPA	United States Environmental Protection Agency

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Executive Summary

The Allied Paper Inc./Portage Creek/Kalamazoo River Superfund site (Site) is located in Allegan and Kalamazoo Counties, Michigan. The Site includes approximately 80 miles of the Kalamazoo River (from Morrow Dam to Lake Michigan), adjacent river banks and formerly impounded floodplains, as well as a 3-mile stretch of Portage Creek. Six operable units (OUs) have been identified for response action at the Site including:

- OU1 - Allied Paper, Inc;
- OU2 - Willow Boulevard/A-Site Landfill;
- OU3 - King Highway Landfill;
- OU4 - 12th Street Landfill;
- OU5 – 80-miles of the Kalamazoo River including a 3-mile stretch of Portage Creek; and
- OU7 – Former Plainwell Paper Mill Property.

This is the first five-year review for the Site. The triggering action for this statutory review is the start of the on-site construction of the Remedial Action (RA) at the King-Highway Landfill Operable Unit 3 (OU3), as discussed in Section I of this five-year review report. Although the construction of the remedial action recently began at OU4, the on-site construction of the RA at OU3 occurred five years earlier (10/21/02) than it did at OU4. Consequently, OU3 "triggered" this first five-year review. A five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at OU3 and OU4 above levels that allow for unlimited use and unrestricted exposure.

This first five-year review report includes a protectiveness determination for OU3 and OU4. This report does not include a protectiveness determination for OU1, OU2, OU5, and OU7 because the RA has not yet started at these OUs. However, all six operable units are being reviewed at this time to keep all OUs on the same five-year review schedule.

This five-year review found that the remedy at OU3 currently protects human health and the environment in the short-term. The landfill cap is in good condition and prevents PCB-contaminated material in the landfill from migrating, via erosion or surface water runoff, into the Kalamazoo River. The cap is also an effective barrier that prevents exposure, via direct contact, to the contaminated material by on-site workers, trespassers, and anglers. The cap also minimizes infiltration of rainwater and reduces the potential for leachate generation and the potential for polychlorinated biphenyl (PCBs) in groundwater to migrate into the Kalamazoo River. Public access to the landfill is restricted by a locked chain-link fence and sheet pile, where present, and prevents people from being exposed to the contaminated material. Institutional Controls (ICs) are not yet in place. However, in order for the remedy to be protective in the long-term, the following actions will need to be taken: (1) submit a schedule or plan to the United States Environmental Protection Agency (U.S. EPA) and the Michigan Department of Environmental Quality (MDEQ) for resolving property ownership issues with respect to the Michigan Department of Transportation (MDOT) and city of Kalamazoo

properties and for implementing ICs at the landfill and MDOT and city of Kalamazoo properties; and (2) submit a landfill gas mitigation plan to MDEQ that will satisfy its concerns about the off-site migration of methane gas at the south end of the landfill. Long term protectiveness requires compliance with effective ICs. U.S. EPA will ensure that long-term stewardship of OU3, as well as every other operable unit of the Site, includes implementation and maintenance of each component of the selected remedy, including any necessary ICs.

The remedy at the 12th Street Landfill OU4 is not protective because the remedy has not yet been constructed and because access controls are inadequate to protect trespassers from short-term risks associated with remedy construction. A chain-link fence is installed along the west side of the landfill but not on the east, north, and south sides of the landfill, and trespassers can easily gain access to the landfill. A chain-link fence will need to be installed on all sides of the landfill to prevent public access to the property and prevent trespassers from being exposed to PCB-contaminated material during the on-going construction activities. Long-term protectiveness requires compliance with existing ICs. Although ICs are in place, an evaluation is necessary of whether groundwater use at the landfill needs to be restricted and, if so, whether existing ICs appropriately restrict or prevent groundwater use at the landfill property. This evaluation will be made during the remedial design phase of the remedy. U.S. EPA will ensure that long-term stewardship of OU4, as well as every other operable unit of the Site, includes implementation and maintenance of each component of the selected remedy, including any necessary ICs.

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Five-Year Review Summary Form

SITE IDENTIFICATION		
Site name *(from WasteLAN)*: **Allied Paper, Inc./Portage Creek/Kalamazoo River**		
EPA ID *(from WasteLAN)*: **MID006007306**		
Region: 5	**State: MI**	**City/County: Allegan and Kalamazoo Counties**
SITE STATUS		
NPL status: ■ Final ☐ Deleted ☐ Other (specify)		
Remediation status (choose all that apply): ☐ Under Construction ■ Operating ☐ Complete		
Multiple OUs?* ■ YES ☐ NO	**Construction completion date:** ___/___/_____	
Has site been put into reuse? ☐ YES ■ NO		
REVIEW STATUS		
Lead agency: ■ EPA ☐ State ☐ Tribe ☐ Other Federal Agency _____		
Author name: Sheri Kolak		
Author title: Remedial Project Manager	**Author affiliation: United States Environmental Protection Agency**	
Review period:** 6/ 06/2007 to 10 /21/ 2007		
Date(s) of site inspection: 8 /1/2007		
Type of review: ■ Post-SARA ☐ Pre-SARA ☐ NPL-Removal only ☐ Non-NPL Remedial Action Site ☐ NPL State/Tribe-lead ☐ Regional Discretion		
Review number: ■ 1 (first) ☐ 2 (second) ☐ 3 (third) ☐ Other (specify) _____		
Triggering action: ■ Actual RA Onsite Construction at King Highway Landfill OU3 ☐ Actual RA Start ☐ Construction Completion ☐ Previous Five-Year Review Report ☐ Other (specify)		
Triggering action date *(from WasteLAN)*: _10/ 21/ 2002		
Due date *(five years after triggering action date)*: 10/ 21/2007		

* ["OU" refers to operable unit.]

Five-Year Review Summary Form (cont'd.)

King Highway Landfill OU3

Issues:

- Institutional controls are not in place at the landfill property, including the land currently owned by MDOT and city of Kalamazoo which is located within the site security fence. The remedy is not protective until effective ICs are placed on both properties and are monitored and maintained.
- MDEQ approval of the Final Completion of Construction Report and the Final Operation & Maintenance Plan (O&M) is pending resolution of the MDOT and city of Kalamazoo property ownership issues; and
- Methane gas has migrated off-site in concentrations that exceed threshold criteria.

Recommendations and Follow-up Actions:

- Submit a schedule or plan to U.S. EPA and MDEQ for 1) resolving issues associated with the MDOT and city of Kalamazoo properties and 2) implementing ICs at the landfill property and the MDOT and city of Kalamazoo properties;
- U.S. EPA will prepare an IC Plan to plan for necessary corrective measures and long-term stewardship; and
- Submit a landfill gas mitigation plan to MDEQ that will satisfy its concerns about the off-site mitigation of methane gas at the south end of the landfill.

Protectiveness Statement:

This five-year review found that the remedy at OU3 currently protects human health and the environment in the short-term. The landfill cap is in good condition and prevents PCB-contaminated material in the landfill from migrating, via erosion or surface water runoff, into the Kalamazoo River. The cap is also an effective barrier that prevents exposure, via direct contact, to the contaminated material by on-site workers, trespassers, and anglers. The cap also minimizes infiltration of rainwater and reduces the potential for leachate generation and the potential for PCBs in groundwater to migrate into the Kalamazoo River. Public access to the landfill is restricted by a locked chain-link fence and sheet pile, where present, and prevents people from being exposed to the contaminated material. Institutional controls are not yet in place. However, in order for the remedy to be protective in the long-term, the following actions will need to be taken: (1) submit a schedule or plan to U.S. EPA and MDEQ for resolving ownership issues associated with the MDOT and city of Kalamazoo properties and for implementing effective ICs at the landfill property and MDOT and city of Kalamazoo properties; and (2) submit a landfill gas mitigation plan to MDEQ that will satisfy its concerns about the off-site migration of methane gas at the south end of the landfill. Long term protectiveness requires compliance with effective ICs. U.S. EPA will ensure that long-term stewardship of OU3, as well as every other operable unit of the Site, includes implementation and maintenance of each component of the selected remedy, including any necessary ICs.

Other Comments: None

Five-Year Review Summary Form (cont'd)

12th Street Landfill OU4

Issues:

- Access controls are inadequate. A chain-link fence is present along the south side of the landfill but there is no fence on the north, east, or west sides of the landfill. Trespassers and anglers can freely enter the property and use the river banks to fish and may become exposed to contaminated material; and

- It is unclear whether groundwater use at the landfill needs to be restricted and, if so, whether existing ICs appropriately restrict groundwater use within the landfill property.

Recommendations and Follow-up Actions:

- Install a chain-link fence on the north, east, and west sides of landfill; post warning signs every 200 feet along the fence and on all entry gates; and place permanent markers around the boundary of the landfill describing the restricted area and the nature of the restrictions; and

- Evaluate whether groundwater use at the landfill should be restricted and, if so, amend existing ICs as necessary to ensure that ICs adequately restrict groundwater use at the landfill property.

Protectiveness Statement for OU4:

The remedy at the 12th Street Landfill OU4 is not protective because the remedy has not yet been constructed and because access controls are inadequate to protect trespassers from short-term risks associated with remedy construction. A chain-link fence is installed along the west side of the landfill but not on the east, north, and south sides of the landfill and trespassers can easily gain access to the landfill. A chain-link fence will need to be installed on all sides of the landfill to prevent public access to the property and prevent trespassers from being exposed to PCB-contaminated material during the on-going construction activities. Long-term protectiveness requires compliance with existing ICs. Although ICs are in place, an evaluation is necessary of whether groundwater use at the landfill needs to be restricted and, if so, whether existing ICs appropriately restrict or prevent groundwater use at the landfill property. This evaluation will be made during remedial design phase of the remedy. U.S. EPA will ensure that long-term stewardship of OU4, as well as every other operable unit of the Site, includes implementation and maintenance of each component of the selected remedy, including any necessary ICs.

Other Comments: None

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Five-Year Review Report

I. Introduction

The United States Environmental Protection Agency (U.S. EPA) has conducted a five-year review of the remedial actions implemented at the Allied Paper, Inc./Portage Creek/Kalamazoo River site (Site). The Michigan Department of Environmental Quality (MDEQ) assisted U.S. EPA in providing an analysis of information in support of this five-year review. The five-year review was conducted from June 2007 through October 2007. This report documents the results of the review.

The purpose of five-year reviews is to determine whether the remedy at a site is protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in the Five-Year Review Report. In addition, the Five-Year Review Report identifies issues found during the review, if any, and recommendations to address them.

This review is required by statute. U.S. EPA must implement five-year reviews consistent with the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollutant Contingency Plan (NCP). CERCLA §121 (c), as amended, states:

> If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.

The NCP part 300.430(f)(4)(ii) of the Code of Federal Regulations (CRF) states:

> If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

This is the first five-year review for the Allied Paper, Inc./Portage Creek/Kalamazoo River site. The triggering action for this statutory review is the start of the on-site construction of the Remedial Action (RA) at the King-Highway Landfill Operable Unit 3 (OU3) as shown in EPA's WasteLAN database: 10/21/2002. Operable Unit 3 is one of six OUs that have been identified at the Site. Although the construction of the remedial action recently began at OU4, the on-site construction of the RA at OU3 occurred five years earlier (10/21/02) than it did at OU3; thus, OU3 "triggered" this first-year review. This five-year review is required due to the fact that hazardous substances, pollutants, or contaminants remain at OU3 and OU4 above levels that allow for unlimited use and unrestricted exposure.

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The Site consists of six OUs including:

- OU1 - Allied Paper, Inc.;
- OU2 - Willow Boulevard/A-Site Landfill;
- OU3 - King Highway Landfill;
- OU4 - 12th Street Landfill;
- OU5 - 80-miles of the Kalamazoo River including a 3-mile stretch of Portage Creek; and
- OU7 - Former Plainwell Paper Mill Property

All OUs are in various stages of the Superfund cleanup process. Operable Unit 1, OU5, and OU7 are in the investigation stage called the "Remedial Investigation/Feasibility Study (RI/FS)." A Record of Decision (ROD) (or cleanup decision) has been issued for OU2, OU3, and OU4. The remedial action (RA) was constructed at OU3 and the remedial action is under construction at OU4. Although a ROD was issued for OU2, construction of the RA has not yet begun. The Agency's five-year review guidance requires remedies to be evaluated for protectiveness at only those OUs where on-site construction of the RA has started. Although on-site construction of the RA is generally completed at OU3 and has recently started at OU4, all OUs are being reviewed at this time to keep all OUs on the same five-year review schedule.

II. Site Chronology

Table 1 lists the chronology of events for the Allied Paper, Inc./Portage Creek/Kalamazoo River site.

Table I

Month/Year	*Events and Milestones*
April 1970-1971	*Initial discovery of problem or contamination*
August 30, 1990	*NPL Listing*
December 1990	*Administrative agreement signed between the Michigan Department of Natural Resources (MDNR) and certain potentially responsible parties ("PRPs") for RI/FS work at the Site*
July 1993	*RI/FS start at OU4*
July/Sept. 1994	*RI/FS complete at OU3*
July 1997	*RI/FS complete at OU4*
February 1998	*ROD issued by MDEQ (successor to MDNR) for OU3, with which U.S. EPA concurred*
June 1998	*122(h) Cash-out agreement signed between U.S.EPA and Millennium Holdings for Time Critical Removal Action at Bryant Mill Pond of OU1*
June 1998	*Remedial Design (RD) Start at OU3*
1998-1999	*Removal Action at Bryant Mill Pond of OU1*

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February 2000	*Administrative agreement signed between MDEQ and Georgia-Pacific for implementation of the Remedial Design/Remedial Action (RD/RA) at OU3*
September 2001	*ROD Issued by MDEQ for OU4, with which U.S EPA concurred*
January/February 2002	*Site-Specific Amendment to 2002 Superfund Memorandum of Agreement(SMOA) signed between U.S. EPA and MDEQ*
September 2002	*Remedial Design complete at OU3*
October 2002	*Construction Start at OU3*
December 2004	*Consent Decree signed by the United States and Weyerhaeuser Company for RD/RA at OU4 and for a RI/FS and RD/RA at OU7*
January 2006	*RI/FS complete at OU2*
September 2006	*ROD issued by U.S. EPA for OU2, with which MDEQ concurred*
February 2007	*Administrative Order on Consent (AOC) signed for Time-Critical Removal Action at Plainwell Impoundment Area of OU5*
February 2007	*AOC signed for Supplemental RI/FS for OU5*
March 2007	*Removal Action start at Plainwell Impoundment Area of OU5*
May 2007	*Construction start at OU4*

III. Background

A. Site History

The Site is located in the Allegan and Kalamazoo Counties of Michigan. The Site includes approximately 80 miles of the Kalamazoo River (from Morrow Lake Dam to Lake Michigan), adjacent river banks and formerly impounded floodplains, as well as a 3-mile stretch of Portage Creek, (See Figure 1, and Site Location Map). The Site was listed on the National Priorities List (NPL) on August 30, 1990.

The Site is contaminated with PCBs from former paper mills or other former industrial operations along the Kalamazoo River. The former paper mills recycled and/or de-inked and repulped carbonless copy waste paper, which between the years of 1950s and 1970s, contained PCBs as an ink carrier. The wastewater from the paper manufacturing operations was historically discharged to the Kalamazoo River. Processed residuals were placed into on-site lagoons for dewatering or into disposal areas directly on the land. The former lagoons and disposal areas later became known as the landfill OUs.

The MDNR (predecessor to MDEQ) first became concerned about the presence of PCBs in the Kalamazoo River in 1971, after routine surface water and biota sampling at the mouth of the river indicated that PCBs were discharging to Lake Michigan via the Kalamazoo River and that the PCBs were widely bioavailable for uptake by fish and aquatic organisms.

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The Site comprises six OUs:

- OU1 - Allied Paper, Inc.;
- OU2 - Willow Boulevard/A-Site Landfill;
- OU3 - King Highway Landfill;
- OU4 - 12th Street Landfill;
- OU5 – 80-miles of the Kalamazoo River including a 3-mile stretch of Portage Creek; and
- OU7 – former Plainwell Paper Mill Property.

In addition to OU7, the former Plainwell Paper Mill, three other former paper mills are associated with the Superfund Site. One of the mills was identified as OU6 but U.S. EPA later reclassified the mill property as a potential source of PCBs to the river, and eliminated the OU6 designation. Pursuant to the AOC executed between certain PRPs and U.S. EPA in February of 2007, the former paper mills will be investigated to determine whether any of the mill properties is a source of PCBs to the Kalamazoo River. If any mill is a source of PCBs to the Kalamazoo River, then U.S. EPA will designate that mill property as an OU. The OU will then be investigated under the Superfund Remedial Investigation/Feasibility Study (RI/FS) process.

Six former hydroelectric dams, three owned by the State of Michigan and three by private companies, are also located within the Superfund Site. One of the dams, the Lake Allegan Dam, is an operating hydropower dam; the remaining five dams are no longer operational. In the 1970s, the State of Michigan partially dismantled its three dams, due primarily to public safety concerns posed to kayakers and boaters. As the dams were dismantled, the water level in the river dropped and the contaminated sediment that was once underwater became exposed or visible on the riverbanks and floodplain areas behind the State-owned dams. The U.S. EPA and MDEQ currently estimate that the Site contains approximately 113,000 lbs of PCBs in the river sediment and floodplain soil.

When the Site was listed on the NPL, it was designated a state lead for purposes of conducting the RI/FS. On December 28, 1990, the MDNR and the Potential Responsible Parties (PRPs) signed an administrative agreement pursuant to which several PRPs agreed to perform a RI/FS investigation for the entire Site. Three PRPs signed the administrative agreement with MDNR including Millennium Holdings LLC (formerly HM Holdings), Georgia-Pacific LLC (formerly known as Georgia-Pacific Corporation), and Plainwell Inc. (formerly Simpson Plainwell Paper Company). Plainwell Inc. later filed for bankruptcy. These three PRPs formed a group and were collectively known as the Kalamazoo River Study Group (KRSG). Although not officially identified as a PRP by the State of Michigan, the Fort James Corporation joined the KRSG and agreed to help fund the RI/FS for the Site. In 2002, U.S. EPA identified another PRP, the Weyerhaeuser Company.

In 2002, certain areas of the Site were re-designated as federal-lead due to the agencies' belief that re-designation of certain areas of the Site was in the best interest of the public. Roles and responsibilities for each OU are outlined in the February 2002 Site-Specific Amendment to the Enforcement Agreement for State-Enforcement Lead Sites in Michigan, under the Superfund

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Memorandum of Agreement (SMOA) between the MDEQ and U.S. EPA. Since 2002, U.S. EPA has the lead on all OUs except for the Allied Paper Inc. OU1 and the King Highway Landfill OU3. The MDEQ will retain the lead on the King Highway Landfill. In accordance with the April 2007 Site-Specific Amendment to the 2002 Site-Specific Amendment to the SMOA, the MDEQ will have the lead on modifying the PRP RI Report for the Allied Paper Inc. OU1. U.S. EPA will acquire the lead for the Allied Paper Inc. OU1 after (1) U.S. EPA accepts the state-approved RI Report and determines that no additional response activities are necessary to complete the RI; or (2) U.S. EPA determines that, in accordance with the timeframes specified in the 2007 Amendment, that the state-approved RI Report still requires modification or that additional response activities are necessary to complete the RI.

B. Operable Units

B.1. Operable Unit 1

Physical Characteristics

The Allied Paper Inc. OU1 encompasses 89 acres along Portage Creek in the city of Kalamazoo in Kalamazoo County, Michigan. Operable Unit 1 is bordered by Cork Street to the south, Alcott Street to the north, a Conrail Railroad line to the west, and residential/commercial properties to the east (See Figure 2, OU1 Location Map).

Land and Resource Use

According to the MDEQ-modified RI Report, property use in the vicinity of OU1 includes areas that are zoned for industrial, commercial, and residential purposes. Industrial and commercial properties are located to the north and south of OU1 and along portions of the east and west sides of OU1. Residential properties are located along a portion of the east side of OU1 and to the west beyond the railroad tracks.
Operable Unit 1 is an inactive disposal area, but groundwater is being collected along collection sumps and treated prior to being discharged to the city of Kalamazoo wastewater treatment plant. Wetlands are present at OU1.

History of Contamination

When the former paper mills on the Kalamazoo River recycled and/or de-inked and repulped waste paper that included carbonless copy paper, PCBs were present in the wastewater produced from the paper manufacturing process. The wastewater contained large quantities of suspended particles – primarily cellulose and clay. Polychlorinated biphenyls adsorb to the suspended particles in the wastewater. Polychlorinated biphenyls were present in the manufacturing process from at least 1957 until well after production of carbonless copy paper containing PCBs stopped in the 1970s. In the 1950s, the mills began building primitive clarifiers and dewatering or settling lagoons to remove solid particles, and the clarified wastewater was discharged to the rivers and creeks (i.e., Portage Creek).

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The Allied Paper Inc.OU1 is divided into individual study areas based on former historic operations (See Figure 3, OU1 Site Plan). According to the MDEQ-modified RI Report, these areas include the Former Operational Areas including, the Bryant Historic Residuals Dewatering Lagoon (HRDL) and Former Residuals Dewatering Lagoons (FRDL), Monarch HRDL, Type III Landfill, Western Disposal Area, and the Alcott Street Properties. All areas received processed wastewater and/or dewatered paper residuals from paper manufacturing operations at the former Allied Paper, Inc. mills. The operational history and volume of contamination for each area of OU1 are discussed below.

- **Former Operational Areas** (Bryant HRDL and FRDLs, Monarch HRDL, Type III Landfill, Western Disposal Area, and the Alcott Street Properties).

    - Bryant HRDL and FRDL*s* – This area consists of six lagoons covering approximately 22 acres. The lagoons were used to settle out residuals from the wastewater generated at the Bryant mills. A clarifier and the earthen-diked HRDL were the primary treatment system, build in 1954. The series of five FRDLs were later added to dewater residuals. The HRDL was filled and has not been used for disposal since the late 1970s. The FRDLs have not been used for disposal since 1989;

    - Monarch HRDL – This 7-acre lagoon was used as part of the initial primary treatment facility for process waste from the Monarch Mill. The facility consisted of a clarifier and an earthen-diked dewatering lagoon. After clarification, the wastewater supernatant was discharged to Portage Creek and the settled residuals were pumped to the Monarch HRDL for dewatering. The Monarch HRDL was used from the early 1950s until the 1960s;

    - Type III Landfill – This 13-acre area was originally licensed as a landfill in 1966 to receive non-process wastes pursuant to State of Michigan requirements. It was then licensed as a Type II landfill and later the designation was changed to a Type III Landfill in 1985 to receive residuals and demolition wastes. Over the period of use (1966 until the late 1980s), the landfill area received various types of industrial waste and residuals; and

    - Western Disposal Area- This area covers approximately 19 acres and is located along the western edge of the Bryant HRDLs, southwest of the former Type III landfill. According to the RI Report, this area was identified as being used as a disposal area for dewatered residuals mined from the HRDLs and FRDLs. By 1986, most of the areas were filled in and vegetation established by 1991.

- **Former Bryant Mill Pond** – Particles in the wastewater discharged from the mills to Portage Creek settled out in the 29-acre Bryant Mill Pond. U.S. EPA conducted a time critical removal action between 1998 and 1999 to address PCBs in the sediment.

- **Residential/Commercial Areas** – (including but not limited to, Former Panelyte, Stryker Corporation, Conrail, Clay Seam Area, East Bank Area, and Other Properties).

    - Panelyte Property and Marsh – this area encompasses approximately 23 acres and contains a fill area located at the southwestern end of the property. This property is a Brownfields Site which is being addressed under a State grant. This property is currently being managed by the MDEQ. Surface water from the Panelyte fill area and Western Disposal area drains toward the Panelyte marsh;

    - Stryker Corporation Property – The parking lots of the Stryker property were constructed over parts of the former Bryant Mill Pond;

    - Conrail Property – The railroad property that extends along the western edge of OU1; and

    - Clay Seam Area – The clay seam is a body of residuals covering approximately a quarter of an acre that is present as a small, nearly vertical bluff on the east side of Portage Creek. Native soils underlie the clay seam at the elevation of the water line. The clay seam extends up to approximately 80 feet inland from the bank of Portage Creek.

Response Activities

Voluntary Response Activities

Between 2000 and 2005, the PRPs conducted a number of interim response measures to stop or prevent the migration of PCBs from the OU into Portage Creek. The interim response measures were voluntarily conducted by the PRPs, and not under an administrative order with the MDEQ or U.S. EPA. The interim response measures included the installation of sheetpile along the Bryant HRDLs and FRDLs to stabilize the existing berm and prevent the Bryant Mill Pond residuals from eroding back into Portage Creek, capping the Bryant HRLDs and FRDLS to prevent erosion and infiltration of rainwater, and installation of a groundwater recovery system to maintain groundwater levels within a foot of the historic norm behind the sheetpile to mitigate the potential for raised groundwater levels to saturate previously unsaturated residuals. In addition, a wastewater treatment plan was installed in the fall of 2004 and began operation in February 2005 to treat groundwater recovered at the OU.

U.S. EPA Time-Critical Removal Action

In 1999, pursuant to a cash-out agreement with MHLLC, U.S. EPA completed a time critical removal action at the Bryant Mill Pond Area, which is a pond that received wastewater discharged by the former Bryant Paper Mills. Approximately 150,000 cubic yards (cy^3) of PCB-contaminated sediment were excavated from the Bryant Mill Pond in an effort to cleanup an upstream area that was a significant source of PCBs to the Kalamazoo River. In 2003, an additional 1,000 cy^3 of contaminated material were removed from the Portage Creek floodplains. All contaminated material was disposed of in the Bryant HRDL and FRDLs of the Allied Paper Inc. OU1.

Basis for Taking Action

There is no basis for taking action at this time as the RI/FS has not been completed nor a ROD issued. Operable Unit 1 is in the RI stage of the Superfund process. The remedial status of OU1 is discussed below.

Remedial Status

On October 26, 2006, MDEQ disapproved the OU1 Revised RI report prepared by Millennium Holdings, LLC and decided to complete the report internally. MDEQ submitted a state-modified RI report for OU1 to U.S. EPA in March 2007. U.S. EPA has reviewed the state-modified RI report and recently provided comments on the report to MDEQ. After U. S. EPA becomes the lead agency, in accordance with the process discussed in Section III.A., of this five-year review report, U.S. EPA will be responsible for overseeing the Feasibility Study (FS) Report and for developing the OU1 ROD.

Since a ROD has not been issued for OU1, a remedial action cannot be discussed or evaluated; therefore, no further discussion of OU1 is contained in this five-year review report.

B.2. Operable Unit 2

Physical Characteristics

The Willow Boulevard/A-Site Landfill OU2 is located southeast of the intersection of Business I-94 and Highway M-96 in Kalamazoo Township, Michigan.
Operable Unit 2 is bordered by the Kalamazoo River to the north and northwest, Davis Creek to the east, and Willow Boulevard Road, former Olmstead Creek, and residential areas to the south (See Figure 4, OU2 Location Map).

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Operable Unit 2 is an approximately 32-acre site that consists of two disposal areas: the Willow Boulevard Landfill (including the Drainageway area), and the A-Site Landfill. Operable Unit 2 also includes impacted areas adjacent to and/or near the Willow Boulevard/A-Site Landfills (See Figure 5, OU2 Site Plan).

The A-Site Landfill occupies approximately 22-acres and contains approximately 475,400 cubic yards of PCB-contaminated material. The Willow Boulevard Landfill (including the Drainageway Area) occupies approximately 11-acres and contains an estimated volume of 152,100 cubic yards of contaminated residuals. Impacted areas adjacent to and/or near the landfills include the area east of Davis Creek; south of the A-Site Berm (including former Olmstead Creek); and the area near Monitoring Well AMW-3A. The area east of Davis Creek is approximately 3.5 acres with an estimated volume of 3, 800 cubic yards; south of the A-Site berm is approximately 2.5 acres with an estimate volume of 2,900; and the AMW-3A area is approximately 0.25 acres with an estimated volume of 100 cubic yards of PCB-contaminated residual, soil, and sediment.

Land and Resource Use

Land use in the vicinity of OU2 includes industrial, commercial, and residential properties. The A-Site Landfill and Willow Boulevard Landfill are zoned for industrial use. The land south of OU2 is zoned residential and industrial. Operable Unit 2 is currently an inactive landfill. Wetland areas are present at OU2.

No private, commercial, or industrial water wells were identified within ¼ mile of OU2. However, ten wells were identified within ½ mile of OU2. Four of the ten wells are public water supply wells owned by the city of Kalamazoo. Four are domestic wells, one well is an industrial well, and the usage of the last well is not known. It is not known whether any of the domestic wells within ½ mile of OU2 are being used for drinking water.

History of Contamination

The Willow Boulevard and A-Site landfills were used to dispose of dewatered paper making residuals from the former Allied Paper King Mill and the Georgia-Pacific Kalamazoo Mill. Both mills are located in Kalamazoo, Michigan. Polychlorinated biphenyls were introduced into the waste stream between the 1950s and 1970s. During this time, the paper mills were de-inking and repulping office waste paper, some of which contained carbonless copy paper contaminated with PCBs. Process residuals from the paper manufacturing operations were then disposed of at the Willow Boulevard and at the A-Site Landfills. Over time, PCB-contaminated residuals from the landfills eroded and migrated into the soil and sediment of adjacent areas and/or into the Kalamazoo River. Surface water runoff from the landfills and adjacent areas may also transport PCBs directly into the Kalamazoo River. Therefore, the landfills and adjacent areas may be sources of PCBs to the river and Davis Creek, which empties into the Kalamazoo River.

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The A-Site Landfill was originally a series of dewatering (or drainage) lagoons. Paper waste from the King Mill was piped to the A-Site lagoons, and water was allowed to settle out. Paper residuals accumulated within the lagoons, and over time, the A-Site became known as the A-Site Landfill. The A-Site lagoons were active between 1960 and 1967. Operations at the King Mill ended in 1971, and the mill was demolished in 1978. Georgia-Pacific purchased the A-Site in 1975 and used it to dispose of paper waste dug up from the King Highway dewatering lagoons until 1977. From 1977 to 1987, the A-Site received dewatered paper making waste from the Kalamazoo King Mill filter presses. The A-Site ceased to be an active disposal area in 1987, when the King Highway Landfill operations began. The Willow Boulevard Landfill was acquired by Georgia-Pacific from the Kalamazoo Paper Company in 1967. From mid-1960 until 1975, dewatered paper residuals from the Kalamazoo Mill and the King Highway Lagoons were disposed of at the Willow Boulevard Landfill. Disposal activities occurred from the mid-1960s until operations stopped in 1975.

Response Activities

Voluntary Response Activities

Between 1992 and 1999, Georgia-Pacific conducted a number of interim response measures to eliminate or reduce erosion of PCB-containing residual and soil from the landfill into the Kalamazoo River. The interim response measures were voluntarily conducted by Georgia-Pacific, and not under an administrative order with the MDEQ or U.S. EPA.

In 1992, GP installed a chain-link fence around the landfill and reseeded the western portion of the A-Site landfill to promote vegetative growth. In 1998, approximately 1,500 feet of sheet pile was installed between the A-Site and the Kalamazoo River to stabilize the earthen berm along the river and mitigate soil erosion. In 1999, approximately 7,000 cubic yards of PCB-contaminated residual and sediment were excavated from the western bank of the Kalamazoo River adjacent to the landfill. The excavated material was placed into the eastern side the Willow Boulevard portion of OU2. The landfill was then regraded to promote drainage and covered with 6 inches of clean sand as a temporary cover. A portion of the river's edge was also backfilled to create a sand berm along the Kalamazoo River. Geotextile and riprap were placed along a portion of the river's edge to reduce erosion of the riverbanks.

U.S. EPA Time-Critical Removal Action

On November 7, 2006, Georgia-Pacific signed an AOC with U.S. EPA to perform a Time-Critical Removal Action at the former Refuse Area of the former Georgia-Pacific Kalamazoo Mill property and at the Oxbow Area of the former Hawthorne Mill property. The former Kalamazoo and Hawthorne Mill properties are located to the north of OU2, across the Kalamazoo River. During the removal action,

Georgia-Pacific removed approximately 33,203 cy^3 of PCB-containing soil/residual from the Refuse Area and approximately 17,488 cy^3 of PCB-containing soil/residual from the Oxbow Area. Georgia-Pacific also removed contaminated soil from a transformer pad, wastewater pipeline, and from an underground pipe that was located at the former Kalamazoo Mill property. Material excavated from the transformer pad was sent to an off-site licensed landfill for disposal and material excavated from the wastewater pipeline and underground pipe were consolidated into the A-Site. The removal action started in November 2006 and was completed in June 2007. The portion of the A-Site that received the contaminated residual/soil was covered and a berm was constructed to keep surface water runoff from entering Davis Creek and the Kalamazoo River.

Basis for Taking Action

Polychlorinated biphenyls are the primary contaminant of concern at OU2. The media of concern are PCB-contaminated residuals within the Willow Boulevard and A-Site Landfills and PCB-contaminated residual, soil, and/or sediment in areas adjacent to the landfills including the Willow Drainageway, the area south of the A-Site Berm, the area east of Davis Creek, and the area near monitoring well AMW-3A. Polychlorinated biphenyls are the primary risk driver at OU2.

The RI for OU2 was conducted between 1993 and 2000. The maximum PCB concentration in surface residuals at the Willow Boulevard Landfill was less than 4 mg/kg PCB and in subsurface residuals, the maximum concentration was 160 mg/kg. Surficial soil samples were not collected at the Willow Drainageway. The maximum PCB concentration in subsurface soils at the Drainageway was 30 mg/kg. The maximum PCB concentration in surface soil at the Area South of the A-Site Berm was 14 mg/kg PCB and in subsurface soil, the maximum concentration was 37 mg/kg PCB. The maximum PCB concentration in surface sediment at the Former Olmstead Creek was 7.6 mg/kg PCB. The maximum PCB concentration in surface residual, soil, and sediment at the area east of Davis Creek was 36 mg/kg PCB. No subsurface soil samples were collected at this area during the RI. The maximum PCB concentration in surface soil at the AMW-3A areas was 5.9 mg/kg PCB and in subsurface soil, the maximum concentration was 62 mg/kg PCB. Surface soil samples collected at residential properties adjacent to the landfills were either not-detected or below the State of Michigan residential cleanup criteria of 4.0 mg/kg PCB.

A quantitative risk assessment was not conducted at OU2. Instead, potential risks associated with exposure pathways at OU2 were qualitatively assessed to determine which media would need to be targeted for remediation. Exposure pathways assessed in the qualitative risk assessment conducted at OU2 include: ingestion of and dermal contact with contaminated residuals, soil, and sediment; inhalation of airborne releases; and erosion into aquatic habitat. Media evaluated include air, surface soils, residuals and sediment, subsurface soils, surface water, and groundwater/leachate. Potential risk

associated with exposure pathways were qualitatively assessed by comparing maximum PCB concentrations detected in the RI with cleanup criteria based on future land use and protective ranges established in the *Final (Revised) Baseline Ecological Risk Assessment dated April 2003 (BERA)*. State of Michigan Part 201 Generic Cleanup Criteria were used in the qualitative assessment of potential risk at OU2.

Based upon the results of the RI and the qualitative assessment of risk to human health and ecological receptors, a response action at OU2 was warranted because PCB concentrations in residuals, soil, and sediment at OU2 exceed the Part 201 Generic Commercial II/Industrial Land Use Criteria of 16 mg/kg PCB (in soil) protective of human health for on-site workers and/or trespassers; the Generic Residential Land Use Criteria of 4 mg/kg PCB (in soil) protective of human health for residential land use; and/or the cleanup range of 5.5 and 8.1 mg/kg PCB (in soil) for the protection of ecological receptors (American Robin) established in the BERA. Additionally, a response action at OU2 was also warranted because of the potential migration of PCBs from the landfills and adjacent areas (via erosion or surface water runoff) into the Kalamazoo River and because PCB concentrations in sediment of the wetland areas may present an unacceptable risk to consumers (e.g., people or mink) of the fish.

Because a remedial action was selected and a ROD issued for OU2, this OU is further discussed in Section IV of this five-year review report.

B.3. Operable Unit 3

Physical Characteristics

The King Highway Landfill OU3 is located within the city of Kalamazoo, Kalamazoo Township, Michigan. OU3 includes the King Highway Landfill, the King Street Storm Sewer floodplain (KSSS), and contaminated river sediments adjacent to the landfill. The OU3 ROD requires the cleanup of these areas, as well as five former waste lagoon areas located at the Georgia-Pacific mill in Kalamazoo (herein referred to as the "Mill Lagoons"). Waste material from the Mill Lagoons was excavated and disposed in the King Highway Landfill. The Mill Lagoons are located north of the landfill across the Kalamazoo River (See Figure 6, OU3 Location Map and Figure 7, OU3 Site Plan).

The King Highway Landfill occupies approximately 15 acres. The Mill Lagoons occupy approximately 7 acres, and the KSSS occupies approximately 1 acre. Operable Unit 3 is bordered by King Highway (M-96) to the south, the Grand Trunk Railroad right-of-way to the west, and the KSSS floodplain and the Kalamazoo River to the north and to the east.

Land and Resource Use

The King Highway Landfill is zoned for industrial or secondary commercial use. The land immediately adjacent to the south and southwest of the landfill is classified for

industrial or secondary commercial use. The land that contains the Mill Lagoons, located at the Georgia-Pacific Mill Property, is zoned for industrial use.

Future land use at the King Highway Landfill property will remain industrial. Institutional Controls were required by the ROD but are not yet in place. As part of the future Institutional Control Plan, a restrictive covenant will be recorded on all deeds comprising the landfill to prohibit all uses of groundwater and all uses of the landfill property that are not consistent with the limited industrial land use category under Part 201.

The projected land use at the Georgia-Pacific Mill Lagoons is not yet known. The ROD for OU3 required deed restrictions also at Mill Lagoons. Pursuant to an AOC between U.S. EPA and certain PRPs, the Georgia Pacific Kalamazoo Mill property will be investigated to determine whether the property is or is not a source of PCBs to the Kalamazoo River. The extent to which additional response activities will be required at the Georgia-Pacific Kalamazoo Mill property has yet to be determined by U.S. EPA and/or MDEQ. U.S. EPA has determined that it is more appropriate to place deed restrictions on the mill lagoons after a cleanup decision is made with regard to the entire Georgia-Pacific Kalamazoo Mill property. Groundwater, which is discharged to the river, is not used as a potable water source at the landfill or downgradient of the landfill.

History of Contamination

During a 15-year period, Georgia-Pacific de-inked office waste paper, which contained carbonless copy paper contaminated with PCBs, at two of the mills located at the Georgia-Pacific Kalamazoo Mill property. Originally, the Kalamazoo Paper Mill consisted of five mills, three for making paper products, and two for finishing and converting. Mills 1 and 3 both performed de-inking operations starting in the early 1950s. Mill 3 discontinued de-inking in the late 1960s, was refurbished, and resumed operations in 1975. Mill 1 de-inked continuously until the late 1970s. Raw paper waste from all the mills was routed to a clarifier. The clarifier effluent was pumped directly into the Kalamazoo River until 1964 which it was rerouted to the city of Kalamazoo Wastewater Treatment Plant.

The underflow from the clarifier was dewatered and disposed of at various locations over the years. From the mid-1950s until the late 1950s, residuals were placed in the Mill Lagoons on the Georgia-Pacific Kalamazoo Mill property. In the late 1950s residuals were sent for dewatering to the King Highway lagoons, which later became the King Highway Landfill. The Mill Lagoons were then only used as an emergency backup system. Georgia-Pacific dewatered residuals in the King Highway lagoons until 1977. After 1977, the King Highway lagoons were not utilized until the lagoons were licensed in 1983 by the MDEQ as a landfill for disposal of paper-making residuals. From 1987 to 1998, Georgia-Pacific used the King Highway Landfill for the disposal of dewatered paper-making residuals. Over time, the contaminated residuals migrated, via erosion or surface water runoff, from the landfills into adjacent areas and/or the Kalamazoo River.

The King Highway landfill is a mono-fill of paper residuals. The landfill covers 15 acres and consists of four cells; Cells 1, 2, 3, and 4. The total volume of residuals in the landfill is estimated at 282,000 cubic yards. Cells 1, 2, and 3 were first licensed by the MDEQ in 1983 under the Michigan Solid Waste Management Action (Act 641) as a Type III landfill. Cell 4 was never permitted as an operating landfill. The majority of residuals in Cell 4 were submerged in a pond formed by the transport of water from the other three cells to Cell 4 through culvert in the dikes. The four cells were separated by dikes approximately 10 to 20 feet high. These dikes were constructed of sand and gravel in the 1950s and were used as access roads. Access roads and no-fill areas comprise 7.9 acres of the King Highway Landfill.

Response Activities

Voluntary Response Activities

Pre-ROD interim measures were voluntarily conducted by Georgia-Pacific and not under an administrative order with the MDEQ. In 1994 and 1996, approximately 1,000 linear feet of sheet piling were installed to stabilize the berm along the northern sides of Cells 1, 2, and 3 of the landfill. The purpose of the interim measure was to prevent berm failure and subsequent migration of contaminated residuals from the landfill into the Kalamazoo River. In 1998, PCB contaminated material was excavated from the King Street Storm Sewer, the Mill Lagoons, and from areas directly adjacent to the landfill. All materials were consolidated back into the landfill.

Basis for Taking Action

The RI for OU3 was conducted in 1993. The maximum PCB concentration in the landfill surface residuals was 3.6 mg/kg. PCB concentrations generally increase with depth through the residuals. However, PCB concentrations in the top eight feet of residuals in Cell 4 are as high as 69 mg/kg. The reason for the difference between Cells 1, 2, and 3 and Cell 4 is that Georgia-Pacific continued to dispose of residuals at the KHL after the use of PCBs in the manufacture of carbonless copy paper ceased. Tests of the residuals that were added to the landfill later in it operational history did not detect PCBs with the exception of one sample in 1987 that contained 6.5 mg/kg PCBs. The maximum PCB concentration found in the top 16 feet of residuals in Cells 1, 2, and 3 was 8.8 mg/kg. Concentrations over 50 mg/kg PCB were detected at depths of 16 to 30 feet. The maximum concentration in the subsurface residuals was 310 mg/kg. Soil below the KHL has a maximum PCB concentration of 9.9 mg/kg.

Total PCB concentrations from samples collected in the KSSS floodplain had PCB concentrations ranging from 0.37 mg/kg to 99 mg/kg. The maximum PCB concentration found in the berms adjacent to the landfill was 77 mg/kg. Analytical results from samples collected at the Mill Lagoons showed PCB concentrations in surface residuals

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ranging from 0.2 to 110 mg/kg. Polychlorinated biphenyls were detected in three subsurface residual samples in the Mill Lagoons at concentrations ranging from 3.4 to 70 mg/kg. Five soil samples were collected below the Mill Lagoons. Polychlorinated biphenyls from native soils, below the lagoons, ranged from 0.043 to 2.9 mg/kg.

Polychlorinated biphenyls were not detected in groundwater above performance standards. However, PCBs were detected in a leachate sample collected from Monitoring Well 10R at a concentration of 1.4 ug/L. One surface water sample was collected from the pond in Cell 4 and analyzed for PCB. The analytical results show a PCB concentration of 0.026 ug/L

The presence of PCB-contaminated residuals, soils, and sediment in areas outside the landfill and the Mill Lagoons was evidence that PCBs were migrating, via erosion or surface water runoff, from the landfill and the Mill Lagoons, into adjacent areas and the Kalamazoo River. Additionally, the landfill berms were continually being eroded by surface water run-off and the continued flow of the Kalamazoo River. As a result of the RI, it was concluded that OU2 and the Mill Lagoons are sources and potential sources of PCB contamination to the Kalamazoo River and its floodplain in the vicinity of OU3 and the Mill Lagoons.

A Baseline Risk Assessment (BRA) was conducted at OU3 to evaluate risks to human health and the environment under unremediated conditions. Because the waste at the OU3 is identical (i.e., wastes was generated from the same source at similar concentrations) to the wastes at the Mill Lagoons, the routes of exposure are the same, and the receptors are the same at the OU3, the MDEQ determined that the BRA for OU3 is applicable to the Mill Lagoons. Therefore, a separate BRA for the Mill Lagoons was not conducted. The BRA concluded that the primary migration pathway for the release of PCBs into the river is erosion of residuals from the landfill berms and floodplains and the Mill Lagoons. The largest potential risk and migration pathway is the release of PCB-contaminated residuals due to failure of the landfill berms.

Based upon the results of the RI and BRA, a response action at OU3 and the Mill Lagoons was necessary to eliminate or reduce the potential migration of PCBs to the Kalamazoo River. The largest potential risks identified for ecological receptors were due to past releases of PCBs from the landfill, its berms, and floodplains of the Mill Lagoons. The ecological risk assessment recognized that organisms and fish in the Kalamazoo River bioaccumulate PCBs and pass them up the food chain to other organisms which would feed upon them. The bioaccumulation food chain effects present the greatest potential risk to ecological and human health, via consumption of the Kalamazoo River fish.

Because a remedial action was selected and a ROD issued for OU3, this OU is further discussed in Section IV of this five-year review report.

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B.4. Operable Unit 4

Physical Characteristics

The 12th Street Landfill OU4 is located in Otsego Township, approximately ½ mile northwest of the city of Plainwell in Allegan County, Michigan. The landfill occupies approximately 6.5 acres and is bordered by the Kalamazoo River to the east, by wetlands to the north and west, by industrial developed land to the south and southeast, and by a gravel pit operation to the south and southwest (See Figure 8, OU4 Location Map and Figure 9, OU4 Site Plan).

The 12th Street Landfill is located within an environmentally sensitive area. The adjacent woodlands, wetlands, and the former powerhouse discharge channel provide suitable habitat for fish, turtles, and amphibians. Small mammals (i.e., mice, squirrels, woodchucks, mink, raccoons, fox and muskrats) and birds inhabit the areas surrounding the landfill. The Kalamazoo River is part of a bird migratory flyway route for waterfowl species, and the areas surrounding the 12th Street Landfill is a migratory stopover that attracts and supports waterfowl. During nesting season, vegetation in the area provides cover and materials for nesting. Larger mammals, such as white-tailed deer, also use the landfill as evidenced by deer paths running over the top and along the sides of the landfill. Muskrat dens have been observed in the wetlands and there is evidence of extensive burrowing into the sides of the landfill by fox and woodchuck.

Land and Resource Use

Land use in the immediate vicinity of OU4 is characterized as industrial with residential property to the south and southwest. Wetlands are present north and northwest of the OU and the Kalamazoo River and Plainwell Dam are located to the east and southeast.

The 12th Street Landfill is zoned industrial and will remain industrial in the future. A Restrictive Covenant running with the land from the owner of the landfill property to MDEQ as the grantee (MDEQ Reference No: RC-RRD-03-052 on USEPA Site No. 059B) is already in place (See Attachment 6, Restrictive Covenant for OU4). The Agency is a third party beneficiary of this Restrictive Covenant. The Restrictive Covenant was recorded with the Allegan County Registry of Deeds on March 25, 2005, to restrict future land use at the landfill property. Groundwater is not currently used for any purpose at the landfill property. As discussed below, an evaluation of whether groundwater use needs to be restricted at OU4 is necessary. If so, the evaluation must include an assessment of whether the existing covenant appropriately restricts groundwater use at the property. Therefore, an evaluation of existing ICs will be required to determine whether existing ICs adequately restrict or prevent groundwater use at the landfill property. This evaluation will be made during the remedial design phase of the OU4 remedy.

History of Contamination

The 12th St. Landfill was used from 1955 to 1981 for disposal of PCB-containing paper residuals consisting mostly of water, wood fiber, and mineral matter. PCBs were introduced into some of the residuals as a result of the paper manufacturing operations at the former Plainwell Paper Mill between 1957 and 1962. Over time, the contaminated residuals migrated, via erosion or surface water runoff, from the landfills into the adjacent wetlands, woodland areas, adjacent property, and into the powerhouse channel of the Kalamazoo River. The landfill is comprised mostly of paper residuals with some concrete rubble, construction debris, waste lumber, and corroded steel drums. The 12th Street Landfill contains an estimated 208,000 cubic yards of PCB-contaminated residuals. The 12th Street Landfill was closed in 1984, and covered with soil and seeded to promote vegetation.

Response Activities

No voluntary response actions were taken at OU4.

Basis for Taking Action

Sampling during the December 1996 RI confirmed the presence of paper residuals in the berm, in the adjacent wetland area, as well as in the former powerhouse discharge channel. Soil/residual samples were collected from soil and monitoring well borings that were located outside the landfill perimeter, and from two sediment cores collected in the former powerhouse discharge channel adjacent to the east side of the landfill. Elevated PCB concentrations were reported in 24 of the 45 samples analyzed, including both samples collected from the former powerhouse discharge channel, with a maximum concentration of 158 mg/kg. Elevated concentrations of inorganic compounds were also detected in several samples at levels exceeding applicable criteria. Trace concentration of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and pesticides were also reported.

Groundwater samples were collected from 15 monitoring wells and analyzed for VOCs, SVOCs, inorganic compounds, pesticides, and PCBs. Polychlorinated biphenyls were not detected and all other results were either non-detect or below the Part 201 Industrial and Commercial Drinking Water Criteria and Groundwater Surface Water Interface (GSI) Criteria, with the exception of bis(2-Ethuylhexyl) phthalate, which was detected in groundwater at a concentration of 290 micrograms per liter (ug/L). In 1995, a second round of groundwater samples was collected from each monitoring well. Groundwater analysis was limited to PCBs only, and the results indicated non-detectable concentrations.

Three leachate wells were sampled in 1993 and again in 1995. Analytical results from the 1993 sampling event indicate that trace concentrations of various VOCs, SVOCs, and Aldrin were present as well as an elevated concentration of toluene (680 ug/L) in leachate

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collected from one leachate well. The toluene concentration exceeds GSI Criteria. In 1995 leachate samples were analyzed only for PCBs. Results indicate that leachate collected from one well had PCB concentrations of 1.4 ug/L.

Due to the similarities between the King Highway Landfill OU3 and the 12th Street Landfill OU4, such as similar waste (PCB-contaminated residuals generated from the same paper recycling process at similar concentrations), identical routes of exposure, and identical receptors, it was assumed that there was a similar level of unacceptable risk at the 12th Street Landfill OU4. Therefore, the King Highway Landfill BRA was used to assess the risks to human health and ecological receptors.

Based upon the results of the RI and BRA, a response action at OU4 was necessary to eliminate or reduce the potential migration of PCBs to the Kalamazoo River. The largest potential risks identified for ecological receptors were due to past releases of PCBs from the landfill into the Kalamazoo River. The ecological risk assessment recognized that organisms and fish in the Kalamazoo River bioaccumulate PCBs and pass them up the food chain to other organisms which would feed upon them. The bioaccumulation food chain effects present the greatest potential risk to ecological and human health, via consumption of the Kalamazoo River fish.

Because a remedial action was selected and a ROD issued for OU4, this OU is further discussed in Section IV of this five-year review report.

B.5. Operable Unit 5

Physical Characteristics

Operable Unit 5 is located in Allegan and Kalamazoo Counties of southwest Michigan. OU5 includes approximately 80 miles of the Kalamazoo River and a 3-mile stretch of Portage Creek (See Figure 10 OU5 Site Map).

Land and Resource Use

The Kalamazoo River is used for recreational purposes (i.e., swimming, boating, and fishing). River water is not used as a drinking water source and is not expected to be used as a drinking water source in the future. Wetland areas are present along areas of the river.

History of Contamination

Former paper mills located on the Kalamazoo River and Portage Creek recycled and/or de-inked and repulped carbonless copy paper, which between 1957 and 1971 contained PCBs as an ink carrier. Although PCB use in the manufacture of carbonless copy paper was discontinued in 1971, the waste streams of the Kalamazoo area paper mills most likely contained PCBs for at least a decade after 1971. The PCB-contaminated wastes

from these paper mills were initially discharged directly to the Kalamazoo River and Portage Creek. Later, waste effluents were sent to clarifiers prior to being discharged to the river and creek. The bottom sludge form these clarifiers were placed in at least four disposal areas (landfills) along the river. Because the PCBs were associated with suspended fine clay particles, the clarifiers were ineffective in stopping the discharge of PCBs. The soils, sediment, water column, groundwater, and biota in and adjacent to an 80-mile stretch of the Kalamazoo River and a 3-mile stretch of Portage Creek are contaminated with PCBs.

The U.S. EPA and MDEQ currently estimate that approximately 113,000 lbs. of PCBs are currently located in the aquatic system. Today, the ongoing, uncontrolled erosion of contaminated paper wastes and soils from the river banks is the most significant source of PCB loading to the Kalamazoo River. A fish advisory has been in place since the 1970s.

The MDEQ completed a Site-wide Final (Revised) Human Health Risk Assessment (HHRA) and Baseline Ecological Risk Assessment (BERA) for OU5. The HHRA quantitatively assessed potential risk to human health for different exposure pathways, including the consumption of fish, direct contact with contaminated floodplain soils, and inhalation of dust and volatile emissions from floodplain soils behind the State-owned dams. The HHRA concluded the most significant exposure pathway is the consumption of fish from the river because fish bioaccumulate PCBs from exposure to PCB-contaminated material, surface water, and prey. Recreational activities, including swimming boating, and wading in the river, do not pose a health risk to people. The BERA concluded that sensitive consumers, such as mink, are the most at risk compared to other ecological receptors. Birds (represented by the American Robin) that consume a substantial amount of earthworms are also at significant risk if foraging takes place in the contaminated areas, and terrestrial mammals (represented by the red fox) may be at some risk if foraging is concentrated in river areas whose prey reside in contaminated areas and have taken up substantial amounts of PCBs.

Response Activities

U.S. EPA Time-Critical Removal Action

On February 27, 2007, Georgia-Pacific and Millennium Holdings, LLC signed an AOC with U.S. EPA and the State of Michigan to conduct a time-critical removal action in an area of the Kalamazoo River called the "Plainwell Impoundment." The removal action will result in excavation and off-site disposal of approximately 132,000 yds^3 of PCB-contaminated sediments, river banks, and floodplain soils. Much of the State of Michigan-owned Plainwell Dam will be dismantled, and the river will be re-routed back to its original pre-dam channel. Excavated river banks will be restored according to a restoration plan approved by federal and State natural resource trustees, using wherever possible soft engineering and native plant species to enhance the interaction between aquatic and terrestrial species at the Site. The removal action started in March 2007, and

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as of September 2007, nearly 8,000 cubic yards of material have been removed from the river and nearby banks.

Basis for Taking Action

There is no basis for taking action at this time as the Supplemental RI/FS for OU5 has not been completed nor a ROD issued. The remedial status of OU5 is discussed below.

Remedial Status

On February 27, 2007, Georgia-Pacific Corporation and Millennium Holdings, LLC signed an AOC with U.S. EPA to conduct a Supplemental RI/FS investigation for the entire 80-mile stretch of the Kalamazoo River. U.S. EPA approved the supplemental RI Work Plan for the first reach of the Kalamazoo River, i.e. the Morrow Dam to Plainwell Dam reach. At the time of this five-year review, samples of river sediment and bank soil are being collected at specific locations along the river.

Since a ROD has not been issued for OU5, a remedial action cannot be discussed or evaluated; therefore, no further discussion of OU5 is contained in this five-year review report.

B.7. Operable Unit 7

Physical Characteristics

The former Plainwell Paper Mill OU7 is located in the city of Plainwell, Allegan County, Michigan (See Figure 11, OU7 Location Map). The 34-acre mill property is bordered by the Kalamazoo River to the north, the Plainwell central business district to the east, residential property to the south, and commercial properties and the city of Plainwell wastewater treatment plant to the west.

Land and Resource Use

Operable Unit 7 was formerly zoned industrial. In 2006, the city of Plainwell purchased the mill property and the mill property was rezoned as residential. Land use in the immediate vicinity of OU7 is characterized as industrial, commercial, and residential. A Restrictive Covenant running with the land from the former owner of the property to MDEQ (MDEQ Reference No: RC-RRD-201-05-001on USEPA Site No. 059B) is already in place (See Attachment 7, Restrictive Covenant for OU7). The U.S. EPA is a third-party beneficiary of this Restrictive Covenant, which was recorded with the Allegan County Registry of Deeds on March 25, 2005. The Restrictive Covenant provides, among other things, that owners of the mill property must take reasonable steps to stop any continuing release of hazardous substances, and may not use the property in a manner that causes existing contamination to migrate beyond the property's boundaries.

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The Restrictive Covenant further provides that as response activities are performed at this property, MDEQ and U.S. EPA may require modifications to the covenant to assure the integrity and effectiveness of any selected remedial action.

History of Contamination

Between 1910 and 1962, various owners of the Plainwell Paper Mill obtained pulp through the de-inking and repulping of used paper. Polychlorinated biphenyls were introduced into the residuals as a result of the use of carbonless copy paper, which between approximately 1954 and 1971 contained PCBs. Wastewater from the de-inking operations was discharge directly to the Kalamazoo River until 1954, when a clarifier was installed adjacent to the mill and wastewater was treated by primarily clarification. The clarified effluent was discharged into the Kalamazoo River. The underflow from the clarifier was dewatered in a series of on-site lagoons. The secondary treatment system was updated in 1983 with the installation of a second clarifier

Typically, twice a year each lagoon was excavated and the material was taken to the 12th Street Landfill, located near the Plainwell Dam. The waste lagoons were taken out of service in 1983 when the second clarifier was installed. Four former waste lagoons are presently covered with soil and are well vegetated. Other lagoons were filled with soil after being cleaned out and are almost entirely located under the mill's present wastewater treatment facilities.

Response Activities

Weyerhaeuser is currently conducting an emergency response action under the terms of its Consent Decree, described below, to abate a potential release from the banks of the mill property. The emergency action only includes those activities made necessary as a result of the of the Plainwell dam removal. The activities include removal of sediments from the powerhouse channel and grading and armoring of bank to handle flow redirected by the Plainwell dam removal.

Basis for Taking Action

There is no basis for taking action at this time as the RI/FS for OU7 has not been completed nor a ROD issued. OU7 is in the RI/FS stage of the Superfund process. The remedial status of OU7 is discussed below.

Remedial Status

In December 2004, Weyerhaeuser signed a Consent Decree which, among other things, obligated the company to conduct the RI/FS and RD/RA for the Plainwell Mill property. In September 2006, Weyerhaeuser submitted an RI/FS Work Plan. After the completion of the emergency response, U.S. EPA will resume its review of the RI/FS Work Plan for the Mill Property. As noted above, effective ICs are

in place and were negotiated as part of the bankruptcy settlement with Plainwell Inc., a former owner of the property. Institutional controls will be reevaluated after the selection of the remedy for the mill property. U.S. EPA will ensure that long-term stewardship of OU7, as well as every other operable unit of the Site, includes implementation and maintenance of each component of the selected remedy, including any necessary ICs.

Since a ROD has not been issued for OU7, a remedial action cannot be discussed or evaluated; therefore, no further discussion of OU7 is contained in this five-year review report.

IV. Remedial Actions

Remedies were selected and RODs were issued for OU2, OU4, and OU3. Therefore, the following subsections describe the selected remedy, its implementation, institutional controls and system operations, where applicable, for these operable units.

A. Operable Unit 2

Remedy Selection

Remedial Action Objectives (RAOs) for the Willow Boulevard/A-Site Landfill OU2 were developed based upon the findings of the November 2004, RI and the human health risk evaluation in the RI. The RAOs for OU2 include:

- Eliminate exposure to PCB-contaminated material exceeding applicable land-use and/or risk based cleanup criteria;
- Prevent PCB migration, via erosion or surface water runoff, into the Kalamazoo River; and
- Mitigate, to the extent practicable, adverse effects to the environment due to implementation of a remedial action.

The OU2 ROD was signed on September 27, 2006. The remedy selected in the ROD includes:

- Excavation of PCB-contaminated residual, soil, and sediment from areas outside the landfill and consolidation of excavated material into the A-Site Landfill portion of OU2;
- Creating a clean buffer between the Kalamazoo River and the Willow Boulevard Landfill portion of OU2;

- Containment of residual waste material underneath a Part 201-landfill compliant cap;
- Installing a fence that encompasses the landfill to restrict access to the landfill;
- Implementing deed restrictions limiting future land use; and
- Long-term groundwater monitoring

Remedy Implementation

The U.S. EPA is in the process of negotiating a Consent Decree (CD) with Millennium Holdings and Georgia-Pacific for the implementation of the RD/RA at OU2.

Because a remedial action has not yet implemented, the remedy cannot be evaluated for protectiveness under the remaining sections of this five-year review report. Therefore, no further discussion of OU2 is provided.

B. Operable Unit 3

Remedy Selection

The RAOs for the King Highway Landfill OU3 were developed based upon the findings of the July 1994 and the human health risk evaluation in the RI. The RAOs identified in the September1994, Focused Feasibility Study include:

- Reduce the potential migration of PCBs to the Kalamazoo River that could result from erosion of residuals from behind the dike that physically separates the residuals from the river, or failure of the dike;
- Restrict the potential for PCB migration from leachate to groundwater;
- Restrict the potential transport of PCB-containing soil/residuals along the dike to the river in surface runoff or by erosion of soils/residuals due to river flows; and
- Restrict the potential contact with PCB-containing soil/residuals and surface water by workers and trespassers at the KHL.

The ROD for OU3 and the Georgia-Pacific Five Former Lagoons was signed by MDEQ in October 1997, and by U.S. EPA in February 1998. The remedy selected in the OU3 ROD includes:

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- Excavation and consolidation of PCB-contaminated soils, sediments, and residuals from the landfill berms, the KSSS floodplain, the Georgia-Pacific Mill Lagoons, the river sediment adjacent to the KHL and containment of the excavated material into the KHL;

- Construction of a State of Michigan Part 115 landfill-compliant cap over the landfill;

- Erosion protection on the berms of the landfill designed to protect against a 100-year flood event;

- Installation of new groundwater monitoring wells and abandonment of wells that are no longer needed;

- Long-term groundwater and surface water monitoring;

- Implementing deed restrictions limiting future land use;

- Implementing access restrictions by enclosing the entire KHL and the Mill Lagoons (only during remediation) with a fence; and

- Placing a permanent marker at the KHL and posting warning signs at the entry gates and on the fence every 200 feet.

The purpose of the selected remedy at the King Highway Landfill OU3 and the Mill Lagoons is to prevent direct contact with PCB-contaminated residuals and eliminate or reduce the potential migration of PCBs from the landfill and the Mill Lagoons into the Kalamazoo River. The selected remedy addresses the principal threat posed by OU3 and the Mill Lagoons by reducing the current and potential migration of PCBs into the Kalamazoo River.

Cleanup goals for soil at OU3 and the Mill Lagoons were based on the anticipated future land use, which was expected to remain industrial. Both properties are zoned for industrial use therefore, the limited industrial cleanup criteria for soil established in Sections 20120(a) and 20121(b) of Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, MCL 324.20101(0) *et seq.* (NREPA), were used. At the time the ROD was signed, the limited industrial cleanup criterion for PCBs in soil was 21 mg/kg PCB, but this standard was later reduced to 16 mg/kg PCB. The ROD required that all visible PCB-contaminated residual, soil, and sediment from the KSSS floodplain and the river adjacent to the landfill, be excavated and consolidated back into the landfill. The ROD did not impose numerical cleanup criteria for the KSSS floodplain and river adjacent to the landfill because these actions were considered an Interim Response Action. However, if the confirmatory sampling at the KSSS floodplain showed that a residential cleanup criterion

of 1 mg/kg PCB or lower had been achieved, then the action at the KSSS floodplain would be accepted as a final RA.

Remedy Implementation

On February 8, 2000, a Consent Order was signed by Georgia-Pacific and the State of Michigan, whereby Georgia-Pacific agreed to implement the remedy for the OU3 and the Georgia-Pacific Five Former Lagoons. In accordance with the Superfund Program Implementation Manual and as recorded in U.S. EPA Superfund Tracking System called "WasteLan," the remedial design start for OU3 is June 30, 1999 and the remedial design was completed on September 27, 2002. There were no difficulties or changes that occurred during the remedial design. Georgia-Pacific voluntarily started construction of the remedial action in 1996, before the ROD was issued and before the Consent Order was signed by the PRPs and the State of Michigan.

At the time the Consent Order was signed in February 2000, the landfill cap had already been constructed. The next on-site mobilization that occurred was on October 21, 2002, when the long-term monitoring well network was installed. Therefore, it is this date that is recorded in WasteLan as the start of the "on-site construction of the RA." The date of on-site construction of the RA is the date that "triggers" the five-year review requirement.

A Final Report for Completion of Construction for the King Highway Landfill OU3 and the Mill Lagoons was submitted to the MDEQ in May 2004 and a post-closure O&M Plan was submitted in June 2004. As of this five-year review, the MDEQ has not yet approved the Final Completion of Construction Report or the Final O&M Plan. The MDEQ approval of these documents is pending resolution of the MDOT and city of Kalamazoo property issues

Institutional Controls

Access restrictions and ICs are required by the ROD at the King Highway Landfill and the Mill Lagoons by the OU3 ROD. Institutional controls are required to ensure the protectiveness of the remedy. Institutional controls are non-engineered instruments, such as administrative and/or legal controls, that help minimize the potential for exposure to contamination and protect the integrity of the remedy. Compliance with ICs is required to assure long-term protectiveness for any areas which do not allow for unlimited use or unrestricted exposure.

Access restrictions at the King Highway Landfill are in place. A locked chain-link fence and sheet pile, where present, encloses the landfill and restricts public access to the landfill and potential for exposure to PCB-contaminated material. Warning signs are posted along the fence every 200 feet, and permanent markers will be posted on both ends of the landfill after deed restrictions on the site parcels are recorded with the Kalamazoo County Register of Deeds.

As noted above, U.S. EPA believes it is not appropriate to require deed restrictions at the Mill Lagoons at this time. The extent to which additional response activities will be required at the Georgia-Pacific Kalamazoo Mill property has yet to be determined by U.S. EPA and/or MDEQ. U.S. EPA has determined that it is more appropriate to place deed restrictions on the mill lagoons after a cleanup decision is made with regard to the entire Georgia-Pacific Kalamazoo Mill property.

Institutional controls at the properties comprising the King Highway Landfill are not yet in place. U.S. EPA requested and Georgia-Pacific agreed to conduct an IC study consisting of specific IC evaluation activities and submit to U.S. EPA an implementation work plan. On August 3, 2007, ARCADIS of New York, on behalf of Georgia-Pacific, notified U.S. EPA that it was in the process of conducting an IC study to evaluate whether all necessary ICs for OU3 had been identified and implemented. On September 17, 2007, ARCADIS submitted an IC Study Report and work plan to U.S. EPA and MDEQ. U.S. EPA and MDEQ are currently reviewing this report. U.S. EPA will develop an IC Plan for the KHL by April 2008, which is six months from the date of this first FYR. The IC Plan will incorporate the results of the final IC Study.

The table below summarizes institutional controls for these restricted areas.

Media, remedy components & areas that do not support UU/UE based on current conditions	***Objectives of IC***	***Title of Institutional Control Instrument Implemented***
Landfill – Capped Area	Prohibit use except maintenance and assure integrity of the landfill cap	Institutional controls are being evaluated
Groundwater – On Site	Prohibit groundwater use	Institutional controls are being evaluated
Other Remedial Action Components	Prohibit inconsistent uses and protect the integrity of the remedy components	Institutional controls are being evaluated

Maps (paper and GIS versions) which depict the current conditions of the site and areas which do not allow for UU/UE will be developed as part of the IC Plan discussed above.

Current Compliance

Access to the site is restricted by a fence. The gate to the site is intact and in good repair. No activities were observed that would have violated the objectives of the institutional controls. The cap and the surrounding area were in good repair; there were no signs of unauthorized access; and no new uses of groundwater were observed. Based on inspections and interviews, U.S. EPA is not aware of site or media uses which are inconsistent with the stated objectives of the ICs. The OU3

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remedy appears to be functioning as intended.

Long-Term Stewardship

Long term protectiveness requires compliance with effective ICs. U.S. EPA will ensure that long-term stewardship of OU3, as well as every other operable unit of the Site, including implementation and maintenance of each component of the selected remedy and any ICs, in accordance with the long-term O&M Plan.

System Operations and O&M Costs

Operation and maintenance costs were estimated in the ROD to be $125,000 per year. The actual annual O&M cost is $250,000. These costs are mostly attributed to activities performed pursuant to the *Hydrogeologic Monitoring Plan* and the *Landfill Gas Monitoring Plan*, which was developed pursuant to the requirements of the AOC (developed years after the Focused Feasibility Study (FFS) and ROD). Some of the activities performed include water level measurements, ultra low-flow groundwater sampling, data analysis and evaluation, design of various landfill gas control devices, and regulatory reporting – none of which were contemplated as part of the development of the annual O&M cost estimate presented in the 1994 FFS. Actual costs of physical cap maintenance and repair are less than those estimated in the 1994 FFS, as there have not been any significant repair activities required thus far for the cap. A significant portion of the current annual O&M costs associated with on-site maintenance activities have been associated with the installation of several landfill gas control devices over the past several years.

C. Operable Unit 4

Remedy Selection

The RAOs for the 12th Street Landfill OU4 were developed based upon the findings of the RI and the human health risk evaluation in the RI. The RAOs identified in the July 1997 Focused Feasibility Study Report include:

- Reduce the potential migration of PCBs to the Kalamazoo River that could result from erosion of residuals;
- Reduce the potential migration of PCBs to the adjacent property and wetlands that could result from erosion of residuals;
- Restrict the potential for PCB migration from leachate to groundwater; and
- Restrict the potential contact with PCB-containing soil/residuals by any workers or trespassers at the site, or any anglers along the river.

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The ROD for OU4 was signed on September 28, 2001. The OU4 ROD requires the cleanup of the 12th Street Landfill and four areas adjacent to the landfill into which PCBs have migrated including: the woodland area, wetlands, adjacent property, and the former powerhouse channel.

The remedy selected in the 12th St.-OU ROD includes:

- Excavation of PCB-contaminated residual, soil, and sediment from areas adjacent to the landfill and consolidation of the excavated material back into the landfill;
- Creating a hydraulic barrier between the east side of the landfill along the former powerhouse discharge channel;
- Restoration of areas that are excavated, cleared and grubbed, or otherwise affected by the remedial action;
- Construction of a side wall containment system around the outside of the landfill that provides side slope stability, 500-year event flood protection, and erosion control;
- Construction of a cover (cap) over the landfill that consists of, from bottom up, a six-inch thick granular fill layer, 30-mil thick geomembrane liner, 24-inches thick general fill layer, and a six-inch thick vegetative layer;
- Installation of a groundwater monitoring network and abandonment of wells no longer in use;
- Long-term groundwater monitoring and during excavation activities, short-term surface water monitoring;
- Deed restrictions to restrict future land use; and
- Access restrictions including constructing a fence surrounding the landfill with warning signs and permanent markers posted along the fence.

Remedy Implementation

The Consent Decree for RD/RA work addresses the 12th Street Landfill OU4 and also requires a RI/FS investigation and RD/RA implementation at the former Plainwell Mill property (OU7). The Consent Decree for RD/RA was signed by U.S. EPA on December 20, 2004, and entered by the U.S. District Court on February 15, 2005. However, at the request of U.S. EPA, the start of the remedial design phase of the remedy was put on hold pending the outcome of settlement negotiations for the Site. Settlement negotiations

ended on February 27, 2007. In May 2007, U.S. EPA notified Weyerhaeuser to begin the design phase of the 12th Street Landfill remedy and to initiate the RI at the former Plainwell Mill Property OU7.

Currently, Weyerhaeuser is performing an emergency response at OU4 in accordance with the Consent Decree in anticipation of the future removal of the Plainwell Dam. The Plainwell Dam is located just upstream and adjacent to the landfill. Some of the activities Weyerhaeuser is performing include removal of contaminated sediments in the adjacent powerhouse channel and grading and armoring of the riverbanks along the Kalamazoo River adjacent to the 12th Street Landfill. The work being conducted by Weyerhaeuser represents a portion of the work associated with implementation of the remedial action that was selected in the ROD. The remaining components of the selected remedial action will be developed during the remedial design phase of the remedy.

Institutional Controls

Access restrictions are inadequate at the 12th St. Landfill OU4. A chain-link fence was installed on the south side of the landfill and warning signs were posted. However, there is no fence on the north, east, and west sides of the landfill and access to the landfill is easily accessible by the public.

The table below summarizes institutional controls for the restricted areas.

Media, remedy components & areas that do not support UU/UE based on current conditions	***Objectives of IC***	***Title of Institutional Control Instrument Implemented***
Groundwater – On Site	Prohibit groundwater use if necessary	Existing ICs will be evaluated as part of the Remedial Design
Other Remedial Action Components	Prohibit Inconsistent Uses and protect the integrity of the remedy components	Existing ICs will be evaluated as part of the Remedial Design

As noted above, a Restrictive Covenant is already in place to restrict future use of the landfill property. The Restrictive Covenant prohibits any excavation that would interfere with the landfill cap to be installed at this OU. The Agency believes that the remedial design should include an evaluation of (1) whether and to what extent groundwater use at the landfill should be restricted; and (2) the effectiveness of the existing Restrictive Covenant to appropriately restrict groundwater use at OU4. This evaluation will be made during remedial design phase of the OU4 remedy.

At the time of this five year review, the landfill continues to be owned by Plainwell Inc., which is liquidating all assets through a bankruptcy proceeding. The Agency is aware

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that Weyerhaeuser intends to acquire ownership of the landfill through the bankruptcy proceedings. Weyerhaeuser recently informed U.S. EPA that its acquisition of the title to the landfill is almost complete. After Weyerhaeuser acquires ownership, the company will be in a position to modify the Restrictive Covenant, if necessary. The Agency will request Weyerhaeuser to evaluate whether groundwater use at OU4 should be restricted, and the effectiveness of existing ICs to appropriately restrict groundwater use, as part of its remedial design of the landfill within 6 months of the date of this FYR.

Current Compliance

The remedy is not constructed and access restrictions are inadequate to protect trespassers from short-term risks associated with remedy construction. A fence needs to be constructed to prevent access and possibly other measures employed to prevent exposures until the full remedy can be implemented.

Long-Term Stewardship

Compliance with effective ICs is required to assure long-term protectiveness. The Agency will ensure that long-term stewardship of OU4, as well as every other operable unit of the Site, includes implementation and maintenance of each component of the selected remedy, including any necessary ICs. Along with implementation of effective ICs, assurance plans (such as the O&M plan) must be developed to assure proper maintenance and monitoring of effective ICs. The plan would include regular inspection of ICs at the site and annual certification to U.S. EPA that ICs are in place and effective.

Systems Operations/O&M

The remedy is under construction. Therefore, operating procedures and O&M costs can not be evaluated. The CD requires that a draft O&M Plan be submitted to U.S. EPA with the Remedial Design Work Plan.

V. Progress Since the Last Review

This is the first five-year review for the Allied Paper, Inc./Portage Creek/ Kalamazoo River Site.

VI. Five-Year Review Process

Administrative Components of the Five-Year Review Process

The U.S. EPA Remedial Project Manager (RPM), Shari Kolak, notified the MDEQ and Georgia-Pacific of the start of the Five-Year Review in a letter dated June 8, 2007. The U.S. EPA RPM headed the Five-Year Review Team and was assisted by the MDEQ Project Manager, Keith Krawczyk.

The review schedule included the following components:

Community Notification
Document Review
Data Review
Site Inspection
Five-Year Review Report Development and Review.

Community Notification and Involvement

In June 2007, the U.S. EPA Office of Public Affairs placed an ad in two local newspapers announcing that the Five-Year Review was in progress and requested that any interested parties contact the U.S.EPA RPM or the U.S. EPA Community Involvement Coordinator for additional information. Copies of the newspaper notice are included in Appendix A. Since the announcement notice has been issued, no member of the community has notified the U.S. EPA of any interest in the Five-Year Review.

Document Review

This Five-Year Review consisted of a review of relevant documents including the following:

For the Willow Boulevard/A-Site Landfill OU2:

- Remedial Investigation/Focused Feasibility Study Report, Willow Boulevard/A-Site Landfill Operable Unit 2, Kalamazoo, Michigan, Allied Paper, Inc., Portage Creek, Kalamazoo River Superfund Site, November 2004;

- Record of Decision for the Willow Boulevard/A-Site Landfill OU2 of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, City of Kalamazoo, Michigan, September 2006;

- Final (Revised) Baseline Ecological Risk Assessment for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, April 2003; and

- Final (Revised) Baseline Human Health Risk Assessment for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, May 2003.

For the King Highway Landfill OU3:

- Record of Decision for the King Highway Landfill Operable Unit 3 of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, City of Kalamazoo, Michigan, February 1998;

- Final Report for Completion of Construction Volume 1 of 9, King Highway Landfill

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Operable Unit 3 and Five Former Georgia-Pacific Lagoons, May 2004;

- Consent Decree for the Design and Implementation Of Certain Response Action At Operable Unit #4 and the Plainwell Inc. Mill Property of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, February 15, 2005;

- Administrative Order by Consent for Response Activity at the King Highway Landfill-OU3, MDEQ Reference No. AOC-ERD-99-010, February 2000;

- Remedial Investigation Report, King Highway Landfill Operable Unit, July 1994;

- Post-Closure Operation and Maintenance Plan, King Highway Landfill Operable Unit of the Allied Paper, Inc/Portage Creek/Kalamazoo River Superfund Site, draft Final June 2004;

- Appendix J to the Final Report for Completion of Construction, King Highway Landfill Operable Unit 3 and Five Former Georgia-Pacific Lagoons, May 2004;

- Landfill Gas Monitoring Plan, King Highway Landfill Operable Unit, June 2002;

- Risk Assessment, King Highway Landfill Operable Unit, Allied Paper, Inc/Portage Creek/Kalamazoo River Superfund Site, August 1994;

- Technical Memorandum 6, King Highway Landfill Operable Unit, Allied Paper, Inc/Portage Creek/Kalamazoo River Superfund Site, March 1994; and

- Institutional Study Report, King Highway Landfill Operable Unit 3 and Five Former Georgia-Pacific Corporation Mill Lagoons, September 2007.

For the 12th Street Landfill OU4:

- Consent Decree for the Design and Implementation Of Certain Response Action At Operable Unit #4 And The Plainwell Inc. Mill Property Of The Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, December 2004;
- Record of Decision for the 12th Street Landfill Operable Unit 4 of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, City of Kalamazoo, Michigan, September 2001; and

- Remedial Investigation/Feasibility Study Technical Memorandum 8, 12th Street Landfill Operable Unit, Plainwell, Michigan, Allied Paper, Inc., Portage Creek, Kalamazoo River Superfund Site, May 31, 1994.

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Data Review

Data from the following documents were reviewed and discussed in this five-year review report:

- King Highway Landfill Operable Unit Hydrogeological Monitoring Plan, Final September 2002;
- Attachment B, 1998 Groundwater Monitoring Reports, King Highway Landfill Operable Unit Hydrogeological Monitoring Plan;
- Attachment C, 2001 Groundwater Monitoring Reports, King Highway Landfill Operable Unit Hydrogeological Monitoring Plan;
- Attachment F to the 1998 King Highway Landfill Operable Unit Hydrogeological Monitoring Plan, Draft July 1998;
- Post-Closure Groundwater Sampling Analytical Results from 1993-2007, for the King Highway Landfill Operable Unit 3 of the Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site, transmitted via e-mail on September 10, 2007, by Pat McQuire with Georgia-Pacific;
- Draft Final King Highway Landfill Operable Unit 3 and Five Former Georgia-Pacific Lagoons, Final Report for Completion of Construction, September 2003;
- Final (Revised) Baseline Ecological Risk Assessment for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, April 2003; and
- Final (Revised) Baseline Human Health Risk Assessment for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, May 2003.

Site Inspection

King Highway Landfill OU3

The Five-Year Review site inspection of the KKL-OU3 was conducted on August 1, 2007. The site inspection team included Shari Kolak from U.S. EPA; Keith Krawczyk from the MDEQ; Mark Brown and L. Chase Fortenberry from Georgia-Pacific; and Michael Hassett from ARCADIS BBL. Site Inspection Photos and the Site Inspection Report are can be found in Attachments 3 and 4, respectively.

At the time of the inspection, weather conditions were sunny with an air temperature of 85 degrees Fahrenheit. The activities conducted during the inspection included a walk through the site to assess the physical integrity of the components of the remedy, including the landfill cap, groundwater monitoring wells, gas vents, security fence, etc.

The landfill cap was found to be in good condition. The vegetative cover had a few distressed areas due to the lack of precipitation during August. The cap appears to be well maintained with no noticeable depressions, cracks, odors, or erosion. However, there was evidence of animals burrowing into the cap. The rodent burrows appeared to be relatively shallow and no waste or geosynthetic was observed. During the site inspection, the MDEQ representative indicated that Georgia-Pacific is timely in repairing any animal burrows that were observed in the past. On September 21, 2007, ARACAS, the contractor for Georgia-Pacific, submitted the August 2007 Monthly Progress Report for the Site. The report indicated that, on August 25, 2007, the vegetative cover was repaired by filling in the animal burrows.

Groundwater wells were in good condition and properly secured. Gas Monitoring probes and passive gas vents were also in good condition, properly secured, and functioning properly. A locked, chain-link fence surrounds the landfill and effectively restricts public access to the landfill. At the time of the inspection, warning signs were posted every 200 feet on the fence, with the exception of the western perimeter of the landfill adjacent to the scrap yard. Shortly after the inspection, ARCADIS, the contractor for the PRP, notified U.S. EPA that additional warning signs were ordered, and the signs will be installed upon receipt, which is anticipated for the week of August 20, 2007. According to the September 17, 2007, IC Study Report, warning signs were posted along the fence at the west end of the landfill on August 25, 2007. Although not required at this time, permanent markers will be posted on each side of the property at the time the Restrictive Covenant is recorded with the city of Kalamazoo registry of deeds.

Interviews

Interviews were conducted with on-site personal and MDEQ staff during the August 1, 2007 site inspection. The following persons were interviewed: Michael Hassett, the project engineer with ARCADIS BBL; Keith Krawczyk, the MDEQ project manager; and representatives from Georgia-Pacific including, Chase Fortenberry and Mark Brown. A phone interview was conducted with Steve Taplin, the O&M Site Manager with Terra Contracting (See Attachment 5, Phone Interview Record).

King Highway Landfill OU3

The MDEQ project manager is satisfied with the O&M Manager's responsiveness in addressing problems as they arise, including bare spots and stressed vegetation in the landfill cap, burrowing animals, or odors from gas vents. The MDEQ project manager is also satisfied with the overall operation and maintenance of the OU3 remedy. No interviews with the public were conducted or necessary during the Five-Year Review period as the community interest at the King Highway Landfill OU3 is minimal.

12th Street Landfill OU4:

The 12th Street Landfill was not inspected during this five-year review because the construction of remedy recently began. The Agency is overseeing Weyerhaeuser's excavation activities

during the emergency response action currently being conducted in preparation of removal of the Plainwell Dam. For purposes of this five-year review, the U.S. EPA Remedial Project Manager, Michael Berkhoff and the MDEQ Project Manager, Keith Krawczyk were consulted to obtain site-related information.

VII. Technical Assessment

A. Operable Unit 3

Question A: Is the remedy functioning as intended by the decision documents?

Yes. The landfill remedy (capping and containment) is operating and functioning as intended by the ROD and the Consent Order. The landfill cap is in good condition and prevents PCB-contaminated material in the landfill from migrating, via erosion or surface water runoff, into the Kalamazoo River. The cap is also an effective barrier that prevents exposure, via direct contact, to the contaminated material by on-site workers, trespassers, and anglers. The cap also minimizes infiltration of rainwater and reduces the potential for leachate generation and, consequently, the migration of PCBs in groundwater into the Kalamazoo River. PCBs were not detected in groundwater above the performance standard, which is an indication that the cap is effective at containing the contaminated paper residuals.

Access restrictions are in place and prevent exposure to the contaminated material. The locked chain-link fence and sheet piling, where present, restricts public access to the landfill via Route M-89 and via the Kalamazoo River. Warning signs are posted every 200 feet along the perimeter fence notifying the public that the area is hazardous due to the buried paper-making residuals. Although not required at the time of this FYR, permanent markers will be posted on all entry gates at the time ICs are recorded with the city of Kalamazoo registry of deeds.

Institutional controls are not yet in place. Georgia-Pacific conducted an evaluation of existing ICs at OU3 and submitted an IC Study Report to U.S. EPA and MDEQ on September 17, 2007. The U.S. EPA and MDEQ are currently reviewing this report. Although ICs are not yet in place, the objectives of the ICs are being met; the public is not directly exposed to PCB-contaminated residuals or to PCBs via groundwater. The landfill property is zoned industrial and will remain industrial in the future via local zoning ordinances and the anticipated deed restrictions. Groundwater at the landfill property is not used for any purpose; therefore, there are no exposure pathways to on-site workers or the public from groundwater. All immediate threats have been addressed and no additional actions, other than the recommended actions identified in Table 4 of this five-year review. U.S. EPA will develop an IC Plan within six months of this five-year review to assure the remedy continues to function as intended with regard to the ICs.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?

Yes, except that since the date of the Consent Order implementing the ROD, the Michigan cleanup standard for PCBs in soil has become less stringent. The exposure assumptions, toxicity

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data, risk assessment methods, and RAOs at the time of the ROD are still valid. However, when the ROD was issued, the State of Michigan Part 201 limited industrial cleanup criterion for PCBs in soil was 21 mg/kg and when the Consent Order for RD/RA was signed, the industrial cleanup criterion for direct contact with PCBs in soil was 9.9 mg/kg. Today, the PCB industrial land use criteria is 16 mg/kg for PCBs in soil. The landfill and the Mill Lagoons were remediated to achieve the industrial land use criterion of 9.9 mg/kg as specified in the Consent Order. Because the landfill and Mill Lagoons were remediated to a level that is below today's standards, the change in cleanup levels has no effect on the protectiveness of the OU3 remedy. The remedy is progressing as expected and is achieving the RAOs.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No. No additional information has been identified that would call into question the protectiveness of the remedy. However, property ownership issues with respect to the city of Kalamazoo and MDOT properties need to be resolved and the methane gas to the south of the landfill will need to be mitigated for the remedy to be protective in the long-term.

B. Operable Unit 4

Question A: Is the remedy functioning as intended by the decision documents?

No. The remedy has not yet been constructed, so is not functioning as intended by the decision document. Although ICs are in place, engineered access restrictions are inadequate to protect trespassers from short-term risks associated with remedy construction. The U.S. EPA has notified Weyerhaeuser of the requirement to enclose the landfill with a fence to prevent public access until the full remedy can be implemented.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of remedy selection still valid?

Yes. Although the State of Michigan Part 201 Industrial cleanup standard for soil has changed, the OU4 ROD did not specify cleanup numbers for industrial soils. Instead, the ROD merely stated that "site cleanup criteria pursuant to Part 201, Environmental Remedial of the NREPA" shall be used.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No. The remedy is not protective because the construction of the remedy is not complete and because access controls are inadequate to protect trespassers.

VIII. Issues

The tables in this section highlight the issues identified during the site inspection at OU3 and for

OU4, based upon document reviews and discussions with the MDEQ project manager.

Issues identified at King Highway Landfill OU3

Some of the landfill remedy components were built on properties that are not owned by Georgia-Pacific. These properties are located within the Site security fence, but are owned by MDOT and the city of Kalamazoo. According to the September 17, 2007 IC Study Report, Georgia-Pacific is in the process of acquiring ownership of the MDOT and city of Kalamazoo properties. Although Georgia-Pacific is in the process of acquiring this property, the KHL remedy is not protective in the long-term until ICs are in place at the landfill property owned by Georgia-Pacific, and the MDOT and city of Kalamazoo properties. In addition, the MDEQ will not approve the Final Completion of Construction Report and the Final O&M Plan until the property ownership issues are resolved. In accordance with the administrative agreement between Georgia-Pacific and MDEQ, until these reports are approved, the MDEQ cannot issue a Certification of Completion of Construction for the landfill and without this certification, appropriate restrictive covenants cannot be recorded with the Kalamazoo County Register of Deeds.

Finally, samples collected as part of the gas monitoring program indicate that methane gas has migrated off-site along the south end of the landfill, and that methane is present at concentrations that exceed threshold criteria. In July 2006, Georgia-Pacific submitted a Work Plan and implementation schedule to MDEQ for the installation of an additional cutoff trench to mitigate the methane gas. During the August 1, 2007, Site inspection, the MDEQ informed Georgia-Pacific that it believes additional controls are necessary to mitigate the methane gas to the south of the landfill. A landfill gas mitigation plan will need to be submitted to MDEQ that will satisfy its concerns about the off-site migration of methane gas at the south end of the landfill.

Table 2: Issues Identified at OU3

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Institutional controls are not in place at the landfill property, including the parcels currently owned by MDOT and city of Kalamazoo which are located within the site security fence. The remedy is not protective until effective ICs are placed on all site properties and are monitored and maintained.	N	Y
The MDEQ will not approve the Final Completion of Construction Report and the Final O&M Plan until the MDOT and city of Kalamazoo property ownership issues are resolved. Until these reports are approved, the MDEQ cannot issue a Certification of Completion of Construction for the landfill and without this certification, under the terms of the agreement between MDEQ and Georgia-Pacific, the appropriate restrictive covenants cannot be recorded with the Kalamazoo County Register of Deeds.	N	Y
Methane gas has migrated off-site in concentrations that exceed threshold criteria and will need to be mitigated.	Y	Y

Issues identified at 12th Street Landfill OU4

Access controls are inadequate. In particular, a chain-link fence was installed along the south side of the landfill but not on the north, east, and west sides of the landfill. Trespassers can freely enter the property and be exposed to PCB-contaminated material during the on-going construction activities. Also, it is not clear whether groundwater use restrictions are necessary and, if so, whether the existing ICs appropriately restrict use of groundwater at the landfill property.

Table 3: Issues Identified at OU4

Issues	Affects Current Protectiveness (Y/N)	Affects Future Protectiveness (Y/N)
Access controls are inadequate. A chain-link fence was installed along the south side of the landfill but there is no fence along the north, east, and west sides of the landfill. Trespassers can freely enter the property and may be exposed to contaminated material.	Y	Y
It is unclear whether groundwater use should be restricted and, if so, whether existing ICs appropriately restrict use of groundwater within the landfill property	N	Y

IX. Recommendations and Follow-up Actions

The recommended follow-up actions for the issues identified in Section VIII are discussed in the table below.

Table 4: Recommendations and Follow-up Actions for OU3

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
Institutional Controls	Submit a schedule or plan to U.S. EPA and MDEQ for 1) resolving property ownership issues with respect to the MDOT and city of Kalamazoo properties and 2) for implementing ICs at the landfill and MDOT and city of Kalamazoo properties.	PRP	U.S. EPA and MDEQ	November 15, 2007	N	Y

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
	An Institutional Control Plan will be prepared documenting the IC evaluation activities and necessary corrective measures. The IC plan is necessary to evaluate what ICs are necessary and develop a schedule for their implantation. The IC plan will also evaluate how to ensure long-term stewardship of the OU and long-term protectiveness of the remedy.	U.S. EPA	U.S. EPA and MDEQ	6 months of date of the five-year review	N	Y
Excessive Landfill Gas Generation	Submit a landfill gas mitigation plan to MDEQ that will satisfy its concerns about the off-site mitigation of methane gas at the south end of the landfill.	PRP	MDEQ	November 2007	Y	Y

Table 5: Recommendations and Follow-up Actions for OU4

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
Site Access	Install a chain-link fence on the north, east, and west sides of the landfill; post warning signs every 200 feet along the fence and on all entry gates; and place permanent markers around the boundary of the landfill describing the restricted area and the nature of the restrictions, per Section II.6 of the Statement of work attached to the February 2005 Consent Decree	PRP	EPA	December 2007	Y	Y

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness (Y/N)	
					Current	Future
Institutional Controls	Evaluate whether groundwater use should be restricted and, if so, amend existing ICs as necessary to ensure that appropriate groundwater use restrictions are implemented	PRP	U.S. EPA	April 2008	N	Y

X. Protectiveness Statements

The remedy at OU3 currently protects human health and the environment in the short-term. The landfill cap is in good condition and prevents PCB-contaminated material in the landfill from migrating, via erosion or surface water runoff, into the Kalamazoo River. The cap is also an effective barrier that prevents exposure, via direct contact, to the contaminated material by on-site workers, trespassers, and anglers. The cap also minimizes infiltration of rainwater and reduces the potential for leachate generation and the potential for PCBs in groundwater to migrate into the Kalamazoo River. Public access to the landfill is restricted by a locked chain-link fence and sheet pile, where present, and prevents people from being exposed to the contaminated material. Institutional controls are not yet in place. However, in order for the remedy to be protective in the long-term, the following actions will need to be taken: (1) submit a schedule or plan to U.S. EPA and MDEQ for resolving ownership issues with respect to the MDOT and city of Kalamazoo properties and for implementing ICs at the landfill and MDOT and city of Kalamazoo properties; and (2) submit a landfill gas mitigation plan to MDEQ that will satisfy its concerns about the off-site migration of methane gas at the south end of the landfill. Long-term protectiveness requires compliance with effective ICs. U.S. EPA will ensure that long-term stewardship of OU3, as well as every other operable unit of the Site, includes implementation and maintenance of each component of the selected remedy, including any necessary ICs.

The remedy at the 12th Street Landfill OU4 is not protective because the remedy has not yet been constructed and because access controls are inadequate to protect trespassers from short-term risks associated with remedy construction. A chain-link fence is installed along the west side of the landfill but not on the east, north, and south sides of the landfill and trespassers can easily gain access to the landfill. A chain-link fence will need to be installed on all sides of the landfill to prevent public access to the property and prevent trespassers from being exposed to PCB-contaminated material during the on-going construction activities. Long-term protectiveness requires compliance with existing ICs. Although ICs are in place, an evaluation is necessary of whether groundwater use at the landfill needs to be restricted and, if so, whether existing ICs appropriately restrict or prevent groundwater use at the landfill property. This evaluation will be made during the remedial design phase of the remedy. U.S. EPA will ensure that long-term

stewardship of OU4, as well as every other operable unit of the Site, includes implementation and maintenance of each component of the selected remedy, including any necessary ICs.

XI. Next Review

The next five-year review for Allied Paper, Inc./Portage Creek/Kalamazoo River Site is required by October 2012, five years from the signature date of this review.

Attachments

Attachment 1: Site Maps (Figures 1- 11)
Attachment 2: Post-Closure Monitoring Groundwater Sample Results, 1993-2007
Attachment 3: Photos Documenting Site Conditions
Attachment 4: Site Inspection Report for OU3
Attachment 5: Phone Interview Record
Attachment 6: Restrictive Covenant for OU4
Attachment 7: Restrictive Covenant for OU7

Appendices

Appendix A: Copy of Newspaper Public Notice

KZ00167220

Attachment 1

Site Maps (Figures 1-11)

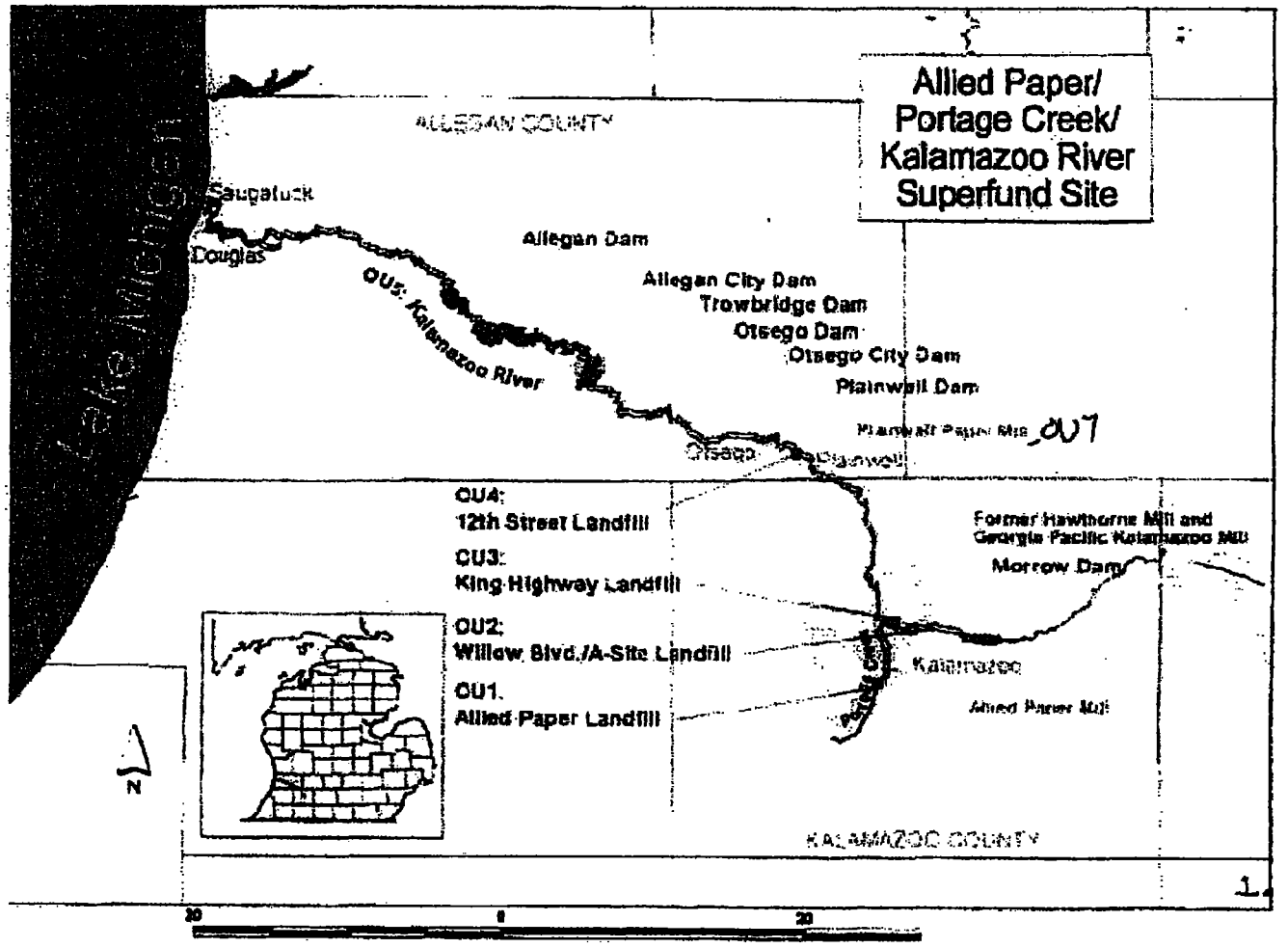


FIGURE 1 - Site Location Map

KZ00167222

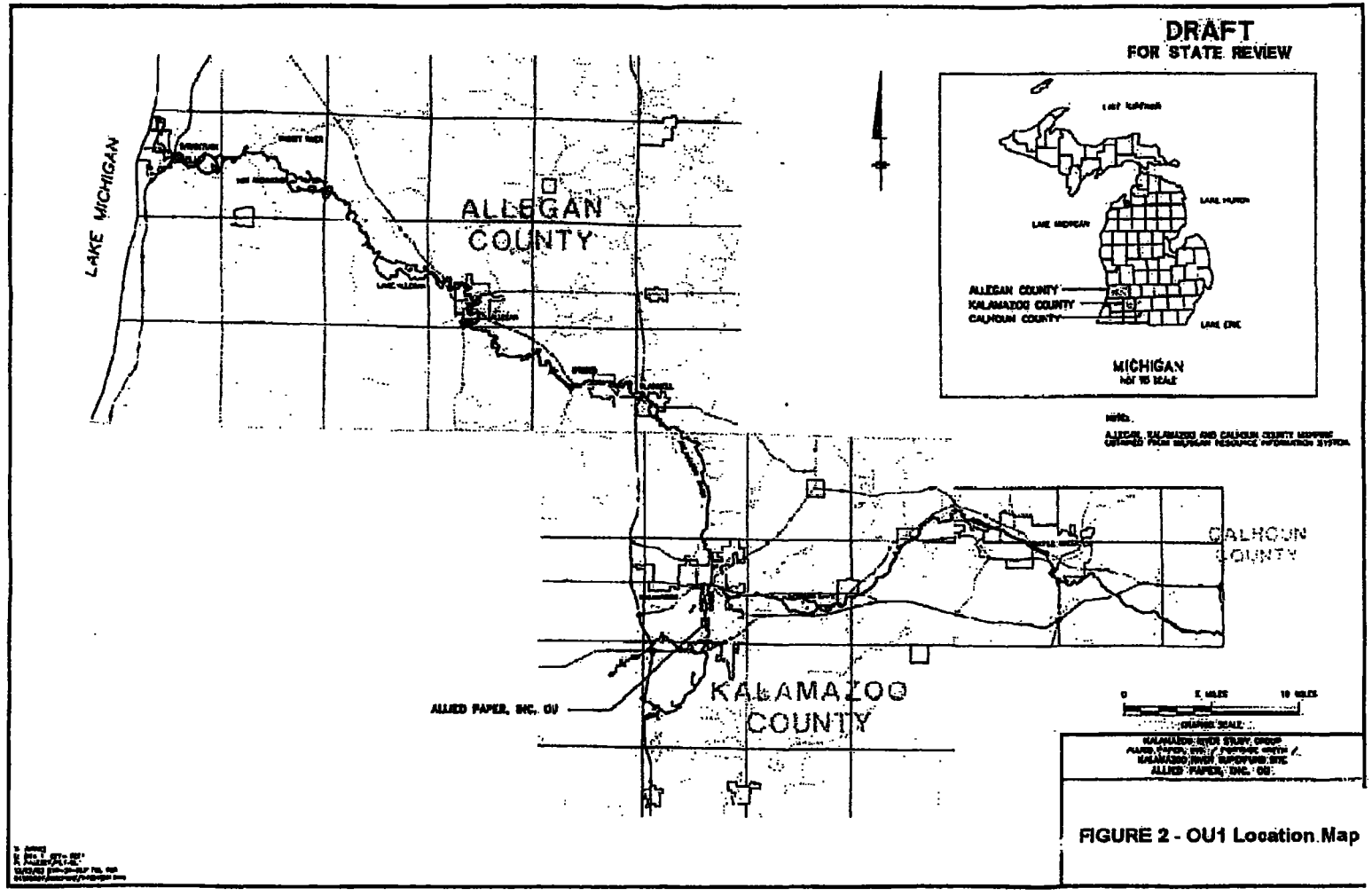


FIGURE 2 - OU1 Location Map

KZ00167223

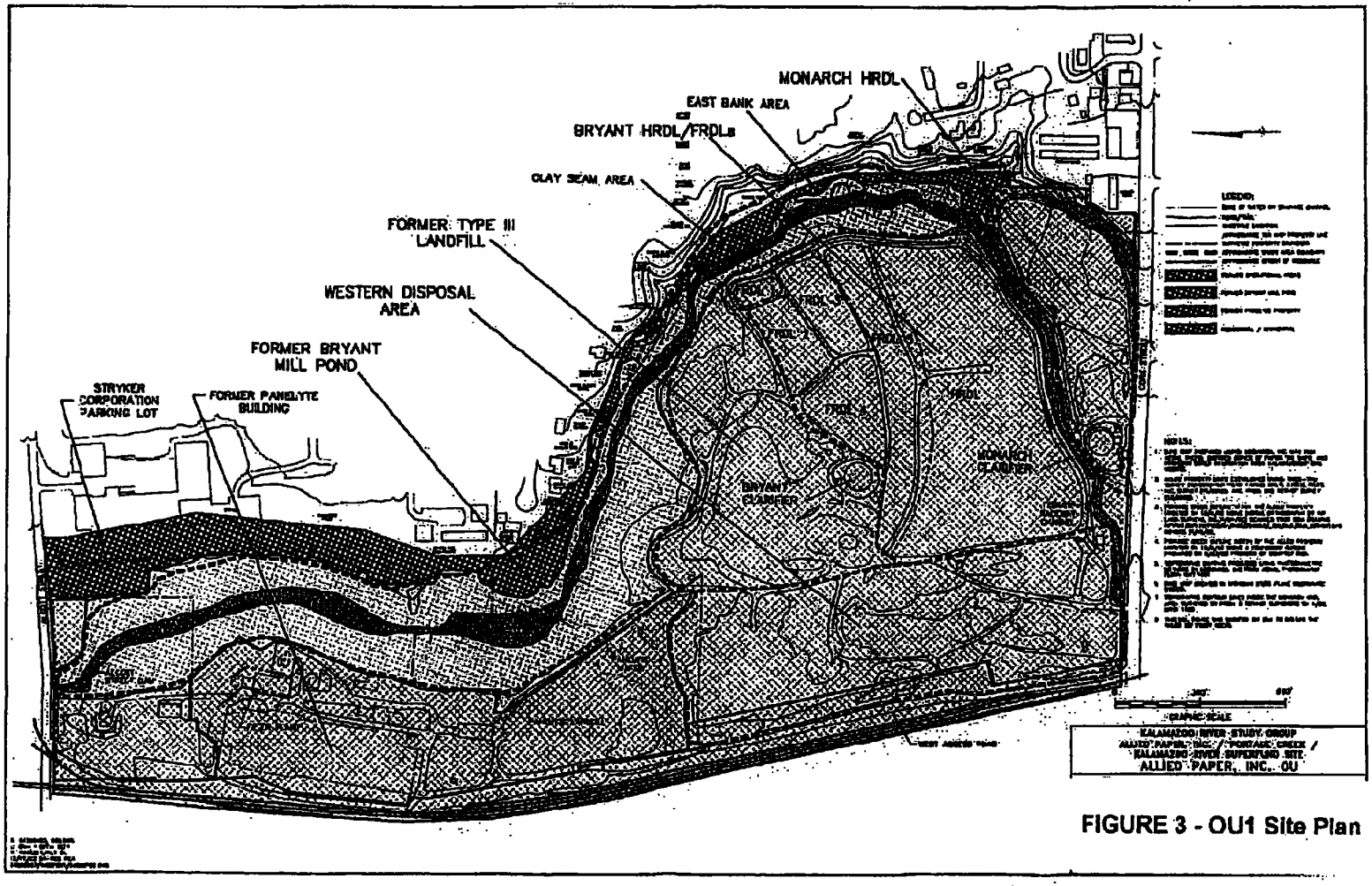
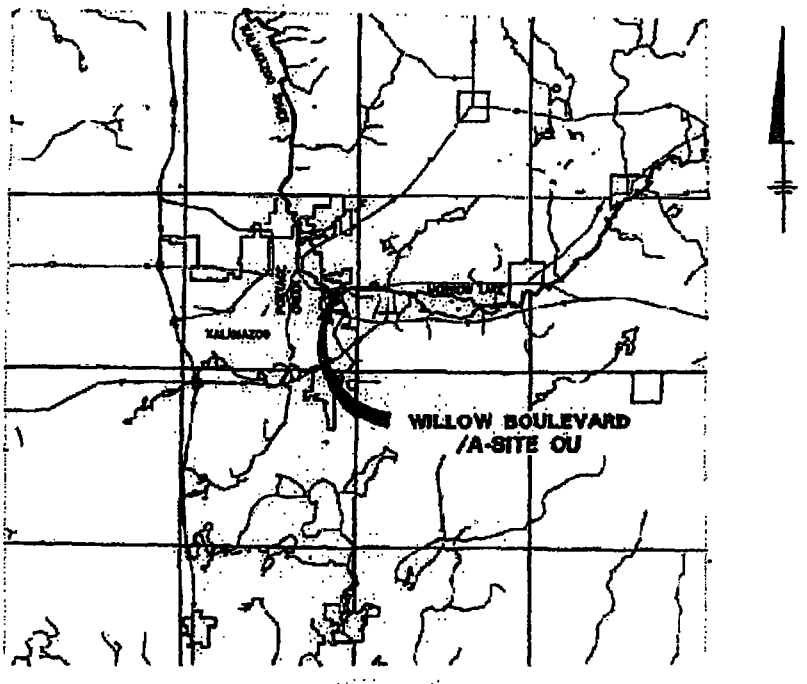
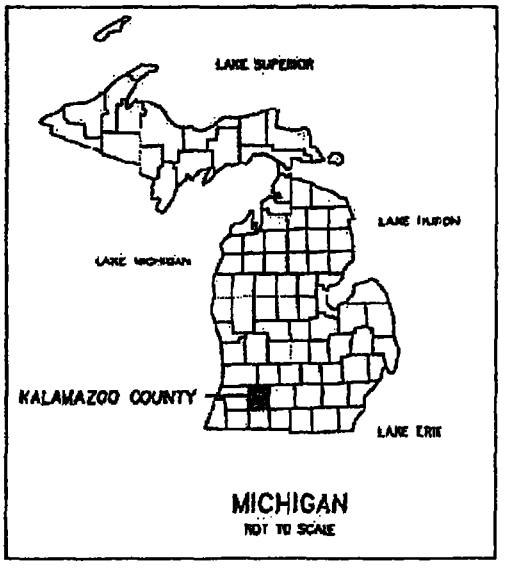


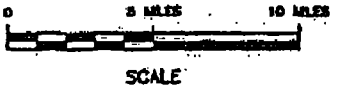
FIGURE 3 - OU1 Site Plan

KZ00167224



KALAMAZOO COUNTY





NOTE:
KALAMAZOO COUNTY MAPPING OBTAINED FROM MICHIGAN RESOURCE INFORMATION SYSTEM.

KALAMAZOO RIVER STUDY GROUP
ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE
REMEDIAL INVESTIGATION/FOCUSED FEASIBILITY STUDY
WILLOW BOULEVARD/A-SITE OU

FIGURE 4 - OU2 Location Map

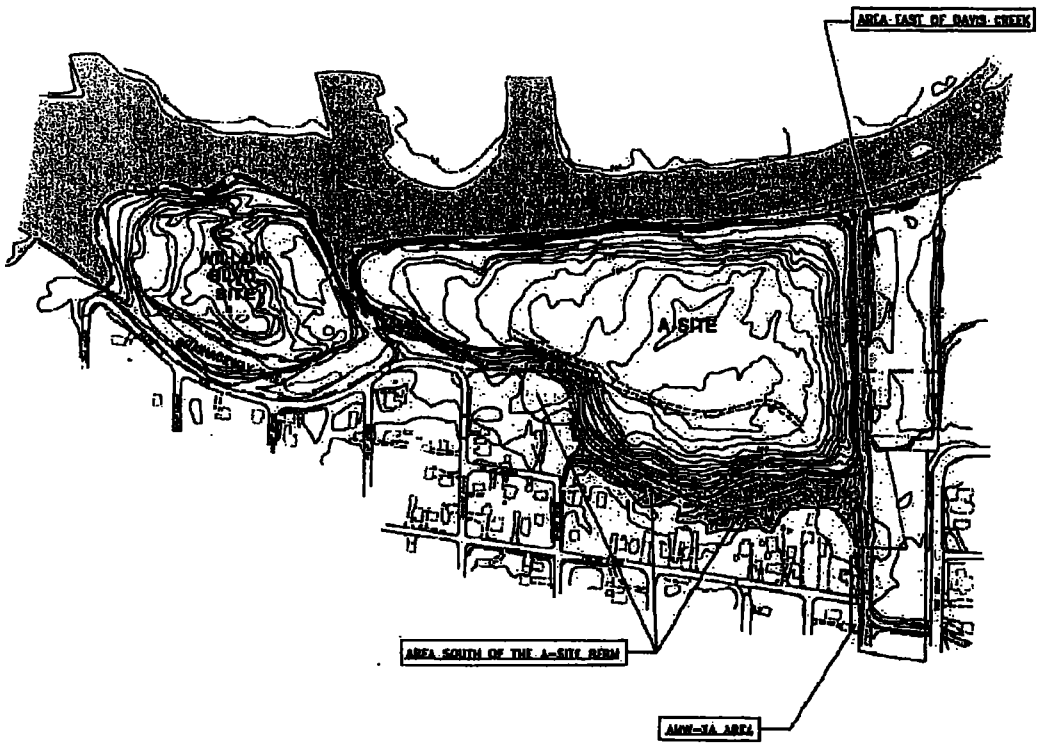
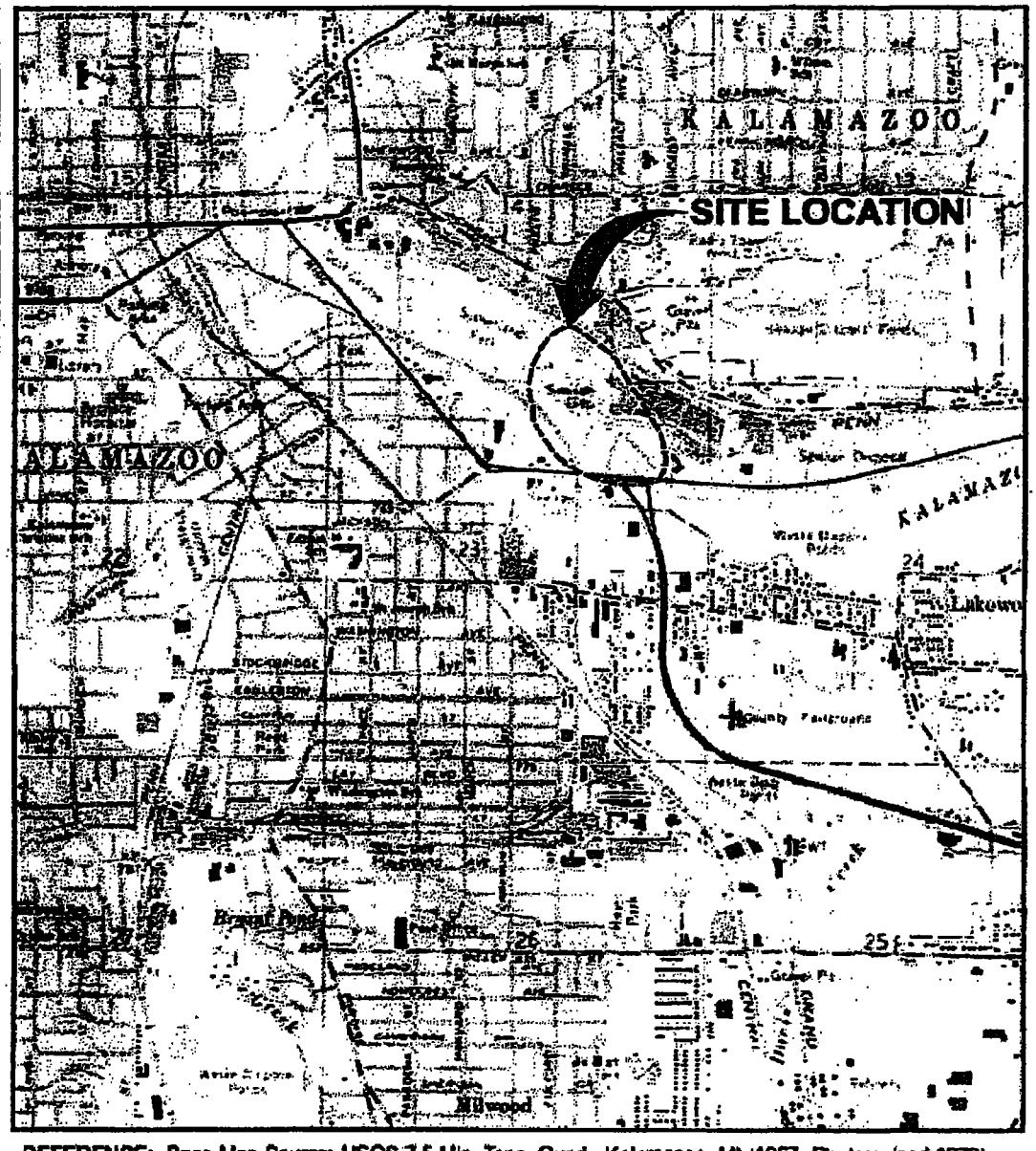


FIGURE 5 - OU2 Site Plan

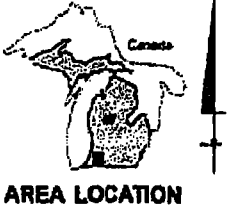
KZ00167226



REFERENCE: Base Map Source: USGS 7.5 Min. Topo. Quad., Kalamazoo, MI (1967, Photorevised 1973).

2000' 0 2000'

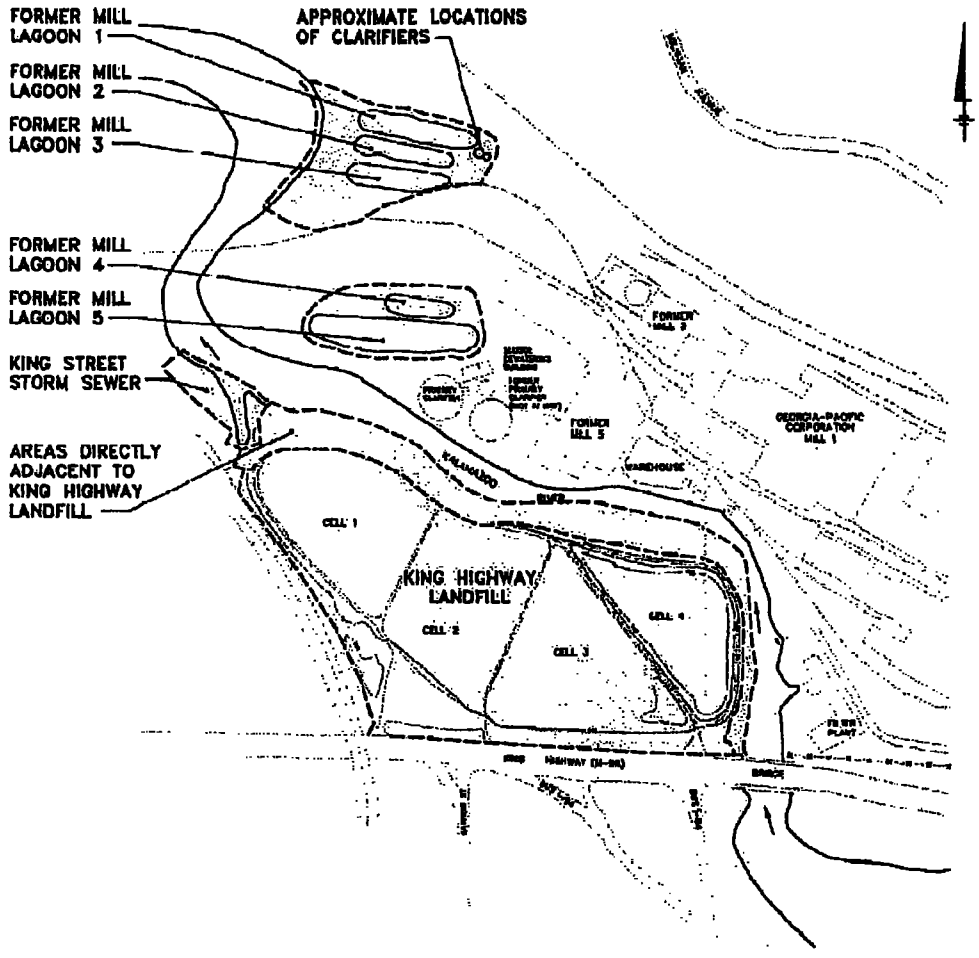
APPROXIMATE SCALE 1" = 2000'



AREA LOCATION

ALLIED PAPER, INC./PORTAGE CREEK
KALAMAZOO RIVER SUPERFUND SITE
EPA 5-YEAR REVIEW REPORT
KHL-OU AND MILL LAGOONS

FIGURE 6 - OU3 Location Map



LEGEND:

- RAILROAD TRACKS
- LOCATION OF CURRENT STRUCTURES
- FENCE
- RIVER FLOW DIRECTION
- APPROXIMATE BOUNDARY OF THE EXTENT OF REMOVAL ACTION

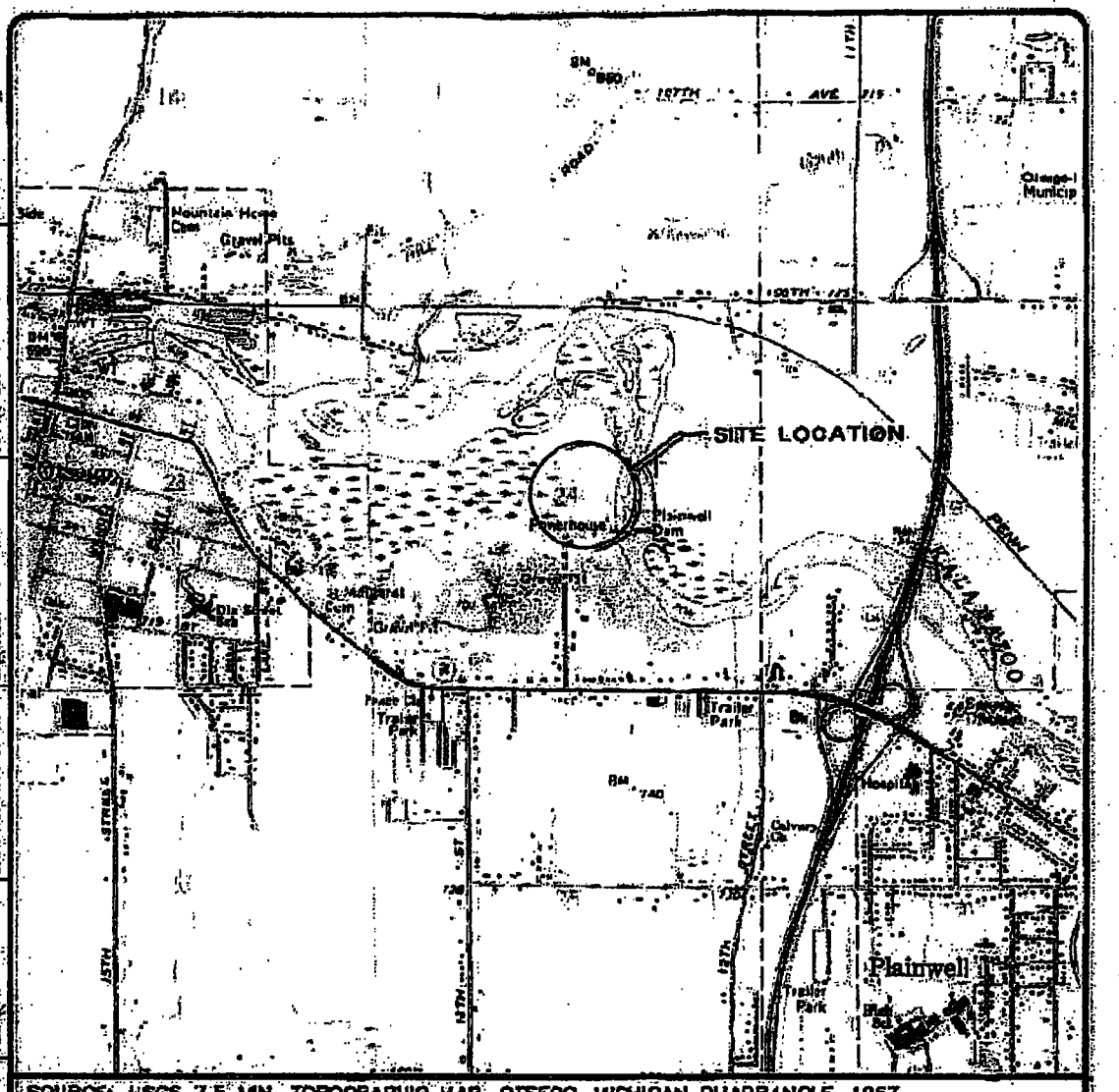
NOTES:

1. BASE MAP INFORMATION IS APPROXIMATE AND IS BASED ON MAPPING PROVIDED BY MICHIGAN DEPARTMENT OF NATURAL RESOURCES, MAPPING DIGITIZED FROM AERIAL PHOTOGRAPHS, AND VARIOUS MEASUREMENTS AND SURVEYS PERFORMED BY BLASLAND, BOUCK, & LEE, INC.

APPROXIMATE SCALE: 1" = 300'

ALLIED PAPER, INC./PORTAGE CREEK/ KALAMAZOO RIVER STUDY GROUP
EPA 5-YEAR REVIEW REPORT
KING HIGHWAY LANDFILL OPERABLE UNIT

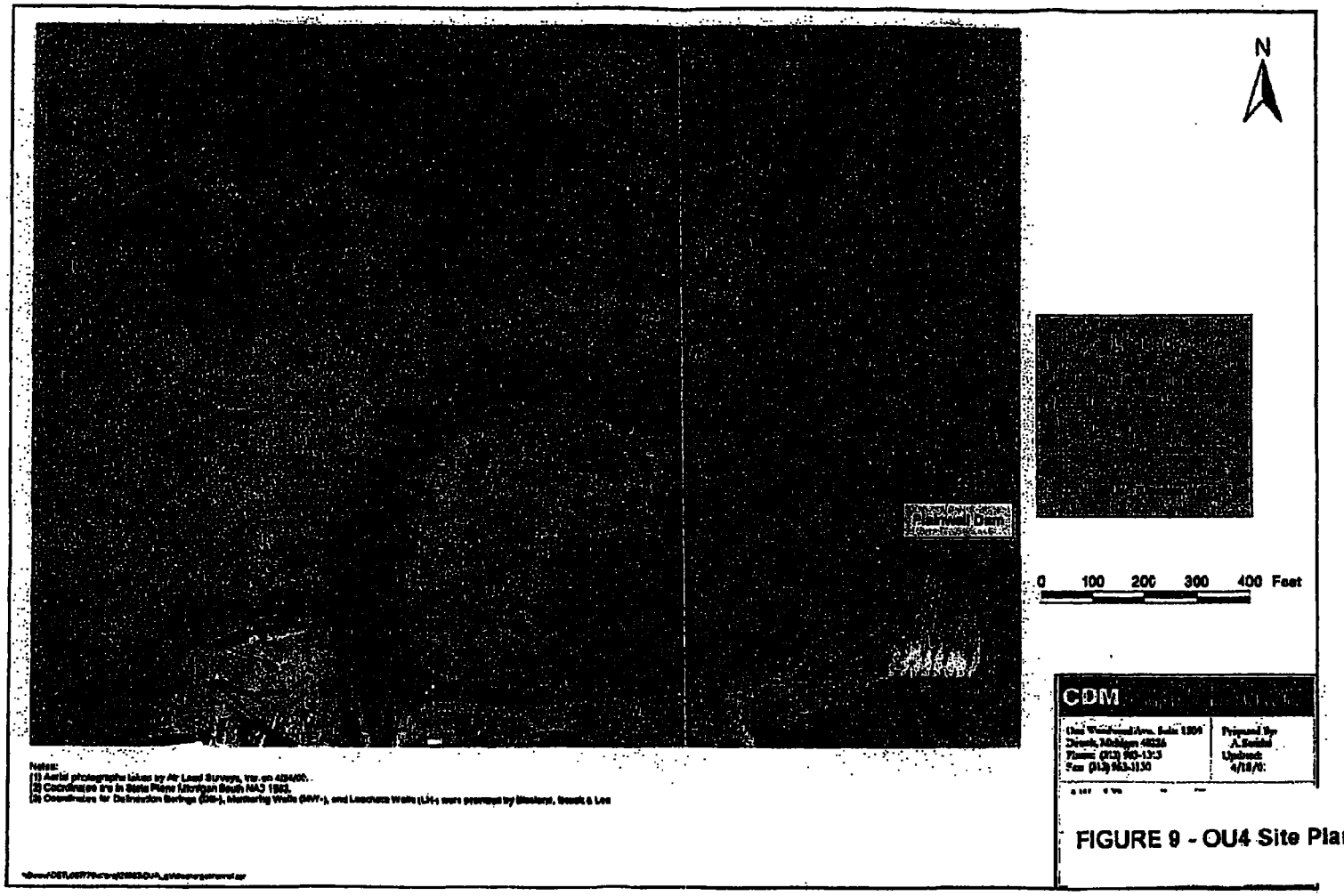
FIGURE 1 - OU3 Site Plan



GERAGHTY & MILLER, INC.
Environmental Services

SIT
REMEDIAL INVEST
12th STRE
ALLIED PAP
KALAMAZO

FIGURE 8 - OU4 Location Map



Notes:
(1) Aerial photographs taken by Air Land Surveys, inc. on 4/24/00.
(2) Coordinates are in State Plane Michigan South NAD 1983.
(3) Coordinates for Delineation Borings (DB-), Monitoring Wells (MW-), and Leachate Wells (LW-) were provided by Blasland, Bouck & Lee

FIGURE 9 - OU4 Site Plan

KZ00167230

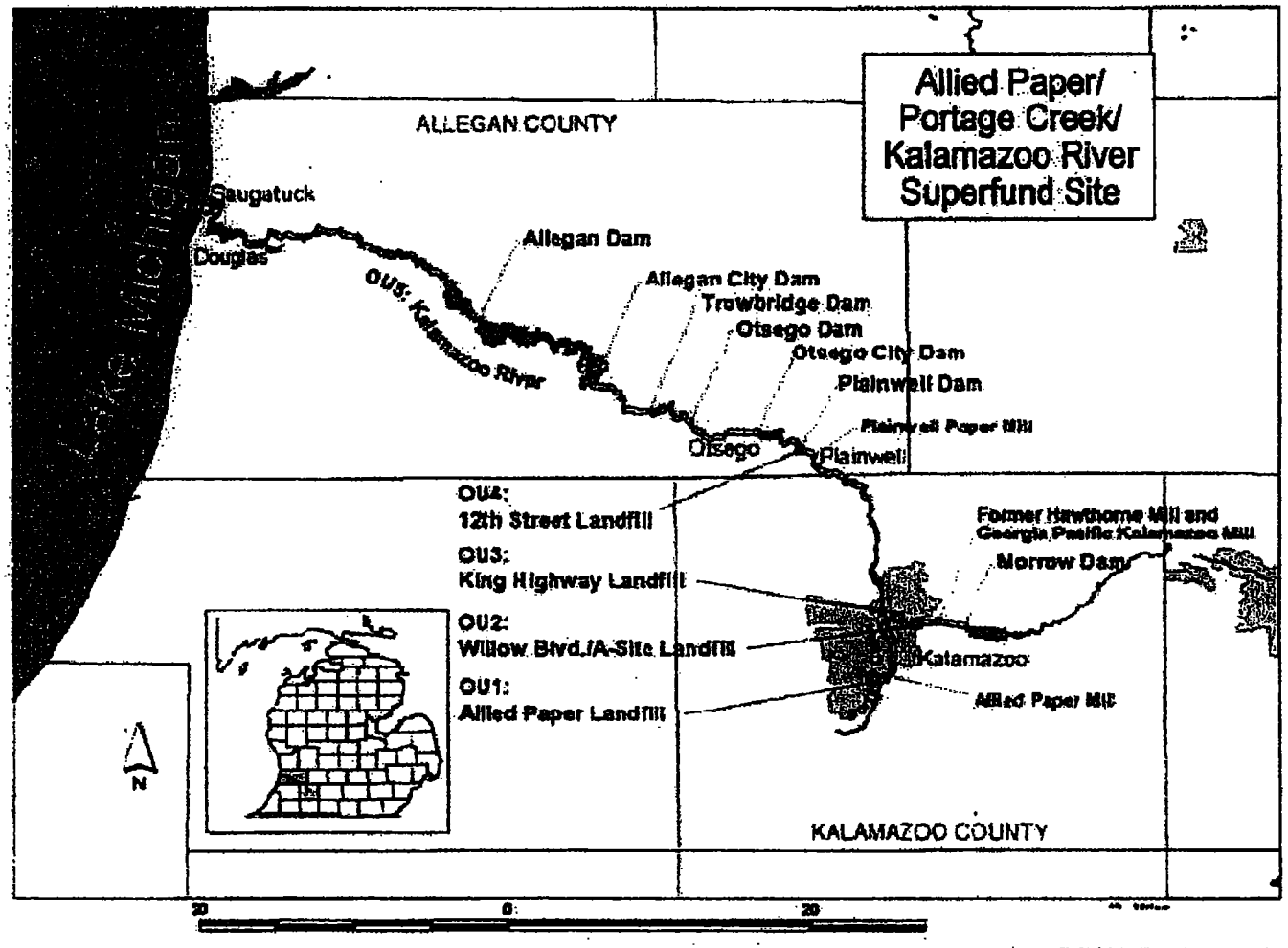
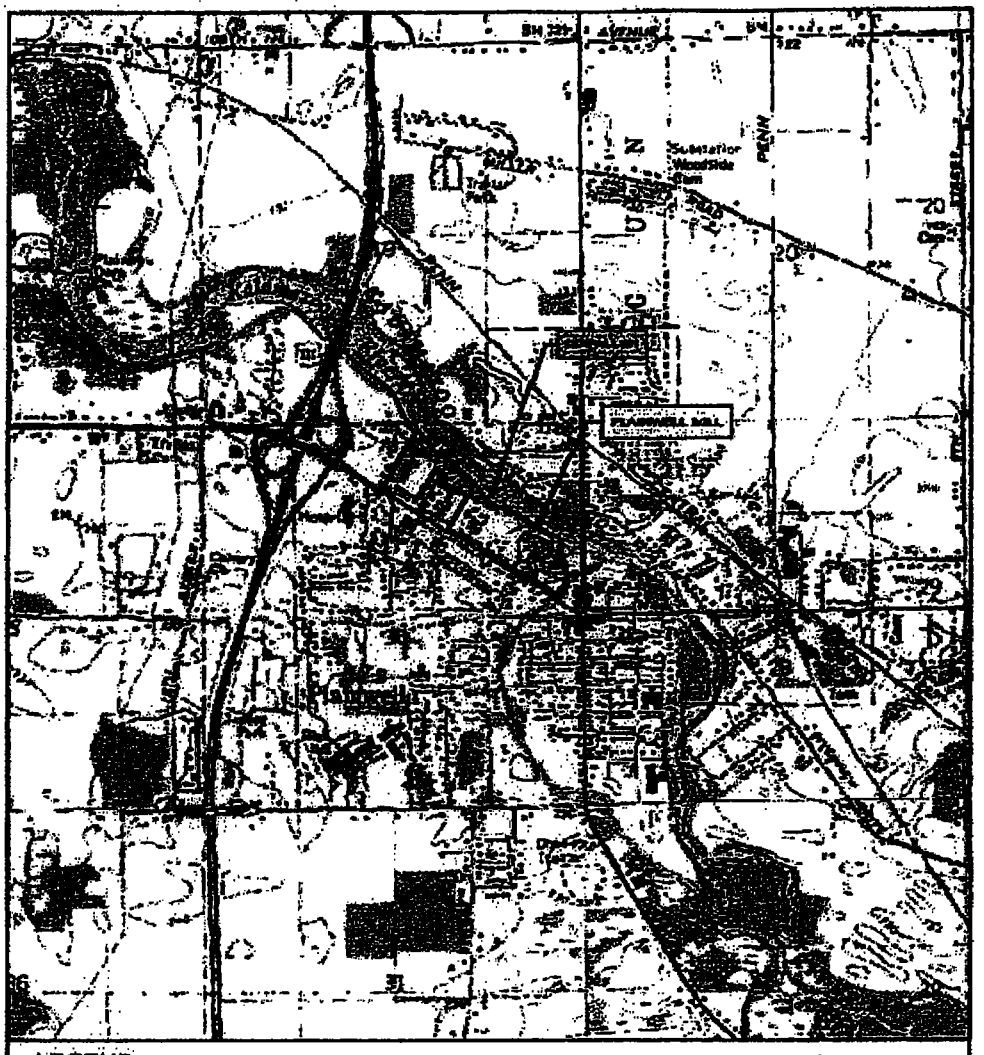


FIGURE 10 - OU5
Site OU Map

KZ00167231



BASE MAP FROM USGS 7.5 MINUTE QUADRANGLE, OSTEGO, 1967, REVISED 1973.

RMT

SITE L

PLAINWELL MILL D
PLA
PLAINV

Figure 11
OU7 Location Map

D:\05130\03\51300301.mxd 8/29/2007 15:00:31

100% Recycled 30% PCW

US EPA RECORDS CENTER REGION 5
442317

SECOND FIVE-YEAR REVIEW REPORT FOR ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE ALLEGAN AND KALAMAZOO COUNTIES, MICHIGAN

Prepared by

U.S. Environmental Protection Agency
Region V
Chicago, Illinois

OCTOBER 2012

Approved by: Date:

Richard C. Karl, Director
Superfund Division

10-18-12

Exhibit 2175

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Table 10: Recommendations and Follow-up Actions for OU4

Attachments

Attachment 1 Site Maps (Figures 1- 11)
Figure 1 Site Location Map
Figure 2 OU1 Location Map
Figure 3: OU1 Site Plan
Figure 4: OU2 Location Map
Figure 5: OU2 Site Plan
Figure 6: OU3 Location Map
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Figure 11: OU7 Location Map

Attachment 2: Post-Closure Monitoring Groundwater Sample Results 2007-2012
Attachment 2A: OU3 Results
Attachment 2B: OU4 Results

Attachment 3: Photos Documenting Site Conditions
- Attachment 3A: Inspection Photos from King Highway Landfill – OU3
- Attachment 3B: Inspection Photos from Willow Boulevard/A-Site Landfill – OU2
- Attachment 3C: Inspection Photos from 12th Street Landfill – OU4

Attachment 4: Site Inspection Report

Attachment 5: Restrictive Covenant for OU2

Attachment 6: Restrictive Covenant for OU4

Attachment 7: Restrictive Covenant for OU7

Appendices

Appendix A Newspaper Public Notices
Appendix B List of Documents Reviewed for the Five-Year Review
Appendix C List of Data Reviewed for the Five-Year Review

LIST OF ACRONYMS

AOC	Administrative Order on Consent
BRA	Baseline Risk Assessment
BERA	Baseline Ecological Risk Assessment
CD	Consent Decree
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
C.F.R.	Code of Federal Regulations
EPA	U.S. Environmental Protection Agency
FRDL	Former Residual Dewatering Lagoons
FS	Feasibility Study
GSI	Groundwater Surface Water Interface
HHRA	Human Health Risk Assessment
HRDL	Historic Residual Dewatering Lagoon
ICs	Institutional Controls
KRSG	Kalamazoo River Study Group
KSSS	King Street Storm Sewer
MDEQ	Michigan Department of Environmental Quality
MDNR	Michigan Department of Natural Resources
MDOT	Michigan Department of Transportation
mg/kg	Milligrams per Kilogram
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NREPA	Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994PA 451
NPL	National Priorities List
O&M	Operation & Maintenance
OU	Operable Unit
PCBs	Polychlorinated Biphenyls
ppm	Parts per Million
PRP	Potentially Responsible Party
RAOs	Remedial Action Objectives
RA	Remedial Action
RD	Remedial Design
RD/RA	Remedial Design/Remedial Action
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
Site	Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site
SMOA	Superfund Memorandum of Agreement
SVOCs	Semi-Volatile Organic Compounds
TBERA	Terrestrial Baseline Ecological Risk Assessment
ug/L	Micrograms per Liter
UU/UE	Unlimited Use and Unrestricted Exposure
VOCs	Volatile Organic Compounds

EXECUTIVE SUMMARY

The Allied Paper Inc./Portage Creek/Kalamazoo River Superfund site (Site) is located in Allegan and Kalamazoo Counties, Michigan. The Site includes disposal areas, paper mill properties, approximately 80 miles of the Kalamazoo River (from Morrow Dam to Lake Michigan), adjacent river banks and contiguous floodplains, as well as a 3-mile stretch of Portage Creek. The U.S. Environmental Protection Agency (EPA) has identified six operable units (OUs) for response action at the Site including:

- OU1 - Allied Paper, Inc./Bryant Mill Pond;
- OU2 - Willow Boulevard/A-Site Landfill;
- OU3 - King Highway Landfill;
- OU4 - 12th Street Landfill;
- OU5 – 80-miles of the Kalamazoo River including a 3-mile stretch of Portage Creek; and
- OU7 – Former Plainwell Paper Mill Property.

The Site currently does not have an operable unit 6. If source investigation activities at any of the remaining paper mill properties (the former Allied Paper Company Monarch Mill property, portions of the former Allied Paper Company Bryant Mill property, and the former Allied Paper Company King Mill property and King Street Storm Sewer area) results in a determination that a specific paper mill property is a source of contamination at the Site, EPA will designate that (those) paper mill property (properties) as OU6. On June 30, 2009, EPA approved Georgia-Pacific's Source Investigation Report that documents the Georgia-Pacific Corporation Kalamazoo Mill and former Hawthorne Mill property is not a source of contamination at the Site. The investigation of the remaining three mill properties listed above has not yet begun.

This is the second five-year review for the Site. The triggering action for this statutory review is the completion of the first five-year review on October 18, 2007. This second five-year review report includes a protectiveness determination for OU2, OU3, and OU4. This report does not include a protectiveness determination for OU1, OU5, or OU7 because remedial action (RA) work has not yet started at those OUs. However, all six OUs are discussed in this site-wide five-year review report and any future remedies at OU1, OU5 and OU7 will be reviewed on the same five-year review schedule.

The remedy at OU2 is expected to be protective of human health and the environment upon completion of the remedy, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. The RA for OU2 began in April 2011 and is expected to be completed in 2013. During 2011, the waste at the Willow Boulevard Landfill portion of OU2 was consolidated and covered with an impermeable cap. The vegetated soil cover for this portion of OU2 was installed in 2012. EPA expects the installation of the impermeable cover at the A-Site portion of OU2 to be completed in 2012 and the installation of the OU2-wide groundwater monitoring system to be completed in 2013. Institutional controls restricting the use of site groundwater, site use, and for protection of the remedy were recorded and filed in 2010. Once the RA is completed EPA expects the remedy at OU2 to be protective of human health and the environment. EPA will make that determination by inspecting the landfill cover and evaluating groundwater and methane monitoring data. In addition, there is a restrictive covenant in place that restricts certain use of the property including use that interferes with

measures necessary to assure the effectiveness and integrity of the remedial action and use of site groundwater.

The remedy at OU3 currently protects human health and the environment in the short term. The landfill cap is generally in good condition and prevents PCB-contaminated material in the landfill from migrating, via erosion or surface water runoff, into the Kalamazoo River. The cap is also an effective barrier that prevents exposure, via direct contact, to the contaminated material by on-site workers, trespassers, and anglers. The cap also minimizes infiltration of rainwater and reduces the potential for leachate generation and the potential for polychlorinated biphenyls (PCBs) in groundwater to migrate into the Kalamazoo River. Public access to the landfill is restricted by a locked chain-link fence and sheet pile, which prevents people from being exposed to the contaminated material. Methane generated within the landfill is passively managed and mitigated by gas collection trenches installed outside of the landfill. These trenches are largely effective with methane only occasionally detected at off-site probes beyond the lateral extent of the trenches. Additional trenching (or some alternative) may need to be installed to extend the lateral capture of methane migration at the OU3 boundary. Some institutional controls (ICs) are in place at OU3, but require revision, while other ICs are not yet in place. In order for the remedy to be protective in the long term, the following actions will need to be taken: (1) implement revised and new ICs; (2) mitigate any off-site migration of methane gas, and (3) properly maintain the landfill. Long-term protectiveness requires compliance with effective ICs. EPA will ensure that long-term stewardship of OU3, as well as every other operable unit of the Site, includes implementation and maintenance of each component of the selected remedy, including any necessary ICs, and proper maintenance of the landfill.

The remedy at OU4 currently protects human health and the environment in the short term. The remedy has been constructed, and exposure pathways that could result in unacceptable risks are being controlled. The following issues need to be addressed as part of operation and maintenance (O&M) at OU4: 1) erosion is occurring at the toe of the landfill where water exits the soil cover drainage feature, and 2) the current access controls do not prevent trespass. Weyerhaeuser, a potentially responsible party (PRP) for OU4, will evaluate additional access controls. Evaluation of groundwater monitoring data will continue until sufficient data is available to determine contaminant trends. Long-term protectiveness requires compliance with existing ICs. Since the last five-year review, the ICs at OU4 have been modified to include a groundwater use prohibition. EPA will ensure that long-term stewardship of OU4, as well as every other operable unit of the Site, includes implementation and maintenance of each component of the selected remedy, including any necessary ICs.

Five Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Allied Paper, Inc./Portage Creek/Kalamazoo River		
EPA ID: MID006007306		
Region: 5	**State:** MI	**City/County:** Allegan and Kalamazoo Counties

SITE STATUS	
NPL Status: Final	
Multiple OUs? Yes	**Has the site achieved construction completion?** No

REVIEW STATUS
Lead agency: EPA
Author name (Federal or State Project Manager): James Saric
Author affiliation: EPA
Review period: 02/23/2012 – October 2012
Date of site inspection: August 7, 2012
Type of review: Statutory
Review number: 2
Triggering action date: 10/18/2007
Due date *(five years after triggering action date)*: 10/18/2012

Issues/Recommendations

OU(s) without Issues/Recommendations Identified in the Five-Year Review:
OU2

Issues and Recommendations Identified in the Five-Year Review:

OU(s): 3	Issue Category: Institutional Controls			
	Issue: Effective ICs are needed on all site properties and need to be monitored and maintained. Institutional controls are needed for the landfill property and the land located within the site security fence that is currently owned by MDOT and the City of Kalamazoo. Additionally, MDEQ will not approve the Final Completion of Construction Report and the Final O&M Plan until the MDOT and City of Kalamazoo property ownership issues are resolved. Until these reports are approved, MDEQ cannot issue a Certification of Completion of Construction for the landfill and without this certification, under the terms of the agreement between MDEQ and Georgia-Pacific, the appropriate restrictive covenants cannot be recorded with the Kalamazoo County Register of Deeds.			
	Recommendation: Submit a plan to MDEQ and EPA for 1) resolving property ownership issues with respect to the MDOT and City of Kalamazoo properties, 2) finalizing the Final Completion of Construction Report and the Final O&M Plan, and 3) implementing all required ICs.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	State/EPA	October 2013

OU(s): 3	Issue Category: Remedy Performance			
	Issue: Methane gas has migrated off-site in concentrations that exceed threshold criteria and will need to be mitigated.			
	Recommendation: Submit an updated landfill gas mitigation plan to MDEQ that will satisfy its concerns about the off-site mitigation of methane gas at the south end of the landfill.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	State/EPA	October 2013

OU(s): 4	Issue Category: Site Access/Security			
	Issue: Access controls are inadequate. A chain-link fence is present along the south side of the landfill but there is no fence on the north, east, or west sides of the landfill. Trespassers and anglers can freely enter the property and use the river banks to fish and have access to the landfill cap and associated gas vents. Additionally, the fence on the southern side of the landfill does not restrict foot traffic. The current access configuration does not prevent vandals from damaging the remedy.			
	Recommendation: Complete evaluation of access controls along with evaluation of potential use of OU4 as an eco-park (i.e., wildlife viewing area) so that final decisions about long-term access controls can be made.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	December 2012

OU(s): 4	Issue Category: Operations and Maintenance			
	Issue: Ongoing erosion at the toe of the landfill over the pore water collection discharge area.			
	Recommendation: Repair or reconstruct drainage feature at toe of landfill.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	October 2013

Protectiveness Statement(s)	
Operable Unit: 2	*Protectiveness Determination:* Will be Protective

Protectiveness Statement:
The remedy at OU2 is expected to be protective of human health and the environment upon completion of the remedy, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. The RA for OU2 began in April 2011 and is expected to be completed in 2013. During 2011, the waste at the Willow Boulevard Landfill portion of OU2 was consolidated and covered with an impermeable cap. The vegetated soil cover for this portion of OU2 was installed in 2012. EPA expects the installation of the impermeable cover at the A-Site portion of OU2 to be completed in 2012 and the installation of the OU2-wide groundwater monitoring system to be completed in 2013. Institutional controls restricting the use of site groundwater, site use, and for protection of the remedy were recorded and filed in 2010. Once the RA is completed EPA expects the remedy at OU2 to be protective of human health and the environment. EPA will make that determination by inspecting the landfill cover and evaluating groundwater and methane monitoring data. In addition, there is a restrictive covenant in place that restricts certain use of the property including use that interferes with measures necessary to assure the effectiveness and integrity of the remedial action and use of site groundwater.

Operable Unit: 3	*Protectiveness Determination:* Short-term Protective

Protectiveness Statement:
The remedy at OU3 currently protects human health and the environment in the short term. The landfill cap is generally in good condition and prevents PCB-contaminated material in the landfill from migrating, via erosion or surface water runoff, into the Kalamazoo River. The cap is also an effective barrier that prevents exposure, via direct contact, to the contaminated material by on-site workers, trespassers, and anglers. The cap also minimizes infiltration of rainwater and reduces the potential for leachate generation and the potential for PCBs in groundwater to migrate into the Kalamazoo River. Public access to the landfill is restricted by a locked chain-link fence and sheet pile, which prevents people from being exposed to the contaminated material. Methane generated within the landfill is passively managed and mitigated by gas collection trenches installed outside of the landfill. These trenches are largely effective with methane only occasionally detected at off-site probes beyond the lateral extent of the trenches. Additional trenching (or some alternative) may need to be installed to extend the lateral capture of methane migration at the OU3 boundary. Some ICs are in place at OU3, but require revision, while other ICs are not yet in place. In order for the remedy to be protective in the long term, the following actions will need to be taken: (1) implement revised and new ICs; (2) mitigate any off-site migration of methane gas, and (3) properly maintain the landfill. Long-term protectiveness requires compliance with effective ICs. EPA will ensure that long-term stewardship of OU3, as well as every other operable unit of the Site, includes implementation and maintenance of each component of the selected remedy, including any necessary ICs, and proper maintenance of the landfill.

Operable Unit:	*Protectiveness Determination:*
4	Short-term Protective

Protectiveness Statement:

The remedy at OU4 currently protects human health and the environment in the short term. The remedy has been constructed, and exposure pathways that could result in unacceptable risks are being controlled. The following issues need to be addressed as part of O&M at OU4: 1) erosion is occurring at the toe of the landfill where water exits the soil cover drainage feature, and 2) the current access controls do not prevent trespass. Weyerhaeuser, a PRP for OU4, will evaluate additional access controls. Evaluation of groundwater monitoring data will continue until sufficient data is available to determine contaminant trends. Long-term protectiveness requires compliance with existing ICs. Since the last five-year review, the ICs at OU4 have been modified to include a groundwater use prohibition. EPA will ensure that long-term stewardship of OU4, as well as every other operable unit of the Site, includes implementation and maintenance of each component of the selected remedy, including any necessary ICs.

Five-Year Review Report

I. Introduction

EPA has conducted a five-year review of the remedial actions implemented at the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. The Michigan Department of Environmental Quality (MDEQ) assisted EPA in providing an analysis of information in support of this five-year review. The five-year review was conducted from February 2012 through October 2012, and is the second five-year review conducted at this Site. This report documents the results of the review.

The purpose of five-year reviews is to determine whether the remedial actions that have allowed hazardous substances, pollutants or contaminants to remain at a site are protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in five-year review reports. In addition, five-year review reports identify issues found during the review, if any, and recommendations to address them.

This review is required by statute. EPA must implement five-year reviews consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA §121(c), as amended, states:

> *If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews.*

EPA interpreted this requirement further in the NCP; 40 C.F.R. §300.430(f)(4)(ii) states:

> *If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.*

This is the second five-year review for the Allied Paper, Inc./Portage Creek/Kalamazoo River Site. The triggering action for this statutory review is the completion of the first five-year review on October 18, 2007. This five-year review is required due to the fact that the remedial actions for OU2, OU3, and OU4 leave hazardous substances, pollutants, or contaminants on site at levels

that do not allow for unlimited use and unrestricted exposure (UU/UE).

The Site consists of six OUs including:

- OU1 - Allied Paper, Inc./Bryant Mill Pond;
- OU2 - Willow Boulevard/A-Site Landfill;
- OU3 - King Highway Landfill;
- OU4 - 12th Street Landfill;
- OU5 - 80-miles of the Kalamazoo River including a 3-mile stretch of Portage Creek; and
- OU7 - Former Plainwell Paper Mill Property.

The Site currently does not have an operable unit 6. If source investigation activities at any of the remaining paper mill properties (the former Allied Paper Company Monarch Mill [Monarch Mill property], portions of the former Allied Paper Company Bryant Mill [Bryant Mill property], and the former Allied Paper Company King Mill and King Street Storm Sewer area [King Mill property]) results in a determination that a specific paper mill property is a source of contamination at the Site, EPA will designate that (those) paper mill property (properties) as OU6. On June 30, 2009, EPA approved Georgia-Pacific's Source Investigation Report that documents the Georgia-Pacific Corporation Kalamazoo Mill and former Hawthorne Mill [Hawthorne Mill property] is not a source of contamination at the Site. The investigation of the three remaining mill properties listed above has not yet begun.

All OUs are in various stages of the Superfund cleanup process. OU1, OU5, and OU7 are in the Remedial Investigation/Feasibility Study (RI/FS) stage. A Record of Decision (ROD) containing the selected cleanup remedy has been issued for OU2, OU3, and OU4. The remedial action was completed at OU3 and OU4 and is underway at OU2. EPA's five-year review guidance requires remedies to be evaluated for protectiveness at only those OUs where on-site construction of the RA has started (i.e., OU2, OU3, and OU4 at this Site). However, all six OUs are discussed in this site-wide five-year review report; background information on OU1, OU5 and OU7 is included to help the reader better understand the nature and extent of the contamination at the Site in general. Any future remedies at OU1, OU5, and OU7 will be reviewed on the same five-year review schedule.

II. Site Chronology

Table 1 below lists the chronology of events for the Allied Paper, Inc./Portage Creek/Kalamazoo River Site.

Table I: Chronology of Site Events

Month/Year	Events and Milestones
April 1970-1971	*Initial discovery of problem or contamination*
August 30, 1990	*EPA placed Site on the National Priorities List (NPL)*
December 1990	*Administrative agreement signed between the Michigan Department of Natural Resources (MDNR) and certain PRPs for RI/FS work at the Site*
July 1993	*RI/FS start at OU4*
July/September 1994	*RI/FS complete at OU3*
July 1997	*RI/FS complete at OU4*
February 1998	*ROD issued by MDEQ (successor to MDNR) for OU3, with EPA concurrence*
June 1998	*122(h) cash-out agreement signed between EPA and Millennium Holdings for Time-Critical Removal Action at Bryant Mill Pond of OU1*
June 1998	*Remedial Design (RD) Start at OU3*
1998-1999	*Removal Action at Bryant Mill Pond of OU1*
February 2000	*Administrative agreement signed between MDEQ and Georgia-Pacific for implementation of the Remedial Design/Remedial Action (RD/RA) at OU3*
September 2001	*ROD Issued by MDEQ for OU4, with EPA concurrence*
January/February 2002	*Site-Specific Amendment to 2002 Superfund Memorandum of Agreement(SMOA) signed between EPA and MDEQ*
September 2002	*Remedial Design complete at OU3*
October 2002	*Construction Start at OU3*
December 2004	*Consent Decree (CD) signed by the United States and Weyerhaeuser Company for RD/RA at OU4 and for RI/FS and RD/RA at OU7*
January 2006	*RI/FS complete at OU2*
September 2006	*ROD issued by EPA for OU2, with MDEQ concurrence*
February 2007	*Administrative Order on Consent (AOC) signed for Time-Critical Removal Action at Plainwell Impoundment Area of OU5*
February 2007	*AOC signed for Supplemental RI/FS for OU5*
March 2007	*Removal Action start at Plainwell Impoundment Area of OU5*
February 2007	*OU5 Area 1 Supplemental RI/FS initiated*
November 2007	*Emergency Response Action for Former Plainwell Mill (OU7) banks start*

March 2008	*OU1 RI approved by EPA*
May 2008	*RI start at OU7*
November 2008	*Emergency Response Action for OU7 completed*
May 2009	*CD signed by the United States and Georgia-Pacific for RD/RA at OU2*
June 2009	*Removal Action at Plainwell Impoundment of OU5 complete*
June 2009	*AOC signed for Time-Critical Removal Action at Plainwell 2 Dam Impoundment of OU5*
August 2009	*Removal Action start at Plainwell 2 Dam Impoundment of OU5*
March 2010	*RD complete at OU 4*
April 2010	*Remedial Action construction start at OU4*
December 2010	*Removal Action complete at Plainwell Dam Impoundment in Area 1 of OU 5*
December 2010	*Supplemental RI/FS start in Area 2 of OU 5*
April 2011	*Remedial Design complete at OU2*
April 2011	*Remedial Action start at OU 2*
July 2011	*Action Memorandum signed to conduct Time-Critical Removal Action at Portage Creek Area of OU 5*
September 2011	*Removal Action construction start at Portage Creek of OU 5*
May 2012	*Supplemental RI/FS start in Area 3 of OU 5*
October 2012	*Remedial Action completion at OU4*

III. Background

A. Site History

The Site is located in both Allegan and Kalamazoo Counties of Michigan. The Site includes disposal areas, paper mill properties, approximately 80 miles of the Kalamazoo River (from Morrow Lake Dam to Lake Michigan), adjacent river banks and floodplains, as well as a 3-mile stretch of Portage Creek (see Figure 1, Site Location Map). EPA placed the Site on the National Priorities List on August 30, 1990.

The Site is primarily contaminated with PCBs from former paper mills, although other former industrial operations also used PCBs along the Kalamazoo River. The former paper mills recycled and/or de-inked and repulped carbonless copy waste paper which, between the 1950s and 1970s, contained PCBs as an ink carrier. The wastewater from the paper manufacturing

operations was historically discharged to the Kalamazoo River. Processed residuals were placed into on-site lagoons for dewatering or into disposal areas directly on the land. The former lagoons and disposal areas later became known as the landfill OUs.

The MDNR (predecessor to MDEQ) first became concerned about the presence of PCBs in the Kalamazoo River in 1971, after routine surface water and biota sampling at the mouth of the river indicated that PCBs were discharging to Lake Michigan via the Kalamazoo River and that the PCBs were widely bioavailable for uptake by fish and aquatic organisms.

The Site comprises six OUs:

- OU1 - Allied Paper, Inc./Bryant Mill Pond;
- OU2 - Willow Boulevard/A-Site Landfill;
- OU3 - King Highway Landfill;
- OU4 - 12th Street Landfill;
- OU5 – 80-miles of the Kalamazoo River including a 3-mile stretch of Portage Creek; and
- OU7 – former Plainwell Paper Mill Property.

In addition to OU7, four other former paper mill properties (the Monarch, Bryant, King, and Hawthorne Mill properties) were associated with the Superfund site. Pursuant to the AOC for a Supplemental RI/FS for OU5 executed between certain PRPs and EPA in February 2007, these four former paper mill properties are to be investigated to determine whether any of the mill properties is a source of PCBs to the Site. If any mill property is a source of PCBs to the Site, then EPA will designate that mill property as OU6. The OU will then be investigated under the Superfund RI/FS process. The Hawthorne Mill property has been investigated and EPA determined that it is not a source of contamination to the Site. Accordingly, EPA has determined that no additional investigation of the Hawthorne Mill property is required for the Site.

Six former hydroelectric dams, three owned by the State of Michigan and three by private companies, are also located within the Superfund Site. One of the dams, the Lake Allegan Dam, is an operating hydropower dam; the remaining five dams are no longer operational. In the 1970s, the State of Michigan partially dismantled its three dams (Plainwell, Otsego and Otsego City). As the state dismantled the dams, the water level in the river dropped and the contaminated sediment that was once underwater became exposed on the riverbanks and floodplain areas behind the state-owned dams. EPA and MDEQ currently estimate that the Site contains approximately 113,000 lbs of PCBs in the river sediment and floodplain soil.

When the Site was listed on the NPL in 1990, it was designated a state–lead site for purposes of conducting the RI/FS. On December 28, 1990, MDNR signed an administrative agreement with several PRPs, pursuant to which the PRPs agreed to perform an RI/FS for the entire Site. Three PRPs signed the administrative agreement with MDNR, including Millennium Holdings LLC (formerly HM Holdings), Georgia-Pacific LLC (formerly known as Georgia-Pacific Corporation), and Plainwell Inc. (formerly Simpson Plainwell Paper Company). (Plainwell Inc. and Millennium Holdings LLC later filed for bankruptcy.) These three PRPs formed a group and

were collectively known as the Kalamazoo River Study Group (KRSG). Although not officially identified as a PRP by the State of Michigan, the Fort James Corporation joined the KRSG and agreed to help fund the RI/FS for the Site. EPA later identified another PRP, the Weyerhaeuser Company, in 2002.

In 1998, EPA signed a cash-out agreement with Millennium Holdings LLC for a time-critical removal action at the Bryant Mill Pond area of OU1. EPA conducted the time-critical removal action using the funds from the cash out agreement and supplemental federal funds. The removal action is discussed in more detail in Section III.B.1 of this five-year review report.

In 2002, certain areas of the Site were re-designated as federal-lead due to the agencies' belief that re-designation of certain areas of the Site was in the best interest of the public. Roles and responsibilities for each OU are outlined in a February 2002 Site-Specific Amendment to the Enforcement Agreement for State-Enforcement Lead Sites in Michigan, under the Superfund Memorandum of Agreement between MDEQ and EPA. Since 2002, EPA has been the lead agency on all OUs except OU3 (King Highway Landfill); MDEQ has retained the lead on OU3. In accordance with an April 2007 Site-Specific Amendment to the 2002 Site-Specific Amendment to the SMOA, EPA acquired the lead for OU1 (Allied Paper, Inc./Bryant Mill Pond) in 2008 after EPA accepted the state-approved RI Report and determined that no additional response activities were necessary to complete the RI.

In 2007 an AOC was signed between Georgia-Pacific LLC, Millennium Holdings LLC, MDEQ and EPA to implement a time-critical removal action in the Plainwell dam area of the Kalamazoo River in OU5. Work began in March 2007 and was completed in June 2009. A total of 130,000 cubic yards of contaminated in-stream and bank sediment were removed by this action.

In 2007 another AOC was signed between Georgia-Pacific LLC, Millennium Holdings LLC and EPA to conduct a Supplemental RI/FS for OU5, which includes the Kalamazoo River and Portage Creek from Morrow Dam to the confluence of Lake Michigan. OU5 consists of seven discreet areas, each requiring its own supplemental RI/FS.

On January 6, 2009, Lyondell Chemical Company and 79 affiliated debtors filed for bankruptcy under Chapter 11 reorganization. One of the debtors was Millennium Holdings, LLC. In January 2009, Millennium Holdings ceased all work at the Site. On April 23, 2010, the U.S. Bankruptcy Court approved Lyondell's reorganization plan. EPA received approximately $100 million (of its court-approved claim of more than $900 million) to be used at the Site from the U.S.'s settlement with the debtors in the bankruptcy action. Georgia-Pacific continues addressing its obligations to complete the supplemental RI/FS according to the 2007 AOC.

In June 2009, Georgia-Pacific LLC and EPA entered into an AOC to conduct a time-critical removal action in the Plainwell 2 Dam area of OU5. This removal project began in August 2009 and was completed in December 2010. Approximately 18,000 cubic yards of soil and debris were removed by this action.

In July 2011, EPA issued an Action Memorandum to complete a time-critical removal action along Portage Creek, in a 1.8-mile stretch immediately downstream of OU1 to the confluence of the Kalamazoo River. The removal work began in September 2011 and will take two to four years to complete. EPA anticipates that this project will remove approximately 17,000 cubic yards of contaminated soil and sediment.

B. Operable Units

B.1. Operable Unit 1

Physical Characteristics

The Allied Paper Inc./Bryant Mill Pond (OU1) encompasses 89 acres along Portage Creek in the City of Kalamazoo in Kalamazoo County, Michigan. OU1 is bordered by Cork Street to the south, Alcott Street to the north, a Conrail Railroad line to the west, and residential/commercial properties to the east (see Figure 2, OU1 Location Map).

Land and Resource Use

According to the MDEQ RI Report, OU1 and areas in the vicinity of OU1 are zoned for industrial, commercial, and residential purposes. Industrial and commercial properties are located to the north and south of OU1 and along portions of the east and west sides of OU1. Residential properties are located along a portion of the east side of OU1 and to the west beyond the railroad tracks. OU1 is an inactive disposal area, but groundwater is being collected along collection sumps and treated prior to being discharged to the City of Kalamazoo Wastewater Treatment Plant. Wetlands are present at OU1.

History of Contamination

When the former paper mills on the Kalamazoo River recycled and/or de-inked and repulped waste paper that included carbonless copy paper, PCBs and other contaminants were present in the wastewater produced from the paper manufacturing process. The wastewater contained large quantities of suspended particles – primarily cellulose and clay. PCBs adsorb to the suspended particles in the wastewater. PCBs were present in the manufacturing process from at least 1957 until well after production of carbonless copy paper containing PCBs stopped in the 1970s. In the 1950s, the mills began building primitive clarifiers and dewatering or settling lagoons to remove solid particles, and the clarified wastewater was discharged to the rivers and creeks (i.e., Portage Creek at OU1).

OU1 is divided into individual study areas based on former historic operations (see Figure 3, OU1 Site Plan). According to the RI Report, these areas include the former operational areas, which include the following: the Bryant Historic Residuals Dewatering Lagoon (HRDL) and Former Residuals Dewatering Lagoons (FRDLs), Monarch HRDL, Type III Landfill, Western Disposal Area, and the Alcott Street Properties. All areas

received processed wastewater and/or dewatered paper residuals from paper manufacturing operations at the former Bryant and Monarch mills. In addition to receiving the processed wastewater and/or dewatered paper residuals, the Type III landfill area received non-process industrial wastes (such as cardboard, packing strips, waste paper and demolition materials). The operational history and volume of contamination for each area of OU1 are discussed below.

- **Former Operational Areas** (Bryant HRDL and FRDLs, Monarch HRDL, Type III Landfill, and Western Disposal Area).

    - Bryant HRDL and FRDLs – This area consists of six lagoons covering approximately 22 acres. The lagoons were used to settle out residuals from the wastewater generated at the Bryant mills. A clarifier and the earthen-diked HRDL were the primary treatment system, built in 1954. The series of five FRDLs were later added to dewater residuals. The HRDL was filled and has not been used for disposal since the late 1970s*. The FRDLs have not been used for disposal since 1989*.

    - Monarch HRDL – This 7-acre lagoon was used as part of the initial primary treatment facility for process waste from the Monarch Mill. The facility consisted of a clarifier and an earthen-diked dewatering lagoon. After clarification, the wastewater supernatant was discharged to Portage Creek and the settled residuals were pumped to the Monarch HRDL for dewatering. The Monarch HRDL was used from the early 1950s until the 1960s.

    - Type III Landfill – This 13-acre area was originally licensed as a landfill in 1966 to receive non-process wastes pursuant to State of Michigan requirements. It was then licensed as a Type II landfill and later the designation was changed to a Type III landfill in 1985 to receive residuals and demolition wastes (Type II landfills can accept municipal solid waste, while Type III landfills can accept construction/demolition and industrial wastes). Over the period of use (1966 until the late 1980s), the landfill area received various types of industrial waste and residuals.

    - Western Disposal Area – This area covers approximately 19 acres and is located along the western edge of the Bryant HRDL, southwest of the former Type III landfill. According to the RI Report, this area was used as a disposal area for dewatered residuals mined from the HRDLs and FRDLs. By 1986 most of the areas were filled in, and vegetation was established by 1991.

* The only exception to this was EPA's time-critical removal action at the Bryant Mill Pond area in 1998-1999. All contaminated materials excavated during the removal action were consolidated in the Bryant HRDL and FRDLs.

- **Former Bryant Mill Pond** – Particles in the wastewater discharged from the mills to Portage Creek settled out in the 29-acre Bryant Mill Pond. As explained in more detail below, EPA conducted a time-critical removal action between 1998 and 1999 to address PCBs in the sediment.

- **Residential/Commercial Areas** (including but not limited to the following: former Panelyte property and marsh, Stryker Corporation property, Conrail property, clay seam area, and east bank area).

    - Panelyte Property and Marsh – This area encompasses approximately 23 acres and contains a fill area located at the southwestern end of the property. This property is a Brownfields Site which is being addressed under a state grant. Surface water from the Panelyte fill area and Western Disposal area drains toward the Panelyte marsh.

    - Stryker Corporation Property – The parking lots of the Stryker property were constructed over parts of the former Bryant Mill Pond.

    - Conrail Property – The railroad property extends along the western edge of OU1.

    - Clay Seam Area – The clay seam is a body of residuals covering approximately a quarter of an acre that is present as a small, nearly vertical bluff on the east side of Portage Creek. Native soils underlie the clay seam at the elevation of the water line. The clay seam extends up to approximately 80 feet inland from the bank of Portage Creek.

    - East Bank Area – A floodplain area along the eastern bank of Portage Creek. Approximately 1,700 cubic yards of residuals were removed from this area in 2002 by the PRPs as a voluntary interim response measure (see below).

Response Activities

Voluntary Response Activities

Between 2000 and 2005, the PRPs conducted a number of interim response measures to stop or prevent the migration of PCBs from OU1 into Portage Creek. The interim response measures were voluntarily conducted by the PRPs, and not under an administrative order with MDEQ or EPA. The interim response measures included the installation of sheetpile along the Bryant HRDL and FRDLs to stabilize the existing berm and prevent the Bryant Mill Pond residuals from eroding back into Portage Creek, capping the Bryant HRLD and FRDLS to

prevent erosion and infiltration of rainwater, and installation of a groundwater recovery system. The purpose of the groundwater recovery system was to maintain groundwater levels within a foot of the historic norm behind the sheetpile to mitigate the potential for raised groundwater levels to saturate previously unsaturated residuals. In addition, a wastewater treatment plant was installed in the fall of 2004 and began operation in February 2005 to treat recovered groundwater at OU1.

EPA Time-Critical Removal Action

In 1999, pursuant to a cash-out agreement with Millennium Holdings LLC, EPA completed a time-critical removal action at the Bryant Mill Pond area, the pond that received wastewater discharged by the former Bryant Mills. Approximately 150,000 cubic yards of PCB-contaminated sediment were excavated from the Bryant Mill Pond in an effort to clean up this upstream area, since it served as a significant source of PCBs to the Kalamazoo River. In 2003, an additional 1,000 cubic yards of contaminated material were removed from the Portage Creek floodplains. All contaminated material excavated during the time-critical removal action was consolidated in the OU1 Bryant HRDL and FRDLs.

Basis for Taking Action

The RI/FS for OU1 has not yet been completed nor a ROD issued, so EPA has not yet documented a basis for taking action at OU1. The remedial status of OU1 is discussed below.

Remedial Status

On October 26, 2006, MDEQ disapproved the OU1 Revised RI Report prepared by Millennium Holdings, LLC and decided to complete the report internally. MDEQ submitted a state-modified RI Report for OU1 to EPA in March 2007. EPA approved the RI Report in March 2008 and became the lead agency, in accordance with the process discussed in Section III.A. of this five-year review report. Millennium Holdings, LLC was developing the FS Report, but ceased activities on the Site in January 2009 with the bankruptcy filing. EPA assumed responsibility for completing the FS and expects to finalize the FS Report in the fall of 2012. EPA anticipates issuing a ROD for OU1 in 2013.

Since a ROD has not been issued for OU1, there is no remedial action to discuss or evaluate; therefore, OU1 is not discussed further in this five-year review report.

B.2. Operable Unit 2

Physical Characteristics

The Willow Boulevard/A-Site Landfill (OU2) is located southeast of the intersection of Business I-94 and Highway M-96 in Kalamazoo Township, Michigan. OU2 is bordered by the Kalamazoo River to the north and northwest, Davis Creek to the east, and Willow Boulevard Road, former Olmstead Creek, and residential areas to the south (see Figure 4, OU2 Location Map).

OU2 is approximately 32-acres in size and consists of two disposal areas: the Willow Boulevard Landfill and the A-Site Landfill. OU2 also includes impacted areas adjacent to and/or near the Willow Boulevard/A-Site Landfills (see Figure 5, OU2 Site Plan).

The A-Site Landfill occupies approximately 22-acres and contains approximately 475,400 cubic yards of PCB-contaminated material. The Willow Boulevard Landfill (including the Drainageway Area) occupies approximately 11-acres and contains an estimated volume of 152,100 cubic yards of contaminated residuals. Impacted areas adjacent to and/or near the landfills include the area east of Davis Creek, the area south of the A-Site berm (including former Olmstead Creek), and the area near monitoring well AMW-3A. The area east of Davis Creek is approximately 3.5 acres in size with an estimated volume of 3,800 cubic yards of contaminated materials. The area south of the A-Site berm is approximately 2.5 acres in size with an estimated volume of 2,900 cubic yards of contaminated materials. The AMW-3A area is approximately 0.25 acres in size with an estimated volume of 100 cubic yards of PCB-contaminated residual, soil, and sediment.

Land and Resource Use

Land use in the vicinity of OU2 includes industrial, commercial, and residential properties. The A-Site Landfill and Willow Boulevard Landfill are zoned for industrial use. The land south of OU2 is zoned residential and industrial. OU2 is currently an inactive landfill. Wetland areas are also present at OU2.

No private, commercial, or industrial water wells were identified within ¼ mile of OU2. However, ten wells were identified within ½ mile of OU2. Four of the ten wells are public water supply wells owned by the City of Kalamazoo. Four are domestic wells, one well is an industrial well, and the usage of the last well is not known. It is not known whether any of the domestic wells within ½ mile of OU2 are being used for drinking water, though groundwater is migrating north toward the Kalamazoo River and not toward the residential area to the south.

History of Contamination

The Willow Boulevard and A-Site landfills were used to dispose of dewatered paper-making residuals from the former Allied Paper King Mill and the Georgia-Pacific Kalamazoo Mill, both located in Kalamazoo, Michigan. PCBs were part of the paper mills' waste streams between the 1950s and 1980s. Process residuals from the paper manufacturing operations were disposed at the Willow Boulevard and A-Site landfills. Over time, PCB-contaminated residuals from the landfills eroded and migrated into the soil and sediment of adjacent areas and/or into the Kalamazoo River. Surface water runoff from the landfills and adjacent areas also transported PCBs directly into the Kalamazoo River. Therefore, the landfills and adjacent areas are sources of PCBs to the river and Davis Creek, which empties into the Kalamazoo River.

The A-Site Landfill was originally a series of dewatering (or drainage) lagoons. Paper waste from the King Mill was piped to the A-Site lagoons, and water was allowed to settle out. Paper residuals accumulated within the lagoons, and over time, the A-Site became known as the A-Site Landfill. The A-Site lagoons were active between 1960 and 1967. Operations at the King Mill ended in 1971, and the mill was demolished in 1978. Georgia-Pacific purchased the A-Site in 1975 and used it to dispose of paper waste dug up from the King Highway dewatering lagoons until 1977. From 1977 to 1987, the A-Site received dewatered paper-making waste from the Kalamazoo King Mill filter presses. The A-Site ceased to be an active disposal area in 1987, when the King Highway Landfill operations began. The Willow Boulevard Landfill was acquired by Georgia-Pacific from the Kalamazoo Paper Company in 1967. From mid-1960 until 1975, dewatered paper residuals from the Kalamazoo Mill and the King Highway Lagoons were disposed at the Willow Boulevard Landfill. Disposal activities occurred from the mid-1960s until operations stopped in 1975.

Response Activities

Voluntary Response Activities

Between 1992 and 1999, Georgia-Pacific conducted a number of interim response measures to eliminate or reduce erosion of PCB-containing residual and soil from the landfill into the Kalamazoo River. The interim response measures were voluntarily conducted by Georgia-Pacific, and not under an administrative order with MDEQ or EPA.

In 1992, GP installed a chain-link fence around the landfill and reseeded the western portion of the A-Site Landfill to promote vegetative growth. In 1998, approximately 1,500 linear feet of sheet pile was installed between the A-Site and the Kalamazoo River to stabilize the earthen berm along the river and mitigate soil erosion. In 1999, approximately 7,000 cubic yards of PCB-contaminated residual and sediment were excavated from the western bank of the Kalamazoo

River adjacent to the landfill. The excavated material was placed into the eastern side of the Willow Boulevard portion of OU2. The landfill was then regraded to promote drainage and covered with 6 inches of clean sand as a temporary cover. A portion of the river's edge was also backfilled to create a sand berm along the Kalamazoo River. Geotextile and riprap were placed along a portion of the river's edge to reduce erosion of the riverbanks.

EPA Time-Critical Removal Action

On November 7, 2006, Georgia-Pacific signed an AOC with EPA to perform a time-critical removal action at the former Refuse Area of the former Georgia-Pacific Kalamazoo Mill property and at the Oxbow Area of the former Hawthorne Mill property. The former Kalamazoo Mill and Hawthorne Mill property is located north of OU2, across the Kalamazoo River. During the removal action, Georgia-Pacific removed approximately 33,203 cubic yards of PCB-containing soil/residual from the Refuse Area and approximately 17,488 cubic yards of PCB-containing soil/residual from the Oxbow Area. Georgia-Pacific also removed contaminated soil from a transformer pad, wastewater pipeline, and from an underground pipe that was located at the former Kalamazoo Mill property. Material excavated from the transformer pad was sent to an off-site licensed landfill for disposal and material excavated from the wastewater pipeline and underground pipe was consolidated into the A-Site. The removal action started in November 2006 and was completed in June 2007. The portion of the A-Site that received the contaminated residual/soil was covered and a berm was constructed to keep surface water runoff from entering Davis Creek and the Kalamazoo River.

Basis for Taking Action

PCBs are the primary contaminant of concern and primary risk-driver at OU2. The media of concern are PCB-contaminated residuals within the Willow Boulevard and A-Site Landfills and PCB-contaminated residual, soil, and/or sediment in areas adjacent to the landfills including the Willow Drainageway, the area south of the A-Site Berm, the area east of Davis Creek, and the area near monitoring well AMW-3A.

The RI for OU2 was conducted between 1993 and 2000. The maximum PCB concentration in surficial residuals at the Willow Boulevard Landfill was 270 milligrams per kilogram (mg/kg), and the maximum concentration in subsurface residuals was 160 mg/kg. Surficial soil samples were not collected at the Willow Drainageway. The maximum PCB concentration in subsurface soil at the Drainageway was 30 mg/kg. The maximum PCB concentration in surface soil at the Area South of the A-Site berm was 14 mg/kg, and the maximum concentration in subsurface soil was 73 mg/kg. The maximum PCB concentration in surface sediment at the Former Olmstead Creek was 7.6 mg/kg. The maximum PCB concentration in surface residual, soil, and sediment at the area east of Davis Creek was 36 mg/kg; no subsurface soil samples were collected at this area

during the RI. The maximum PCB concentration in surface soil at the AMW-3A area was 5.9 mg/kg, and the maximum concentration in subsurface soil was 62 mg/kg. PCB concentrations in surface soil samples collected at residential properties adjacent to the landfills were either not-detect or below the State of Michigan residential cleanup criteria of 4.0 mg/kg.

A quantitative risk assessment was not conducted at OU2. Instead, potential risks associated with exposure pathways at OU2 were qualitatively assessed to determine which media would need to be targeted for remediation. Exposure pathways assessed in the qualitative risk assessment conducted at OU2 included the following: ingestion of and dermal contact with contaminated residuals, soil, and sediment; inhalation of airborne releases; and erosion into aquatic habitat. Media evaluated included air, surface soils, residuals and sediment, subsurface soils, surface water, and groundwater/leachate. Potential risks associated with exposure pathways were qualitatively assessed by comparing maximum PCB concentrations detected during the RI with cleanup criteria based on future land use and protective ranges established in the *Final (Revised) Baseline Ecological Risk Assessment* dated April 2003 (BERA). State of Michigan Part 201 Generic Cleanup Criteria were used in the qualitative assessment of potential risk at OU2.

Based upon the results of the RI and the qualitative assessment of risk to human health and ecological receptors, a response action at OU2 was deemed to be warranted because PCB concentrations in residuals, soil, and sediment at OU2 exceeded the Part 201 Generic Commercial II/Industrial Land Use Criteria of 16 mg/kg PCB (in soil) protective of human health for on-site workers and/or trespassers, the Generic Residential Land Use Criteria of 4 mg/kg PCB (in soil) protective of human health for residential land use, and/or the cleanup range of 5.5 to 8.1 mg/kg PCB (in soil) for the protection of ecological receptors (American Robin) established in the BERA. Additionally, a response action at OU2 was also deemed to be warranted because of the potential migration of PCBs from the landfills and adjacent areas (via erosion or surface water runoff) into the Kalamazoo River and because PCB concentrations in sediment of the wetland areas may present an unacceptable risk to people or animals (e.g., mink) who consume fish.

Because a ROD was issued that selected a remedial action for OU2, this OU is further discussed in the remaining sections of this five-year review report.

B.3. Operable Unit 3

Physical Characteristics

The King Highway Landfill (OU3) is located within the City of Kalamazoo, Kalamazoo Township, Michigan. OU3 includes the King Highway Landfill, the King Street Storm Sewer (KSSS) floodplain, and contaminated river sediments adjacent to the landfill. The OU3 ROD requires the cleanup of these areas, as well as five former waste lagoon areas located at the Georgia-Pacific Mill in Kalamazoo (herein referred to as the "Mill

Lagoons"). Waste material from the Mill Lagoons was excavated and disposed in the King Highway Landfill. The Mill Lagoons are located north of the landfill across the Kalamazoo River (see Figure 6, OU3 Location Map, and Figure 7, OU3 Site Plan).

The King Highway Landfill occupies approximately 15 acres. The Mill Lagoons occupy approximately 7 acres, and the KSSS occupies approximately 1 acre. OU3 is bordered by King Highway (M-96) to the south, the Grand Trunk Railroad right-of-way to the west, and the KSSS floodplain and the Kalamazoo River to the north and to the east.

Land and Resource Use

The King Highway Landfill is zoned for industrial or secondary commercial use. The land immediately adjacent to the south and southwest of the landfill is classified for industrial or secondary commercial use. The land that contains the Mill Lagoons, located at the Georgia-Pacific Mill Property, is zoned for industrial use.

Future land use at the King Highway Landfill property will remain industrial. Institutional controls were required by the ROD. Some ICs are in place, but require revision, while other ICs are not yet in place. The landfill or areas with waste includes multiple parcels, some of which may have ICs in place. As part of the Institutional Control Plan for OU3, appropriate restrictive covenants will be recorded on all deeds for all the parcels which make up OU3. GP is working with the City of Kalamazoo to grant access for a bike path along the border of the property.

The Georgia-Pacific Lagoons were addressed as a part of the OU3 ROD. The projected land use at the Georgia-Pacific Mill Lagoons is expected to be restricted to industrial use with no public access.

History of Contamination

During a 15-year period, Georgia-Pacific de-inked office waste paper, which contained carbonless copy paper contaminated with PCBs, at two of the mills located at the Georgia-Pacific Kalamazoo Mill property. Originally, the Kalamazoo Paper Mill consisted of five mills, three for making paper products, and two for finishing and converting. Mills 1 and 3 both performed de-inking operations starting in the early 1950s. Mill 3 discontinued de-inking in the late 1960s, was refurbished, and resumed operations in 1975. Mill 1 de-inked continuously until the late 1970s. Raw paper waste from all the mills was routed to a clarifier. The clarifier effluent was pumped directly into the Kalamazoo River until 1964, at which time it was rerouted to the City of Kalamazoo Wastewater Treatment Plant.

The underflow from the clarifier was dewatered and disposed at various locations over the years. From the mid-1950s until the late 1950s, residuals were placed in the Mill Lagoons on the Georgia-Pacific Kalamazoo Mill property. In the late 1950s residuals

were sent for dewatering to the King Highway lagoons, which later became the King Highway Landfill. The Mill Lagoons were then only used as an emergency backup system. Georgia-Pacific dewatered residuals in the King Highway lagoons until 1977. After 1977, the King Highway lagoons were not utilized until the lagoons were licensed in 1983 by the MDEQ as a landfill for disposal of paper-making residuals. From 1987 to 1998, Georgia-Pacific used the King Highway Landfill for the disposal of dewatered paper-making residuals. Over time, the contaminated residuals migrated, via erosion or surface water runoff, from the landfills into adjacent areas and/or the Kalamazoo River.

The King Highway Landfill is a mono-fill of paper residuals. The landfill covers 15 acres and consists of four cells: Cells 1, 2, 3, and 4. The total volume of residuals in the landfill is estimated at 282,000 cubic yards. Cells 1, 2, and 3 were first licensed by the MDEQ in 1983 under the Michigan Solid Waste Management Action (Act 641) as a Type III landfill. Cell 4 was never permitted as an operating landfill. The majority of residuals in Cell 4 were submerged in a pond formed by the transport of water from the other three cells to Cell 4 through a culvert in the dikes. The four cells were separated by dikes approximately 10 to 20 feet high. These dikes were constructed of sand and gravel in the 1950s and were used as access roads. Access roads and no-fill areas comprise 7.9 acres of the King Highway Landfill. During construction of the sedimentation basin, nearby well installation, and during installation of landfill gas cutoff trenches, residuals contiguous with the landfill cells were encountered. Residuals were also encountered on parts of those no-fill areas as well as on property not owned by GP (i.e., City of Kalamazoo and MDOT).

Response Activities

Voluntary Response Activities

Pre-ROD interim measures were voluntarily conducted by Georgia-Pacific, and not under an administrative order with MDEQ. In 1994 and 1996, approximately 1,000 linear feet of sheet piling was installed to stabilize the berm along the northern sides of Cells 1, 2, and 3 of the landfill. The purpose of this interim measure was to prevent berm failure and subsequent migration of contaminated residuals from the landfill into the Kalamazoo River. In 1998, PCB-contaminated material was excavated from the King Street Storm Sewer, the Mill Lagoons, and from areas directly adjacent to the landfill cells. This included a portion of the Kalamazoo River directly adjacent to the sheet piling. Though these actions were required in the ROD for OU3, they are considered to be voluntary actions as they were conducted prior to the February 9, 2000, AOC for response actions at OU3. All known materials were consolidated back into the landfill from those areas.

Basis for Taking Action

The RI for OU3 was conducted in 1993. The maximum PCB concentration in the landfill

surface residuals was 3.6 mg/kg. PCB concentrations generally increase with depth through the residuals. However, PCB concentrations in the top eight feet of residuals in Cell 4 are as high as 69 mg/kg. Tests of the residuals that were added to the landfill later in its operational history did not detect PCBs with the exception of one sample in 1987 that contained 6.5 mg/kg PCBs. The maximum PCB concentration found in the top 16 feet of residuals in Cells 1, 2, and 3 was 8.8 mg/kg. Concentrations exceeding 50 mg/kg PCB were detected at depths of 16 to 30 feet. The maximum concentration in the subsurface residuals was 310 mg/kg. Soil below the King Highway Landfill has a maximum PCB concentration of 9.9 mg/kg.

Total PCB concentrations from samples collected in the KSSS floodplain had PCB concentrations ranging from 0.37 mg/kg to 99 mg/kg. The maximum PCB concentration found in the berms adjacent to the landfill was 77 mg/kg. Analytical results from samples collected at the Mill Lagoons showed PCB concentrations in surface residuals ranging from 0.2 to 110 mg/kg. PCBs were detected in three subsurface residual samples in the Mill Lagoons at concentrations ranging from 3.4 to 70 mg/kg. Five soil samples were collected below the Mill Lagoons. PCBs from native soils, below the lagoons, ranged from 0.043 to 2.9 mg/kg.

PCBs were not detected in groundwater at OU3 above performance standards. However, PCBs were detected in a leachate sample collected from Monitoring Well 10R at a concentration of 1.4 micrograms per liter (ug/L). One surface water sample was collected from the pond in Cell 4 and analyzed for PCBs. The analytical results show a PCB concentration of 0.026 ug/L.

The presence of PCB-contaminated residuals, soils, and sediment in areas outside the landfill and the Mill Lagoons is evidence that PCBs were migrating, via erosion or surface water runoff, from the landfill and the Mill Lagoons, into adjacent areas and the Kalamazoo River. Additionally, the landfill berms were eroding by surface water run-off and the continued flow of the Kalamazoo River. As a result of the information gained during the RI, the state concluded that OU3 and the Mill Lagoons are sources and potential sources of PCB contamination to the Kalamazoo River and its floodplain in the vicinity of OU3 and the Mill Lagoons.

A Baseline Risk Assessment (BRA) was conducted at OU3 to evaluate risks to human health and the environment under unremediated conditions. Because the waste at OU3 is identical (i.e., the wastes was generated from the same source at similar concentrations) to the wastes at the Mill Lagoons, and because the routes of exposure and the receptors are also the same, the MDEQ determined that the BRA for OU3 is applicable to the Mill Lagoons. Therefore, a separate BRA for the Mill Lagoons was not conducted. The BRA concluded that the primary migration pathway for the release of PCBs into the river is erosion of residuals from the landfill berms and floodplains and the Mill Lagoons. The largest potential risk and migration pathway is the release of PCB-contaminated residuals due to failure of the landfill berms.

Based upon the results of the RI and BRA, a response action at OU3 and the Mill Lagoons was necessary to eliminate or reduce the potential migration of PCBs to the Kalamazoo River. The largest potential risks identified for ecological receptors were due to past releases of PCBs from the landfill, its berms, and floodplains of the Mill Lagoons. The ecological risk assessment recognized that organisms and fish in the Kalamazoo River bioaccumulate PCBs and pass them up the food chain to other organisms which would feed upon them. The bioaccumulation food chain effects present the greatest potential risk to ecological and human health, via consumption of fish from the Kalamazoo River.

Because a ROD was issued that selected a remedial action for OU3, this OU is further discussed in the remaining sections of this five-year review report.

B.4. Operable Unit 4

Physical Characteristics

The 12th Street Landfill (OU4) is located in Otsego Township, approximately ½ mile northwest of the City of Plainwell in Allegan County, Michigan. The landfill occupies approximately 6.5 acres and is bordered by the Kalamazoo River to the east, by wetlands to the north and west, by industrial developed land to the south and southeast, and by a gravel pit operation to the south and southwest (see Figure 8, OU4 Location Map, and Figure 9, OU4 Site Plan).

The 12th Street Landfill is located within an environmentally sensitive area. The adjacent woodlands, wetlands, and the former powerhouse discharge channel provide suitable habitat for fish, turtles, and amphibians. Small mammals (i.e., mice, squirrels, woodchucks, mink, raccoons, fox and muskrats) and birds inhabit the areas surrounding the landfill. The Kalamazoo River is part of a bird migratory flyway route for waterfowl species, and the areas surrounding the 12th Street Landfill provide a migratory stopover that attracts and supports waterfowl. During nesting season, vegetation in the area provides cover and materials for nesting. Larger mammals, such as white-tailed deer, also use the landfill as evidenced by deer paths running over the top and along the sides of the landfill. Muskrat dens have been observed in the wetlands and there is evidence of extensive burrowing into the sides of the landfill by fox and woodchuck.

Land and Resource Use

Land use in the immediate vicinity of OU4 is characterized as industrial with residential property to the south and southwest. Wetlands are present north and northwest of the OU and the Kalamazoo River and former Plainwell Dam are located to the east and southeast.

The 12th Street Landfill is zoned industrial and will remain industrial in the future. A restrictive covenant running with the land from the owner of the landfill property to MDEQ as the grantee (MDEQ Reference No: RC-RRD-03-052 on USEPA Site No. 059B) is already in place (see Attachment 6, Restrictive Covenant for OU4). EPA is a third party beneficiary of this restrictive covenant. The restrictive covenant was recorded with the Allegan County Registry of Deeds on March 25, 2005, to restrict future land use at the landfill property. The existing restrictive covenant was amended on July 15, 2012, to prohibit the use of groundwater at the OU.

History of Contamination

The 12th St. Landfill was used from 1955 to 1981 for disposal of PCB-containing paper residuals consisting mostly of water, wood fiber, and mineral matter. PCBs were introduced into some of the residuals as a result of the paper manufacturing operations at the former Plainwell Paper Mill between 1957 and 1962. Over time, the contaminated residuals migrated, via erosion or surface water runoff, from the landfill into the adjacent wetlands, woodland areas, adjacent property, and into the powerhouse channel of the Kalamazoo River. The landfill is comprised mostly of paper residuals with some concrete rubble, construction debris, waste lumber, and corroded steel drums. The 12th Street Landfill contains an estimated 208,000 cubic yards of PCB-contaminated residuals. The 12th Street Landfill was closed in 1984 and covered with soil and seeded to promote vegetation.

Response Activities

No voluntary response actions were taken at OU4.

Basis for Taking Action

Sampling during the December 1996 RI confirmed the presence of paper residuals in the berm, in the adjacent wetland area, and in the former powerhouse discharge channel. Soil/residual samples were collected from soil and monitoring well borings that were located outside the landfill perimeter, and from two sediment cores collected in the former powerhouse discharge channel adjacent to the east side of the landfill. Elevated PCB concentrations were reported in 24 of the 45 samples analyzed, including both samples collected from the former powerhouse discharge channel, with a maximum PCB concentration of 158 mg/kg. Elevated concentrations of inorganic compounds were also detected in several samples at levels exceeding applicable criteria. Trace concentrations of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs) and pesticides were also reported.

Groundwater samples were collected from 15 monitoring wells and analyzed for VOCs, SVOCs, inorganic compounds, pesticides, and PCBs. PCBs were not detected and all other results were either non-detect or below the Part 201 Industrial and Commercial

Drinking Water Criteria and Groundwater Surface Water Interface (GSI) Criteria, with the exception of bis(2-ethuylhexyl) phthalate, which was detected in groundwater at a concentration of 290 ug/L. In 1995, a second round of groundwater samples was collected from each monitoring well. In that round of sampling, groundwater analysis was limited to PCBs only, and the results indicated non-detectable concentrations.

Three leachate wells were sampled in 1993 and again in 1995. Analytical results from the 1993 sampling event indicated that trace concentrations of various VOCs, SVOCs, and aldrin were present as well as an elevated concentration of toluene (680 ug/L) in leachate collected from one leachate well. The toluene concentration exceeded GSI criteria. In 1995, leachate samples were analyzed only for PCBs. Results indicated that leachate collected from one well had a PCB concentration of 1.4 ug/L.

Due to the similarities between the King Highway Landfill (OU3) and the 12th Street Landfill (OU4), such as similar waste (PCB-contaminated residuals generated from the same paper recycling process at similar concentrations), identical routes of exposure, and identical receptors, it was assumed that there was a similar level of unacceptable risk at the 12th Street Landfill as at OU3. Therefore, the King Highway Landfill BRA was used to assess the risks to human health and ecological receptors at OU4.

Based upon the results of the RI and BRA, a response action at OU4 was necessary to eliminate or reduce the potential migration of PCBs to the Kalamazoo River. The largest potential risks identified for ecological receptors were due to past releases of PCBs from the landfill into the Kalamazoo River. The ecological risk assessment recognized that organisms and fish in the Kalamazoo River bioaccumulate PCBs and pass them up the food chain to other organisms which would feed upon them. The bioaccumulation food chain effects present the greatest potential risk to ecological and human health, via consumption of fish from the Kalamazoo River.

Because a ROD was issued that selected a remedial action for OU4, this OU is further discussed in the remaining sections of this five-year review report.

B.5. Operable Unit 5

Physical Characteristics

Operable Unit 5 is located in Allegan and Kalamazoo Counties in southwestern Michigan. OU5 includes approximately 80 miles of the Kalamazoo River and a 3-mile stretch of Portage Creek (see Figure 10, OU5 Site Map).

Land and Resource Use

The Kalamazoo River is used for recreational purposes (i.e., swimming, boating, and fishing). River water is not used as a drinking water source and is not expected to be

used as a drinking water source in the future. Wetland areas are present along areas of the river. Land use in the floodplains adjacent to the river includes a mix of recreational, agricultural, residential and commercial use.

History of Contamination

Former paper mill operations, as previously discussed, were the source of the PCB contamination. Although PCB use in the manufacture of carbonless copy paper was discontinued in 1971, the waste streams of the Kalamazoo area paper mills most likely contained PCBs for at least a decade after 1971. The PCB-contaminated wastes from these paper mills were initially discharged directly to the Kalamazoo River and Portage Creek. Later, waste effluents were sent to clarifiers prior to being discharged to the river and creek. The bottom sludge from these clarifiers was placed in at least four disposal areas (landfills) along the river. Because the PCBs were associated with suspended fine clay particles, the clarifiers were ineffective in stopping the discharge of PCBs. The soils, sediment, water column, groundwater, and biota in and adjacent to an 80-mile stretch of the Kalamazoo River and a 3-mile stretch of Portage Creek are contaminated with PCBs.

EPA and MDEQ estimate that approximately 113,000 lbs of PCBs are currently located in the aquatic system. Today, the ongoing, uncontrolled erosion of contaminated paper wastes and soils from the river banks is the most significant source of PCB loading to the Kalamazoo River. Further, the presence of PCB-contaminated paper wastes in the river system, including streambed sediments and adjacent floodplain sediments, continues to expose ecological receptors, and human receptors who consume fish at unacceptable levels. A fish advisory, which is currently a published and posted warning to humans to not consume the fish in the Kalamazoo River, has been in place since the 1970s.

In 2003, MDEQ completed a Site-Wide Final (Revised) Human Health Risk Assessment (HHRA) and Baseline Ecological Risk Assessment for OU5. The HHRA quantitatively assessed potential risk to human health for different exposure pathways, including the consumption of fish, direct contact with contaminated floodplain soils, and inhalation of dust and volatile emissions from floodplain soils behind the state-owned dams. The HHRA concluded the most significant exposure pathway is the consumption of fish from the river because fish bioaccumulate PCBs from exposure to PCB-contaminated material, surface water, and prey. Recreational activities, including swimming, boating, and wading in the river, do not pose a health risk to people. The BERA concluded that sensitive consumers, such as mink, are the most at risk compared to other ecological receptors. Birds (represented by the American Robin) that consume a substantial amount of earthworms are also at significant risk if foraging takes place in the contaminated areas, and terrestrial mammals (represented by the red fox) may be at some risk if foraging is concentrated in river areas whose prey reside in contaminated areas and have taken up substantial amounts of PCBs.

Consistent with the 2007 AOC between EPA, Georgia-Pacific LLC, and Millennium Holdings, LLC, the risk assessments (HHRA and BERA) can be revised in each area-wide RI/FS for OU5. A new Terrestrial Baseline Ecological Risk Assessment (TBERA) was developed for Area 1 of OU5, building upon information from the BERA. The TBERA also concluded that risks to ecological receptors may exist. EPA approved the TBERA as part of the Area 1 RI in June 2012.

Response Activities

EPA Time-Critical Removal Action: Plainwell Dam

On February 27, 2007, Georgia-Pacific and Millennium Holdings, LLC signed an AOC with EPA and the State of Michigan to conduct a time-critical removal action in an area of the Kalamazoo River called the "Plainwell Impoundment." Work began in March 2007 and was completed in June 2009. A total of 130,000 cubic yards of contaminated in-stream and bank sediment were removed by this action. Consistent with the federal Toxic Substances Control Act, sediments containing PCB concentrations greater than 50 parts per million (ppm, equivalent to mg/kg) were disposed at Environmental Quality Co.'s Wayne Disposal Landfill in Belleville, Michigan. Sediments with concentrations less than 50 ppm, which represent 80 percent of the waste material, were disposed at Allied Waste's C and C Landfill near Marshall, Michigan, and its Ottawa Farms Landfill near Coopersville, Michigan. The estimated cost of this project was $30 million. This project also rerouted the Kalamazoo River to its original channel and removed the dam near Plainwell. The Kalamazoo River is now free-flowing from Kalamazoo to Otsego City, Michigan, with the exception of the diversion structures associated with the Plainwell Dam #2.

EPA Time-Critical Removal Action: Plainwell 2 Dam

In June 2009, Georgia-Pacific LLC and EPA entered into a legal agreement committing Georgia-Pacific to conduct a time-critical removal action in the Plainwell #2 Dam area. This second removal action project began in August 2009 approximately three miles upstream of the earlier Plainwell Dam cleanup, and included a two-mile stretch of the Kalamazoo River. The project was completed in December 2010. Approximately 11,000 linear feet of riverbank was cleared, excavated and restored, with approximately 18,000 cubic yards of soil and debris disposed off-site at the Allied Waste C&C Landfill in Marshall, Michigan, and at Ottawa County Farms Landfill in Coopersville, Michigan.

EPA Time-Critical Removal Action: Portage Creek

In July 2011, EPA signed an action memorandum to conduct a time-critical removal action along a 1.8-mile stretch of Portage Creek from Alcott Street to the

confluence of the Kalamazoo River. EPA began implementing this PCB hot-spot excavation project in September 2011. The project will take two to four field seasons to complete and will remove approximately 17,000 cubic yards of contaminated soil and sediment at a cost of about $16 million.

Basis for Taking Action

The Supplemental RI/FSs for OU5 have not been completed, and no RODs have been issued for OU5. As a result, EPA has not yet documented a basis for taking any final remedial actions at this OU. The remedial status of OU5 is discussed below.

Remedial Status

On February 27, 2007, Georgia-Pacific Corporation and Millennium Holdings, LLC signed an AOC with EPA to conduct a Supplemental RI/FS investigation for the entire 80-mile stretch of the Kalamazoo River. OU 5 is divided into seven areas each separated by a dam. Area 1 is the most upstream area from Morrow Dam to the former Plainwell Dam. EPA approved the SRI Report for Area 1 on June 27, 2012. The FS Report for Area 1 is scheduled to be submitted to EPA in November 2012. The SRI for Area 2, which is the area of the Kalamazoo River from the former Plainwell Dam to the Otsego City dam, began in December 2010 and is due to EPA in November 2012. The SRI for Area 3, which is the area of the Kalamazoo River from the Otsego City dam to the Otsego dam, began in June 2012 and sampling is underway. Samples of river sediment and bank soil are being collected at specific locations along the river (see Figure 10, OU5 Site Map).

Since a ROD has not been issued for OU5, there is no remedial action to discuss or evaluate; therefore, OU5 is not discussed further in this five-year review report.

B.6. Operable Unit 7

Physical Characteristics

The former Plainwell Paper Mill (OU7) is located in the City of Plainwell, Allegan County, Michigan (see Figure 11, OU7 Location Map). The 34-acre mill property is bordered by the Kalamazoo River to the north, the Plainwell central business district to the east, residential property to the south, and commercial properties and the City of Plainwell Wastewater Treatment Plant to the west.

Land and Resource Use

Operable Unit 7 was formerly zoned industrial. In 2006, the City of Plainwell purchased the mill property and the mill property was rezoned as residential. Land use in the

immediate vicinity of OU7 is characterized as industrial, commercial, and residential. A restrictive covenant running with the land from the former owner of the property to MDEQ (MDEQ Reference No: RC-RRD-201-05-001on USEPA Site No. 059B) is already in place (see Attachment 7, Restrictive Covenant for OU7). EPA is a third-party beneficiary of this restrictive covenant, which was recorded with the Allegan County Registry of Deeds on March 25, 2005. The restrictive covenant provides, among other things, that owners of the mill property must take reasonable steps to stop any continuing release of hazardous substances, and may not use the property in a manner that causes existing contamination to migrate beyond the property's boundaries. The restrictive covenant further provides that as response activities are performed at this property, MDEQ and EPA may require modifications to the covenant to assure the integrity and effectiveness of any selected remedial action.

History of Contamination

Between 1910 and 1962, various owners of the Plainwell Paper Mill obtained pulp through the de-inking and repulping of used paper. PCBs were introduced into the residuals as a result of the use of carbonless copy paper, which between approximately the 1950s and 1970s contained PCBs. Wastewater from the de-inking operations was discharged directly to the Kalamazoo River until 1954. After 1954, a clarifier was installed adjacent to the mill and wastewater was treated primarily by clarification. The clarified effluent was discharged into the Kalamazoo River. The underflow from the clarifier was dewatered in a series of on-site lagoons. The secondary treatment system was updated in 1983 with the installation of a second clarifier.

Historically, twice a year each lagoon was excavated and the material was taken to the 12th Street Landfill, located near the Plainwell Dam. The waste lagoons were taken out of service in 1983 when the second clarifier was installed. Four former waste lagoons are presently covered with soil and are well vegetated. Other lagoons were filled with soil after being cleaned out and are almost entirely located under the mill's present wastewater treatment facilities.

Response Activities

Emergency Response Action: Plainwell Mill Southern Banks

In 2007, at the request of the City of Plainwell, Weyerhaeuser conducted an emergency response action for the excavation of the southern banks of the Kalamazoo River adjacent to OU7 to abate a potential release from the banks of the mill property. The emergency action included only those activities made necessary as a result of the Plainwell Dam removal. An Emergency Response Action approach was authorized by EPA, on June 29, 2007, in accordance with the emergency action provisions of the Operable Unit #4 and the Plainwell, Inc. Mill Property of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund

Site Consent Decree, which became effective February 22, 2005. Weyerhaeuser began work in November 2007 and completed the work in November 2008. Excavation activities were conducted in four stages (Zone A through Zone D), each stage addressing a separate section of the adjacent Plainwell Mill banks, which were selected based on similar bank and/or river conditions. Removal activities began with Zone A, a 600-foot length of river bank adjacent to the west end of OU7, and then moved upstream to Zone B, a 700-foot length of river bank east of Zone A, followed by Zone D, a 650-foot length of river bank adjacent to the east end of OU7, and finally Zone C, a 650-foot length of river bank area situated between Zones B and D. Excavation on shore was considered complete when visible residuals were removed and PCB concentrations in composite verification samples collected from underlying soils were less than 4 mg/kg. Excavation of floodplain and near-shore sediments was considered complete when the original river bottom was encountered or when residuals were no longer visible in soil and sediment samples and PCB concentrations in verification samples collected from the underlying material were less than 1 mg/kg. Areas where PCB concentrations exceeding target levels remained in place were covered with geotextile fabric and 6 inches of clean soil or stone. Excavated areas were backfilled with clean fill material, graded, and stabilized with rip-rap. Weyerhaeuser removed a total of approximately 3,500 cubic yards of sediment and floodplain soil. Consistent with the federal Toxic Substances Control Act, sediments containing PCB concentrations greater than 50 ppm were segregated and disposed (59.67 tons) at Environmental Quality Co.'s Wayne Disposal Landfill in Belleville, Michigan. Sediments with concentrations less than 50 ppm (4,704 tons) were disposed at Waste Management Westside Landfill in Three Rivers, Michigan.

Basis for Taking Action

OU7 is in the RI/FS stage of the Superfund process. The RI/FS has not been completed, and a ROD has not been issued for OU7. As a result, EPA has not yet documented a basis for taking action at OU7. The remedial status of OU7 is discussed below.

Remedial Status

In December 2004, Weyerhaeuser signed a Consent Decree which, among other things, obligated the company to conduct the RI/FS and RD/RA for the Plainwell Mill property. RI Phase I field sampling and analysis activities were conducted between May and December 2008 and included a historical information review, a geophysical survey, installation of test pits along the banks of the Kalamazoo River to the north of the mill buildings, and an initial groundwater evaluation and assessment of the on-site coal tunnel. Phase 2 of the RI was conducted between January and June 2010 and included PCB investigation activities near the mill

buildings banks. A draft RI Report was submitted to EPA in June 2011, and EPA provided comments on the draft report in February 2012.

As noted above, effective ICs are in place at OU7. The ICs were negotiated as part of the bankruptcy settlement with Plainwell Inc., a former owner of the property. The ICs will be reevaluated after the selection of a remedy for OU7.

Since a ROD has not been issued for OU7, there is no remedial action to discuss or evaluate; therefore, OU7 is not discussed further in this five-year review report.

IV. Remedial Actions

Remedial actions were selected in RODs that were issued for OU2, OU3, and OU4. Therefore, for each of these OUs, the following subsections describe the selected remedy (including ICs), its implementation, and system operations, where applicable.

A. Operable Unit 2

Remedy Selection

Remedial action objectives (RAOs) for the Willow Boulevard/A-Site Landfill (OU2) were developed based upon the findings of the November 2004 RI and the human health risk evaluation in the RI. The RAOs for OU2 include:

- Eliminate exposure to PCB-contaminated material exceeding applicable land-use and/or risk based cleanup criteria;
- Prevent PCB migration, via erosion or surface water runoff, into the Kalamazoo River; and
- Mitigate, to the extent practicable, adverse effects to the environment due to implementation of a remedial action.

The OU2 ROD was signed on September 27, 2006. The remedy selected in the ROD includes:

- Excavation of PCB-contaminated residuals, soil, and sediment from areas outside the landfill and consolidation of excavated material into the A-Site Landfill portion of OU2;
- Creating a clean buffer between the Kalamazoo River and the Willow Boulevard Landfill portion of OU2;
- Implementation of bank stabilization and erosion control measures to protect against bank and/or dike failure and migration of PCB-contaminated residuals into the Kalamazoo River.
- On-site disposal of PCB-contaminated material in accordance with a 40 C.F.R. § 761.61 risk-based disposal approval;
- Installing a fence that encompasses the landfill to restrict access to the landfill;

- Implementing deed restrictions limiting future land use to industrial and/or commercial use, and
- Long-term groundwater monitoring.

Remedy Implementation

On May 18, 2009, EPA and Georgia-Pacific signed a Consent Decree for the implementation of the remedy at OU2. Remedial design work began in 2010 with the Preliminary Design Report being submitted in July 2010. The Final Remedial Design Report was submitted in May of 2011 and approved by EPA on April 27, 2011. The RA site work began in May 2011 with clearing and grubbing of the Willow Boulevard Landfill. EPA anticipates that RA site work will be completed in the spring of 2013. Current completed activities include consolidation of wastes from the areas surrounding the Willow Boulevard and A-Site Landfills and capping, storm water management, and initial turf establishment at the Willow Boulevard Landfill. Capping and storm water management efforts at the A-Site Landfill are currently under construction. Major RA construction activities are anticipated to conclude with installation of the long-term monitoring network in late 2012 or the spring of 2013.

Institutional Controls

Since the last five-year review, the ICs at OU2 have been completed and recorded to prevent use of site groundwater and inconsistent land use, and for the protection of the remedy currently under construction (see Attachment 5). Table 2 summarizes the institutional controls for the restricted areas at OU2.

Table 2: Institutional Controls Summary for OU2

[illegible]	[illegible]	[illegible]
Groundwater - On Site	Prohibit groundwater use	Declaration of Restrictive Covenants and Environmental Protection Easement, July 22, 2010
Other Remedial Action Components	Prohibit Inconsistent Uses and protect the integrity of the remedy components	Declaration of Restrictive Covenants and Environmental Protection Easement, July 22, 2010

As noted above, a restrictive covenant is in place to restrict future use of the landfill property. The restrictive covenant prohibits any activity or use that would interfere with the landfill cap, prohibits excavation, restricts property uses to those compatible with industrial use, and restricts the use of site groundwater at this OU.

Current Compliance

The remedy is currently under construction. Compliance will be evaluated after completion of the remedial action.

Long-Term Stewardship

Compliance with effective ICs is required to assure long-term protectiveness. EPA will ensure that long-term stewardship of OU2, as well as every other OU of the Site, includes implementation and maintenance of each component of the selected remedy, including any necessary ICs. Along with implementation of effective ICs, assurance plans (such as the O&M Plan) must be developed to assure proper maintenance and monitoring of effective ICs. The plan would include regular inspection of ICs at the Site and annual certification to EPA that ICs are in place and effective.

B. Operable Unit 3

Remedy Selection

The RAOs for the King Highway Landfill (OU3) were developed based upon the findings of the July 1994 RI and the human health risk evaluation in the RI. The RAOs identified in the September1994 Focused Feasibility Study include:

- Reduce the potential migration of PCBs to the Kalamazoo River that could result from erosion of residuals from behind the dike that physically separates the residuals from the river, or failure of the dike;
- Restrict the potential for PCB migration from leachate to groundwater;
- Restrict the potential transport of PCB-containing soil/residuals along the dike to the river in surface runoff or by erosion of soils/residuals due to river flows; and
- Restrict the potential contact with PCB-containing soil/residuals and surface water by workers and trespassers at the King Highway Landfill.

The ROD for OU3 and the Georgia-Pacific Five Former Lagoons was signed by MDEQ in October 1997, and EPA concurred on the ROD in February 1998. The remedy selected in the OU3 ROD includes:

- Excavation and consolidation of PCB-contaminated soils, sediments, and residuals from the landfill berms, the KSSS floodplain, the Georgia-Pacific Mill Lagoons, and the river sediment adjacent to the King Highway Landfill, and containment of the excavated material into the King Highway Landfill;
- Construction of a State of Michigan Part 115 landfill-compliant cap over the landfill;
- Erosion protection on the berms of the landfill designed to protect against a 100-year flood event;

- Installation of new groundwater monitoring wells and abandonment of wells that are no longer needed;
- Long-term groundwater and surface water monitoring for 30 years after capping;
- Landfill gas monitoring;
- Implementing deed restrictions limiting future land use;
- Implementing access restrictions by enclosing the entire King Highway Landfill and the Mill Lagoons (only during remediation) with a fence; and
- Placing a permanent marker at the King Highway Landfill and posting warning signs at the entry gates and on the fence every 200 feet.

The purpose of the selected remedy at the King Highway Landfill and the Mill Lagoons is to prevent direct contact with PCB-contaminated residuals and eliminate or reduce the potential migration of PCBs from the landfill and the Mill Lagoons into the Kalamazoo River. The selected remedy addresses OU3 and the Mill Lagoons by reducing the current and potential migration of PCBs into the Kalamazoo River.

Cleanup goals for soil at OU3 and the Mill Lagoons were based on the anticipated future land use, which was expected to remain industrial. Both properties are zoned for industrial use, therefore, the limited industrial cleanup criteria for soil established in Sections 20120(a) and 20121(b) of Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, MCL 324.20101(0) *et seq.* (NREPA), were used. At the time the ROD was signed, the limited industrial cleanup criterion for PCBs in soil was 21 mg/kg, but this standard was later reduced to 16 mg/kg. The ROD required that all visible PCB-contaminated residual, soil, and sediment from the KSSS floodplain and the river adjacent to the landfill be excavated and consolidated back into the landfill. The ROD did not impose numerical cleanup criteria for the KSSS floodplain and river adjacent to the landfill because these actions were considered an interim response action. However, if the confirmatory sampling at the KSSS floodplain showed that a residential cleanup criterion of 1 mg/kg PCB or lower had been achieved, then the action at the KSSS floodplain would be accepted as a final RA.

Remedy Implementation

On February 8, 2000, a Consent Order was signed by Georgia-Pacific and the State of Michigan, whereby Georgia-Pacific agreed to implement the remedy for OU3 and the Georgia-Pacific Five Former Lagoons. The remedial design started on June 30, 1999, and was completed on September 27, 2002. There were no difficulties or changes that occurred during the remedial design. Georgia-Pacific voluntarily started construction of the remedial action in 1996, before the ROD was issued and before the Consent Order was executed.

At the time the Consent Order was signed in February 2000, the landfill cap had already been constructed. The next on-site mobilization that occurred was on October 21, 2002, when the long-term groundwater monitoring well network was installed. This date of on-site construction of the RA is the date that "triggered" the initial five-year review requirement.

Georgia-Pacific submitted a Final Report for Completion of Construction for the King Highway Landfill OU3 and the Mill Lagoons to the MDEQ in May 2004 and a post-closure O&M Plan in June 2004. As of this five-year review, the MDEQ has not yet approved the Final Completion of Construction Report or the Final O&M Plan. However, additional components of the remedy were, and are, still needed to ensure long-term protectiveness, including the following: methane gas mitigation efforts (trenches); resolution of property ownership issues for components of the remedy constructed beyond property owned by Georgia-Pacific and residuals that were discovered to be contiguous with the landfill extending onto adjacent properties; related remediation efforts for those residuals; and implementation of appropriate ICs. Therefore, new drafts of the Completion of Construction Report and O&M plan are necessary to reflect the current status of the OU. The review of these draft documents is being conducted by MDEQ concurrent with the remaining mitigation efforts.

Institutional Controls

At the King Highway Landfill, a locked chain-link fence and sheet pile enclose the landfill and restrict public access to the landfill and potential for exposure to PCB-contaminated material. Warning signs are posted along the fence every 200 feet, and permanent markers will be posted on both ends of the landfill after deed restrictions on the site parcels are recorded with the Kalamazoo County Register of Deeds. The Mill Lagoons property is also fenced to restrict public access to the property.

Two draft restrictive covenants have been prepared for OU3 and final details are being worked out between the State of Michigan and Georgia-Pacific LLC. The first restrictive covenant covers the landfill property portion of OU3, and the second covers the Mill Lagoons property, also part of OU3.

Restrictive Covenant for the King Highway Landfill Property

The King Highway Landfill restrictions as set forth in the draft restrictive covenant include: prohibitions on any use of the property that would interfere with response activities at the property; prohibitions on construction/use of wells for consumption, irrigation or any use except those necessary for response activities; prohibitions on construction of any new buildings or structures unless the structures are outside the remedy area and are approved by MDEQ; prohibitions on excavation or other intrusive activity that could affect the integrity of the landfill cap; and restrictions on uses other than those necessary to implement the remedial action. An Access License Easement under negotiation between the City of Kalamazoo and Georgia-Pacific provides the city and its contractors access across the landfill property to access a city force main; the access road covered by the easement is described on a survey that will be recorded with the restrictive covenant.

The restrictions for the landfill property cover six parcels owned by Georgia-Pacific. Georgia-Pacific owned three of the parcels (known as 1, 2, and 10) at the time of the

previous five-year review, and acquired three of the parcels (known as Parcel A, B, and the Triangle Parcel) from 2006-2008 after it was identified that parts of the OU3 remedy were installed on land not owned by Georgia-Pacific, including land within the Michigan Department of Transportation (MDOT) right-of-way along King Highway.[1] In addition, landfill gas monitoring results at the time revealed that methane gas was migrating offsite.

To address these conditions, Georgia-Pacific purchased the Triangle parcel from MDOT, and Parcels A and B from MDOT and the City of Kalamazoo, respectively, and these parcels will be subject to the terms of the restrictive covenant. Georgia-Pacific also implemented a series of contingency actions to address the methane gas, including releasing potentially trapped gases, installing ventilators on passive gas riser vents, installing four landfill gas cutoff trenches and other barriers at the sides of the landfill, installing additional permanent gas monitoring probes, and increasing the frequency of landfill gas monitoring. While investigating and addressing the issues regarding the methane gas, additional residuals were discovered beyond the extent of the landfill and within the MDOT right-of-way. Georgia-Pacific performed additional investigations in the area, secured a permit to work on the MDOT property, and re-excavated in certain areas, removing visible residuals. In addition, Georgia-Pacific took soil borings for evaluation of the need for additional excavation, and a test pit was excavated for taking confirmation samples. The investigation and remedial activities conducted in the MDOT right-of-way are documented in reports submitted to MDEQ.

The portion of the King Highway right-of-way impacted by residuals was not available for purchase from MDOT, and therefore an approach for addressing remaining contamination was agreed upon as follows (in summary): Georgia-Pacific executed an Environmental License Agreement with MDOT for property within the MDOT right-of-way along King Highway, identified as "Parcel C" in documents submitted to MDEQ and filed with the Kalamazoo County Register of Deeds. The Environmental License Agreement delineates and provides notice of an area within the right-of-way where residual contamination remains, and provides for a bond from Georgia-Pacific for the purpose of covering additional costs that MDOT may incur due to the presence of the contamination if future construction is necessary within the right-of-way. The Environmental License was signed in March 2010. MDEQ approved the completed remedial activities within the right-of-way on December 29, 2010. The remedial activities included excavation of the top foot of soil and disposing the materials at a solid waste landfill, placing an orange geotextile demarcation layer along the bottom of the excavation, backfilling the area with a minimum of one foot of clean topsoil, and grading, seeding and mulching the topsoil to promote proper drainage and revegetation.

[1] At the time of the 2007 five-year review, it was not known that residuals contiguous with the landfill extended onto adjacent properties.

On January 28, 2011, Georgia-Pacific recorded a Notice of Environmental Conditions with the Kalamazoo County Register of Deeds to place a notice in the chain of title regarding the location and nature of the PCB contamination remaining within the MDOT right-of-way, as well as the exposure barrier and clean fill placed over the residuals. Permanent markers for the right-of-way were placed between May 11 and May 18, 2011.

Restrictive Covenant on the Mill Lagoons Property

No decision had been made regarding restrictions on the Mill Lagoons portion of OU3 at the time the 2007 five-year review was completed. Georgia-Pacific, in consultation with MDEQ and EPA, has agreed to record a restrictive covenant restricting the uses of the Mill Lagoons property to substantially the same extent the King Highway Landfill is restricted, including: prohibitions on any use of the property that would interfere with response activities at the property; prohibitions on construction/use of wells for consumption, irrigation or any use except those necessary for response activities; prohibitions on construction of any new buildings or structures unless the structures are outside the remedy area and are approved by MDEQ; and restrictions on uses other than those necessary to implement the remedial action, with the exception of the following limited allowed uses:

- A recreational trail crossing a portion of the Mill Lagoons property that is owned and will be maintained by Kalamazoo County. An easement from Georgia-Pacific to Kalamazoo County executed on May 15, 2012, allows access to the recreational non-motorized path, prescribes allowed uses, requires maintenance, and describes the area covered by the easement and on which recreational uses are allowed by the restrictive covenant (the easement will be attached to the restrictive covenant and recorded with it). The easement also acknowledges the Superfund status of the Mill Lagoons property and commits the county to complying with all laws and rules that apply to the Mill Lagoons property. The draft restrictive covenant creates an express exception for recreational use for the easement area, fencing, and benches within the fenced area. Kalamazoo County has also provided its consent to the terms of the draft restrictive covenant, which will be recorded with the restrictive covenant. New surveys depicting the trail location are being prepared for recording as well.

- An Access License Agreement allowing Kalamazoo County access to construct and maintain the non-motorized path crossing a portion of the Mill Lagoons property, also executed on May 15, 2012. The Access License grants a temporary construction license for installation of the recreational trail, prohibits soil excavation or removal, and acknowledges the Superfund status of the Mill Lagoons property and commits the county to complying with all laws and rules that apply to the Mill Lagoons property. The license expires on the earlier of completion of the trail or December 31, 2012.

- Portions of the City of Kalamazoo sanitary sewer line, as well as a force main and pump station, are located on and under the Mill Lagoons property and are served by

an access road for maintenance. The sewer lines are identified in existing easements recorded at Liber 820, page 1483, and Liber 811, page 780. An Access License Agreement for construction and maintenance of the force main, sewer line, and pump station in areas covered by the restrictive covenants is under discussion between the City of Kalamazoo and Georgia-Pacific to address the city's plans for sewer improvements in the near future. The Access License Agreement, when executed, will be recorded and will reference the Restrictive Covenant for the Mill Lagoons Property and the Landfill Property as needed. The draft restrictive covenant language addresses the city's plans by providing for an allowed use within the sewer easements and forthcoming Access License Agreement for sewer installation or maintenance work.

Table 3 summarizes the institutional controls for these restricted areas at OU3.

Table 3: Institutional Controls Summary for OU3

[illegible]	[illegible]	[illegible]
Landfill – Capped Area	Prohibit use except maintenance and assure integrity of the landfill cap	Institutional controls are being evaluated
Groundwater – On Site	Prohibit groundwater use	Institutional controls are being evaluated
Other Remedial Action Components	Prohibit inconsistent uses and protect the integrity of the remedy components	Institutional controls are being evaluated
Georgia-Pacific Mill Property	Use limited to industrial use and a recreational bike trail	Institutional controls are being evaluated

System Operations and O&M Costs

GP has submitted a document that summarizes the previous five years of O&M costs for OU3, as is required by the AOC. The "maintenance" category is not itemized, but the dollar amounts are a significant percentage. Operation and maintenance costs were estimated in the ROD to be $125,000 per year. The actual annual O&M cost is $250,000. These costs are mostly attributed to activities performed pursuant to the *Hydrogeologic Monitoring Plan* and the *Landfill Gas Monitoring Plan*, which were developed pursuant to the requirements of the AOC (and which were developed years after the Focused Feasibility Study and ROD). Some of the activities performed include water level measurements, ultra low-flow groundwater sampling, data analysis and evaluation, design of various landfill gas control devices, and regulatory reporting – none of which were contemplated as part of the development of the annual O&M cost estimate presented in the 1994 Focused FS. Actual costs of physical cap maintenance and repair are less

than those estimated in the 1994 Focused FS, as there have not been any significant repair activities required thus far for the cap. A significant portion of the current annual O&M costs associated with on-site maintenance activities have been associated with the installation of several landfill gas control devices over the past several years.

C. Operable Unit 4

Remedy Selection

The RAOs for the 12th Street Landfill (OU4) were developed based upon the findings of the RI and the human health risk evaluation in the RI. The RAOs identified in the July 1997 Focused Feasibility Study Report include:

- Reduce the potential migration of PCBs to the Kalamazoo River that could result from erosion of residuals;
- Reduce the potential migration of PCBs to the adjacent property and wetlands that could result from erosion of residuals;
- Restrict the potential for PCB migration from leachate to groundwater; and
- Restrict the potential contact with PCB-containing soil/residuals by any workers or trespassers, or any anglers along the river.

MDEQ signed the ROD for OU4 on September 28, 2001. EPA concurred on September 28, 2001. The OU4 ROD requires the cleanup of the 12th Street Landfill and four areas adjacent to the landfill into which PCBs have migrated including: the woodland area, wetlands, adjacent property, and the former powerhouse channel.

The remedy selected in the 12th Street Landfill OU 4 ROD includes:

- Excavation of PCB-contaminated residuals, soil, and sediment from areas adjacent to the landfill and consolidation of the excavated material back into the landfill;
- Creating a hydraulic barrier between the east side of the landfill along the former powerhouse discharge channel;
- Restoration of areas that are excavated, cleared and grubbed, or otherwise affected by the remedial action;
- Construction of a side wall containment system around the outside of the landfill that provides side slope stability, 500-year event flood protection, and erosion control;
- Construction of a cover (cap) over the landfill that consists of, from bottom up, a six-inch-thick granular fill layer, 30-mil-thick geomembrane liner, 24-inch-thick general fill layer, and a six-inch-thick vegetative layer;
- Installation of a groundwater monitoring network and abandonment of wells no longer in use;
- Long-term groundwater monitoring and, during excavation activities, short-term surface water monitoring;

- Deed restrictions to restrict future land use; and
- Access restrictions including constructing a fence surrounding the landfill with warning signs and permanent markers posted along the fence.

Remedy Implementation

The Consent Decree for RD/RA work addresses the 12th Street Landfill OU4 and also requires a RI/FS investigation and RD/RA implementation at the former Plainwell Mill property (OU7). The Consent Decree for RD/RA was agreed to by EPA and Weyerhaeuser in December 2004, and entered by the U.S. District Court on February 15, 2005. However, at the request of EPA, the start of the remedial design phase of the remedy was put on hold pending the outcome of settlement negotiations for the Plainwell Dam removal action. Settlement negotiations ended on February 27, 2007. In May 2007, EPA notified Weyerhaeuser to begin the design phase of the 12th Street Landfill remedy and to initiate the RI at the former Plainwell Mill Property OU7.

Weyerhaeuser completed an emergency response at OU4 in accordance with the Consent Decree in anticipation of the future removal of the Plainwell Dam. The Plainwell Dam is located just upstream and adjacent to the landfill. Weyerhaeuser completed removal of contaminated sediments in the adjacent powerhouse channel and grading and armoring of the riverbanks along the Kalamazoo River adjacent to the 12th Street Landfill. The work represented a portion of the work associated with implementation of the remedial action that was selected in the ROD. The remaining components of the selected remedy were designed during the remedial design phase of work that started with the submittal of the Preliminary Design Report in October 2008. The final Remedial Design Report was approved in March of 2010. RA field work began in April 2010 and included consolidation of waste, capping, storm water management, turf establishment, and installation of a long-term groundwater monitoring network. Weyerhaeuser completed the RA field work in November 2010. EPA granted the Certification of Completion of the RA on October 1, 2012. Initial operation and maintenance efforts include repair of erosion during turf establishment and placement of additional topsoil and seeding over the perimeter pore water discharge trench to prevent undercutting of the rip-rap-filled shallow trench and surface erosion.

Quarterly groundwater monitoring began in October 2011. Two quarters of monitoring have been completed so far. Low-level concentrations of arsenic and cyanide have been detected at concentrations that exceed applicable State of Michigan generic criteria at one or more monitoring locations. Evaluation of groundwater monitoring data will continue until sufficient data is available to determine contaminant trends.

Institutional Controls

Access restrictions are currently inadequate at the 12th Street Landfill. A chain-link fence was installed on the south side of the landfill and warning signs were posted. However, OU4 is not fenced on the north, east, and west sides of the landfill, and the OU is easily accessible by the public.

Since the last five-year review, the ICs at OU4 have been modified to prohibit the use of groundwater. Table 4 summarizes the institutional controls for the restricted areas at OU4.

Table 4: Institutional Controls Summary for OU4

[illegible]	[illegible]	[illegible]
Groundwater – On Site	Prohibit groundwater use	Amendment to Declaration of Restrictive Covenants and Environmental Protection Easement, July 19, 2012.
Other Remedial Action Components	Prohibit inconsistent uses and protect the integrity of the remedy components	Declaration of Restrictive Covenants and Environmental Protection Easement, March 22, 2005.

As noted above, a restrictive covenant is already in place to restrict future use of the landfill property. The restrictive covenant prohibits any excavation that would interfere with the landfill cap and the amendment to the restrictive covenant prohibits of the use of on-site groundwater.

Current Compliance

The access restrictions are currently inadequate to prevent trespassing and/or remedy vandalism at the landfill. A fence needs to be constructed to prevent access and possibly other measures need to be employed to ensure long-term protectiveness. During the RD phase, Weyerhaeuser requested permission to only install limited fencing so the use of OU4 as an eco-park could be evaluated. EPA expects to discuss this potential use of OU4 and long-term access controls with Weyerhaeuser by the end of 2012.

Long-Term Stewardship

Compliance with effective ICs is required to assure long-term protectiveness. EPA will ensure that long-term stewardship of OU4, as well as every other operable unit of the Site, includes implementation and maintenance of each component of the selected remedy, including any necessary ICs. Along with implementation of effective ICs, assurance plans (such as the O&M Plan) must be developed to assure proper maintenance and monitoring of effective ICs. The plan would include regular inspection of ICs at the site and annual certification to EPA that ICs are in place and effective.

V. Progress Since the Last Review

Protectiveness Statements from Prior Review

The prior five-year review contained the following protectiveness statements for OU3 and OU4:

OU3 – King Highway Landfill: *"The remedy at OU3 currently protects human health and the environment in the short-term. The landfill cap is in good condition and prevents PCB-contaminated material in the landfill from migrating, via erosion or surface water runoff, into the Kalamazoo River. The cap is also an effective barrier that prevents exposure, via direct contact, to the contaminated material by on-site workers, trespassers, and anglers. The cap also minimizes infiltration of rainwater and reduces the potential for leachate generation and the potential for PCBs in groundwater to migrate into the Kalamazoo River. Public access to the landfill is restricted by a locked chain-link fence and sheet pile, where present, and prevents people from being exposed to the contaminated material. Institutional controls are not yet in place. However, in order for the remedy to be protective in the long-term, the following actions will need to be taken: (1) submit a schedule or plan to U.S. EPA and MDEQ for resolving ownership issues with respect to the MDOT and city of Kalamazoo properties and for implementing ICs at the landfill and MDOT and city of Kalamazoo properties; and (2) submit a landfill gas mitigation plan to MDEQ that will satisfy its concerns about the off-site migration of methane gas at the south end of the landfill. Long-term protectiveness requires compliance with effective ICs. U.S. EPA will ensure that long-term stewardship of OU3, as well as every other operable unit of the Site, includes implementation and maintenance of each component of the selected remedy, including any necessary ICs."*

OU4 12th Street Landfill: *"The remedy at the 12th Street Landfill OU4 is not protective because the remedy has not yet been constructed and because access controls are inadequate to protect trespassers from short-term risks associated with remedy construction. A chain-link fence is installed along the west side of the landfill but not on the east, north, and south sides of the landfill and trespassers can easily gain access to the landfill. A chain-link fence will need to be installed on all sides of the landfill to prevent public access to the property and prevent trespassers from being exposed to PCB-contaminated material during the on-going construction activities. Long-term protectiveness requires compliance with existing ICs. Although ICs are in place, an evaluation is necessary of whether groundwater use at the landfill needs to be restricted and, if so, whether existing ICs appropriately restrict or prevent groundwater use at the landfill property. This evaluation will be made during the remedial design phase of the remedy. U.S. EPA will ensure that long-term stewardship of OU4, as well as every other operable unit of the Site, includes implementation and maintenance of each component of the selected remedy, including any necessary ICs."*

<u>Issues and Recommendations from Prior Review</u>

During the first five-year review, several issues were identified at OU3 and OU4. The information below provides information on the actions that have been taken to address those issues.

OU3 King Highway Landfill:

Table 5: Actions Taken at OU3 Since the Last Five-Year Review

Issues from Previous Review	Recommendations/ Follow-up Actions	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
Institutional controls are not in place at the landfill property, including the land currently owned by MDOT and city of Kalamazoo which is located within the site security fence. The remedy is not protective until effective ICs are placed on both properties and are monitored and maintained.	An IC Plan will be prepared documenting the IC evaluation activities and necessary corrective measures. The IC plan is necessary to evaluate what ICs are necessary and develop a schedule for their implementation. The IC plan will also evaluate how to ensure long-term stewardship of the OU and long-term protectiveness of the remedy.	EPA	April 18, 2008	The IC plan was completed on September 14, 2007. Two draft restrictive covenants have been prepared for OU3 and final details are being worked out between the State of Michigan and Georgia-Pacific LLC. The first restrictive covenant covers the landfill property portion of OU3, and the second covers the Mill Lagoons property, also part of OU3.	Sept. 2007 (IC plan); January 2011 (draft restrictive covenant); Ongoing
MDEQ approval of the Final Completion of Construction Report and the Final O&M Plan is pending resolution of the MDOT and city of Kalamazoo property ownership issues.	Submit a schedule or plan to U.S. EPA and MDEQ for 1) resolving issues associated with the MDOT and city of Kalamazoo properties and 2) implementing ICs at the landfill property and the MDOT and city of Kalamazoo properties	PRP	November 15, 2007	Two draft restrictive covenants have been prepared for OU3 and final details are being worked out between the State of Michigan and Georgia-Pacific LLC. The first restrictive covenant covers the landfill property portion of OU3, and the second covers the Mill Lagoons property, also part of OU3.	January 2011 (draft restrictive covenant); Ongoing
Methane gas has migrated off-site in concentrations that exceed threshold criteria and will need to be mitigated.	Submit a landfill gas mitigation plan to MDEQ that will satisfy its concerns about the off-site mitigation of methane gas at the south end of the landfill	PRP	November 2007	Georgia-Pacific constructed gas collection trenches and additional monitoring locations to evaluate the effectiveness of the mitigation efforts.	2007-2012

Other actions that have been taken at OU3 since the last five-year review include the following:

- Acquisition of the Triangle Parcel at the southwest corner of the King Highway Landfill and Parcels A and B along the southern boundary of the King Highway Landfill to ensure that all structures and/or components of the remedy were located on property owned by Georgia-Pacific.

- Excavation and off-site disposal of some PCB-containing soils/residuals from the western portion of the MDOT right-of-way located south of the site security fence. As part of this remedial activity, a certain area of PCB-containing soils/residuals was left in place. This area, referred to as Parcel C, was delineated through visual observation and analytical testing via the advancement of soil borings and the excavation of test pits. The top one foot of material in Parcel C was excavated and an orange non-woven geotextile was placed at the bottom of the excavation. The area was then backfilled with a one-foot-thick layer of clean backfill material, graded, seeded, and mulched to promote drainage and facilitate revegetation. A *Final Environmental License Agreement Associated with the MDOT R-O-W* was executed between MDOT and Georgia-Pacific; this was the mechanism by which MDOT allowed the PCB-containing soils/residuals to remain within its property. In parallel with the Final License Agreement, the *Final Notice of Environmental Conditions Affecting Property Controlled by the MDOT* was developed in coordination with MDEQ and recorded with the Kalamazoo County Register of Deeds on January 28, 2011, to notify any potential future owners of the property that PCB-containing material remained below grade within this area.

- Installation of permanent markers in the MDOT right-of-way to notify the public of the environmental conditions that exist – specifically, PCB-containing residuals present below the demarcation layer installed one foot below grade within Parcel C.

OU4 12th Street Landfill:

Table 6: Actions Taken at OU4 Since the Last Five-Year Review

Issues from Previous Review	Recommendations/ Follow-up Actions	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
Access controls are inadequate. A chain-link fence is present along the south side of the landfill but there is no fence on the north, east, or west sides of the landfill. Trespassers and anglers can freely enter the property and use the river banks to fish and may become exposed to contaminated material.	Install a chain-link fence on the north, east, and west sides of landfill; post warning signs every 200 feet along the fence and on all entry gates; and place permanent markers around the boundary of the landfill describing the restricted area and the nature of the restrictions.	PRP	December 2007	Not yet completed; a fence needs to be constructed to prevent access and possibly other measures employed to prevent exposures until the remedy is fully implemented. During the RD phase, Weyerhaeuser requested permission to install limited fencing so the use of OU4 as an eco-park could be evaluated. EPA expects to discuss this potential use of OU4 and long-term access controls with Weyerhaeuser by the end of 2012.	Planned for May 2013

Issues from Previous Review	Recommendations/ Follow-up Actions	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
It is unclear whether groundwater use at the landfill needs to be restricted and, if so, whether existing ICs appropriately restrict groundwater use within the landfill property.	Evaluate whether groundwater use at the landfill should be restricted and, if so, amend existing ICs as necessary to ensure that ICs adequately restrict groundwater use at the landfill property.	PRP	April 2008	The use of groundwater has been restricted through the Amendment to Declaration of Restrictive Covenants and Environmental Protection Easement, July 19, 2012.	July 19, 2012

Other actions that have been taken at OU4 since the last five-year review include the following:

- The final Remedial Design Report was approved in March 2010. RA field work began in April 2010 and included consolidation of waste, capping, storm water management, turf establishment, and installation of a long-term groundwater monitoring network. Weyerhaeuser completed the RA field work in November 2010, and EPA granted the Certification of Completion of the RA on October 1, 2012. Initial operation and maintenance efforts include repair of erosion during turf establishment and placement of additional topsoil and seeding over the perimeter pore water discharge trench to prevent undercutting of the rip-rap-filled shallow trench and surface erosion.

- Quarterly groundwater monitoring began in October 2011. Two quarters of monitoring have been completed. Low-level concentrations of arsenic and cyanide have been detected at concentrations that exceed applicable State of Michigan criteria at one or more monitoring locations. Evaluation of groundwater monitoring data will continue until sufficient data is available to determine contaminant trends.

VI. Five-Year Review Process

Administrative Components of the Five-Year Review Process

The EPA Remedial Project Manager (RPM), James Saric, notified the MDEQ and Georgia-Pacific of the start of the second five-year review in a letter dated February 23, 2012. The EPA RPM headed the five-year review team and was assisted by co-RPMs Michael Berkoff and Sheila Desai, and the MDEQ Project Managers, Paul Bucholtz, Keith Krawczyk, and Kristi Zakrzewski.

The review schedule included the following components:

Community Notification
Document Review
Data Review
Site Inspection
Five-Year Review Report Development and Review

Community Notification and Involvement

In September 2012, the EPA Office of Public Affairs placed an ad in the local newspapers announcing that the five-year review was in progress and requesting that any interested parties contact the EPA RPM or Community Involvement Coordinator for additional information. Copies of the newspaper notices are included in Appendix A. Since the announcement notice was issued, no member of the community has contacted EPA regarding the five-year review.

Document Review

The five-year review included a review of relevant documents, which are listed in Appendix B.

Data Review

The five-year review included a review of relevant data reports listed in Appendix C. The findings of the data are discussed throughout this five-year review report. Since the last five-year review, groundwater samples at OU3 have been collected quarterly through 2010 and then biannually since 2011. PCBs have not been detected in the vast majority of those groundwater samples. When detected, PCBs are significantly below the 0.2 µg/L screening level. At OU4, quarterly groundwater monitoring began in April 2011. PCBs have not been detected in the vast majority of those samples. When detected, PCBs are significantly below the 0.2 µg/L screening level. Monitoring wells have yet to be installed at OU2. The groundwater monitoring results for OU3 and OU4 are included in Attachment 2.

Site Inspection

Willow Boulevard/A-Site Landfill OU2

The five-year review site inspection of OU2 was conducted on August 7, 2012, with Kristi Zakrzewski from MDEQ, Garry Griffith from Georgia-Pacific, and Michael Berkoff from EPA participating. The photographs and site inspection log are included in Attachments 3 and 4, respectively.

During the inspection, EPA observed that the gas venting sand layer was being placed upon the A-Site portion of OU2. Installation of the landfill cover was complete at the Willow portion of OU2, but the groundwater monitoring system had not yet been installed.

King Highway Landfill OU3

The five-year review site inspection of OU3 was conducted on August 7, 2012, with Keith Krawczyk from MDEQ, Garry Griffith from Georgia-Pacific, and Michael Berkoff from EPA participating. The photographs and site inspection log are included in Attachments 3 and 4, respectively.

At the time of the inspection, weather conditions were sunny with an air temperature in the mid-80s. The activities conducted during the inspection included a walk through the OU to assess the physical integrity of the components of the remedy, including the landfill cap, groundwater monitoring wells, gas vents, security fence, etc.

The landfill cap was in good condition. The vegetative cover had a few distressed areas. Most of these areas appear to be due to the lack of precipitation. There was one distressed area at which methane was detected on May 31, 2012 (see Figure 7, OU3 Site Map). The presence of methane in the soil would indicate that methane is migrating up through some compromise to the geosynthetic liner. On August 27, 2012, contractors for Georgia-Pacific excavated the area and discovered a tear and several small holes in the geomembrane liner. The contractors then replaced that section of the liner, tested its integrity and then backfilled the area. Georgia-Pacific's contractors completed the work on August 29, 2012. Erosion was observed in the southeast corner of the landfill with the toe of the liner visible in four locations. Erosion of the soil cover, in the form of a gully, was also observed along the southern border of the landfill near the sedimentation outlet. The second location is outside of the landfill cap. Georgia-Pacific expressed its intent to address both of these areas. During the inspection, the inspection team observed another distressed area on the eastern toe of the landfill, which was similar in appearance to the distressed area at which methane had been detected. Georgia-Pacific agreed to sample the soil in this area for methane. The inspection team observed some settling within the drainage swale along the northern landfill cap access road. That settling prevents drainage as designed. Georgia-Pacific agreed to regrade the area. Some gas vents appeared to be slightly tipped but the surrounding cap did not appear to be compromised. Otherwise, the cap appeared to be fairly well maintained with no other noticeable depressions, cracks, or odors. The areas in need of repair will be addressed as a part of the regular O&M of the landfill.

Groundwater wells were in good condition and properly secured. Gas monitoring probes and passive gas vents were also in good condition, properly secured, and functioning properly. A locked, chain-link fence surrounds the landfill and effectively restricts public access to the landfill. At the time of the inspection, warning signs were posted every 200 feet on the fence. Permanent markers will be posted on each side of the property at the time the restrictive covenant is recorded with the City of Kalamazoo Registry of Deeds.

Interviews were conducted with Keith Krawczyk, MDEQ project manager, and Garry Griffith, Georgia-Pacific project manager, during the August 7, 2012, site inspection.

Though the MDEQ project manager is generally satisfied with the overall operation and maintenance of the OU3 remedy, he is dissatisfied with the O&M Manager's responsiveness in addressing problems as they arise and the overall quality of the site inspections. The Georgia-Pacific project manager addressed these concerns, stating that future inspections would be conducted by different personnel and that they would be more prepared for the inspections, and an appropriate response would be completed to address issues identified during the inspections.

No interviews with the public were conducted or necessary during the five-year review period as community interest regarding OU3 is minimal.

12th Street Landfill OU4:

The five-year review site inspection of OU4 was conducted on August 7, 2012, with Kristi Zakrzewski from MDEQ, Jodie Dembowske of Conestoga Rovers & Associates, and Michael Berkoff from EPA participating. The photographs and site inspection log are included in Attachments 3 and 4, respectively.

At the time of the inspection, weather conditions were sunny with an air temperature in the mid-80s. The activities conducted during the inspection included a walk through the OU to assess the physical integrity of the components of the remedy, including the landfill cap, groundwater monitoring wells, gas vents, security fence, etc.

The landfill cap was in good condition. The vegetative cover had a few distressed areas, which appear to be due to the lack of precipitation. At the toe of the landfill, on the northern, southern and western sides, the site team observed a band of erosion. The area corresponds with the zone at which water exits the cap drainage layer. Portions of the geotextile layer that make up the drainage feature were exposed. This band of erosion had been observed at the landfill on multiple previous site visits. The previous remedy for the problem was to add soil patches to the eroded areas. The inspection team agreed that repairs are needed to prevent further erosion. Otherwise, the cap appeared to be fairly well maintained with no noticeable depressions, cracks, or odors.

Groundwater wells were in good condition and properly secured. Gas monitoring probes and passive gas vents were also in good condition, properly secured, and functioning properly. As previously discussed, access controls do not currently prevent trespass. At the time of the inspection, warning signs were not posted every 200 feet on the fence and permanent markers were not posted on each side of the property. EPA and MDEQ are evaluating Weyerhaeuser's proposed signage, which will be installed once approved. The restrictive covenant is recorded with the City of Kalamazoo Registry of Deeds.

VII. Technical Assessment

A. Operable Unit 2

Question A: Is the remedy functioning as intended by the decision documents?

No. Implementation of the remedy is not yet complete, as the landfill cover is not in place at the A-Site Landfill. Groundwater monitoring wells are not in place at the Willow portion, so it is not yet possible to determine if the remedy is operating as intended at that portion of the OU. However, once completed it is anticipated that the remedy will function as designed. Site controls implemented as a part of the RA mitigate the possibility for off-site transport and exposure to contaminated materials.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection still valid?

Yes. The exposure assumptions, toxicity data, risk assessment methods, and RAOs at the time of the ROD are still valid.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No. No additional information has been identified that would call into question the protectiveness of the remedy.

B. Operable Unit 3

Question A: Is the remedy functioning as intended by the decision documents?

Yes. The landfill remedy (capping and containment) is operating and functioning as intended by the ROD and the Consent Order. The landfill cap is generally in good condition and prevents PCB-contaminated material in the landfill from migrating, via erosion or surface water runoff, into the Kalamazoo River. The cap is also an effective barrier that prevents exposure, via direct contact, to the contaminated material by on-site workers, trespassers, and anglers. The cap also minimizes infiltration of rainwater and reduces the potential for leachate generation and, consequently, the migration of PCBs in groundwater into the Kalamazoo River. PCBs were not detected in groundwater above the performance standard.

Access restrictions are in place and prevent exposure to the contaminated material. The locked chain-link fence and sheet piling restricts public access to the landfill via Route M-89 and via the Kalamazoo River. Warning signs are posted every 200 feet along the perimeter fence notifying the public that the area is hazardous due to the buried paper-making residuals. Although not required at the time of this five-year review, permanent markers were installed along the MDOT property to demarcate the extent of residuals left in place. Signs have been posted on all entry gates and every 200 feet along the chain link fence.

As previously discussed, not all institutional controls are in place. However, the objectives of the ICs are being met since the public is not directly exposed to PCB-contaminated residuals or to PCBs via groundwater. The landfill property is zoned industrial and will remain industrial in the future via local zoning ordinances and the anticipated deed restrictions. Groundwater at the landfill property is not used for any purpose; therefore, there are no exposure pathways to on-site workers or the public from groundwater. All immediate threats have been addressed and no additional actions, other than the recommended actions identified in Section VIII of this five-year review, are anticipated.

Methane gas has migrated off-site in concentrations that exceed threshold criteria. However, Georgia-Pacific has constructed gas collection trenches to address this issue and additional

monitoring locations have been established to evaluate the effectiveness of the mitigation efforts.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection still valid?

Yes, except that since the date of the Consent Order implementing the ROD, the Michigan cleanup standard for PCBs in soil has become less stringent. The exposure assumptions, toxicity data, risk assessment methods, and RAOs at the time of the ROD are still valid. However, when the ROD was issued, the State of Michigan Part 201 limited industrial cleanup criterion for PCBs in soil was 21 mg/kg and when the Consent Order for RD/RA was signed, the industrial cleanup criterion for direct contact with PCBs in soil was 9.9 mg/kg. Today, the PCB industrial land use criteria is 16 mg/kg for PCBs in soil. The landfill and the Mill Lagoons were remediated to achieve the industrial land use criterion of 9.9 mg/kg as specified in the Consent Order. Because the landfill and Mill Lagoons were remediated to a level that is below today's standards, the change in cleanup levels has no effect on the protectiveness of the OU3 remedy. The remedy is progressing as expected and is achieving the RAOs.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No. Methane migration could be an issue as it is occasionally detected outside of the capture zone of the gas collection trenches outside of the Georgia-Pacific property, and always detected at those gas wells within the perimeter fence above the lower explosive limit. It is possible that this issue is now very localized to GW-13. Additional gas collection trenches have been installed along with new monitoring locations, though more may be required. Continued monitoring is necessary and will be conducted to determine if this is an issue in the future.

B. Operable Unit 4

Question A: Is the remedy functioning as intended by the decision documents?

No. The major activities involved in construction of the landfill are complete, and EPA approved the Certification of Remedial Action Completion in early October 2012. Although ICs are in place, engineered access restrictions are inadequate to protect trespassers from damaging the components of the remedy, and the lack of access controls could potentially result in future exposure to PCB-contaminated material. Except for the lack of access controls, it appears that the rest of the remedy is operating as intended. EPA has agreed to let Weyerhaeuser evaluate access controls as a part of its evaluation of the landfill as a wildlife viewing area. This evaluation should be complete by the end of 2012.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of remedy selection still valid?

Yes. The exposure assumptions and RAOs used at the time of the remedy selection are still valid. The OU4 ROD did not specify cleanup numbers for industrial soils. Instead, the ROD

established visual criteria as the primary method by which PCB-contaminated material would be identified. Post-excavation sampling was then compared to Michigan Part 201 criteria; specifically, confirmation samples at OU4 were compared to the residential/commercial criterion of 4 mg/kg PCB.

Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No. No additional information has been identified that would call into question the protectiveness of the remedy.

VIII. Issues

The tables in this section highlight the issues identified for OU2, OU3 and OU4 during the five-year review, based upon document reviews and discussions with the MDEQ project manager(s).

Willow Boulevard/A-Site Landfill OU2

No issues were identified at OU2.

King Highway Landfill OU3

MDEQ has not yet approved the Construction Completion Report and it may require further revision and augmentation before approval. Monitoring and maintenance of the landfill needs improvement.

Some of the landfill remedy components were built on properties that are not owned by Georgia-Pacific. These properties are located within the security fence at OU3, but are owned by MDOT and the City of Kalamazoo. Georgia-Pacific needs to continue to work toward resolution of this issue and implement the necessary ICs.

The following table summarizes the issues at OU3 that affect the protectiveness of the remedy.

Table 7: Issues Identified at OU3

Issues	Affects Current Protectiveness	Affects Future Protectiveness
Effective ICs are needed on all site properties and need to be monitored and maintained. Institutional controls are needed for the landfill property and the land located within the site security fence that is currently owned by MDOT and the City of Kalamazoo. Additionally, MDEQ will not approve the Final Completion of Construction Report and the Final O&M Plan until the MDOT and City of Kalamazoo property ownership issues are resolved. Until these reports are approved, MDEQ cannot issue a Certification of Completion of Construction for the landfill and without this certification, under the terms of the agreement between MDEQ and Georgia-Pacific, the appropriate restrictive covenants cannot be recorded with the Kalamazoo County Register of Deeds.	No	Yes
Methane gas has migrated off-site in concentrations that exceed threshold criteria and will need to be mitigated.	No	Yes

12th Street Landfill OU4

The following table summarizes the issues at OU4 that affect the protectiveness of the remedy.

Table 8: Issues Identified at OU4

Issues	Affects Current Protectiveness	Affects Future Protectiveness
Access controls are inadequate. A chain-link fence is present along the south side of the landfill but there is no fence on the north, east, or west sides of the landfill. Trespassers and anglers can freely enter the property and use the river banks to fish and have access to the landfill cap and associated gas vents. Additionally, the fence on the southern side of the landfill does not restrict foot traffic. The current access configuration does not prevent vandals from damaging the remedy.	No	Yes
Ongoing erosion at the toe of the landfill over the pore water collection discharge area.	No	Yes

IX. Recommendations and Follow-Up Actions

The recommended follow-up actions to address the issues identified in Section VIII of this report for OU3 and OU4 are presented in Table 9 and Table 10, respectively.

Table 9: Recommendations and Follow-Up Actions for OU3

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness	
					Current	Future
Effective ICs are needed on all site properties and need to be monitored and maintained. Institutional controls are needed for the landfill property and the land located within the site security fence that is currently owned by MDOT and the City of Kalamazoo. Additionally, MDEQ will not approve the Final Completion of Construction Report and the Final O&M Plan until the MDOT and City of Kalamazoo property ownership issues are resolved. Until these reports are approved, MDEQ cannot issue a Certification of Completion of Construction for the landfill and without this certification, under the terms of the agreement between MDEQ and Georgia-Pacific, the appropriate restrictive covenants cannot be recorded with the Kalamazoo County Register of Deeds.	Submit a plan to MDEQ and EPA for 1) resolving property ownership issues with respect to the MDOT and City of Kalamazoo properties, 2) finalizing the Final Completion of Construction Report and the Final O&M Plan, and 3) implementing all required ICs.	PRP	EPA and MDEQ	October 2013	No	Yes
Methane gas has migrated off-site in concentrations that exceed threshold criteria and will need to be mitigated.	Submit an updated landfill gas mitigation plan to MDEQ that will satisfy its concerns about the off-site mitigation of methane gas at the south end of the landfill.	PRP	EPA and MDEQ	October 2013	No	Yes

Table 10: Recommendations and Follow-Up Actions for OU4

Issue	Recommendations and Follow-up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness	
					Current	Future
Access controls are inadequate. A chain-link fence is present along the south side of the landfill but there is no fence on the north, east, or west sides of the landfill. Trespassers and anglers can freely enter the property and use the river banks to fish and have access to the landfill cap and associated gas vents. Additionally, the fence on the southern side of the landfill does not restrict foot traffic. The current access configuration does not prevent vandals from damaging the remedy.	Complete evaluation of access controls along with evaluation of potential use of OU4 as an eco-park (i.e., wildlife viewing area) so that final decisions about long-term access controls can be made.	PRP	EPA and MDEQ	December 2012	No	Yes
Ongoing erosion at the toe of the landfill over the pore water collection discharge area.	Repair or reconstruct drainage feature at toe of landfill.	PRP	EPA and MDEQ	October 2013	No	Yes

X. Protectiveness Statements

The remedy at OU2 is expected to be protective of human health and the environment upon completion of the remedy, and in the interim, exposure pathways that could result in unacceptable risks are being controlled. The RA for OU2 began in April 2011 and is expected to be completed in 2013. During 2011, the waste at the Willow Boulevard Landfill portion of OU2 was consolidated and covered with an impermeable cap. The vegetated soil cover for this portion of OU2 was installed in 2012. EPA expects the installation of the impermeable cover at the A-Site portion of OU2 to be completed in 2012 and the installation of the OU2-wide groundwater monitoring system to be completed in 2013. Institutional controls restricting the use of site groundwater, site use, and for protection of the remedy were recorded and filed in 2010. Once the RA is completed EPA expects the remedy at OU2 to be protective of human

health and the environment. EPA will make that determination by inspecting the landfill cover and evaluating groundwater and methane monitoring data. In addition, there is a restrictive covenant in place that restricts certain use of the property including use that interferes with measures necessary to assure the effectiveness and integrity of the remedial action and use of site groundwater.

The remedy at OU3 currently protects human health and the environment in the short term. The landfill cap is generally in good condition and prevents PCB-contaminated material in the landfill from migrating, via erosion or surface water runoff, into the Kalamazoo River. The cap is also an effective barrier that prevents exposure, via direct contact, to the contaminated material by on-site workers, trespassers, and anglers. The cap also minimizes infiltration of rainwater and reduces the potential for leachate generation and the potential for PCBs in groundwater to migrate into the Kalamazoo River. Public access to the landfill is restricted by a locked chain-link fence and sheet pile, which prevents people from being exposed to the contaminated material. Methane generated within the landfill is passively managed and mitigated by gas collection trenches installed outside of the landfill. These trenches are largely effective with methane only occasionally detected at off-site probes beyond the lateral extent of the trenches. Additional trenching (or some alternative) may need to be installed to extend the lateral capture of methane migration at the OU3 boundary. Some ICs are in place at OU3, but require revision, while other ICs are not yet in place. In order for the remedy to be protective in the long term, the following actions will need to be taken: (1) implement revised and new ICs; (2) mitigate any off-site migration of methane gas, and (3) properly maintain the landfill. Long-term protectiveness requires compliance with effective ICs. EPA will ensure that long-term stewardship of OU3, as well as every other operable unit of the Site, includes implementation and maintenance of each component of the selected remedy, including any necessary ICs, and proper maintenance of the landfill.

The remedy at OU4 currently protects human health and the environment in the short term. The remedy has been constructed, and exposure pathways that could result in unacceptable risks are being controlled. The following issues need to be addressed as part of O&M at OU4: 1) erosion is occurring at the toe of the landfill where water exits the soil cover drainage feature, and 2) the current access controls do not prevent trespass. Weyerhaeuser, a PRP for OU4, will evaluate additional access controls. Evaluation of groundwater monitoring data will continue until sufficient data is available to determine contaminant trends. Long-term protectiveness requires compliance with existing ICs. Since the last five-year review, the ICs at OU4 have been modified to include a groundwater use prohibition. EPA will ensure that long-term stewardship of OU4, as well as every other operable unit of the Site, includes implementation and maintenance of each component of the selected remedy, including any necessary ICs.

XI. Next Review

The next five-year review for the Allied Paper, Inc./Portage Creek/Kalamazoo River Site is required within five years from the signature date of this review.

Attachments

Attachment 1: Site Maps (Figures 1- 11)
Attachment 2: Post-Closure Monitoring Groundwater Sample Results 2007-2012
Attachment 3: Photos Documenting Site Conditions
Attachment 4: Site Inspection Report
Attachment 5: Restrictive Covenant for OU2
Attachment 6: Restrictive Covenant for OU4
Attachment 7: Restrictive Covenant for OU7

Appendices

Appendix A: Newspaper Public Notices
Appendix B: List of Documents Reviewed for the Five-Year Review
Appendix C: List of Data Reviewed for the Five-Year Review

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF:
SE-5J

FEB 14 2007

MEMORANDUM

DATE: FEB 14 2007

SUBJECT: ENFORCEMENT ACTION MEMORANDUM: Determination of an Imminent and Substantial Threat to Public Health and the Environment at the Plainwell Impoundment Area of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site, Allegan County, Michigan (Site ID# 059B)

FROM: Samuel Borries, On-Scene Coordinator
Emergency Response Branch 2 - Section 2

THRU: Linda M. Nachowicz, Chief FOR LN.
Emergency Response Branch 2

TO: Richard C. Karl, Director
Superfund Division

I. PURPOSE

The purpose of this Action Memorandum is to document the determination of an imminent and substantial threat to public health and the environment at the "Plainwell Impoundment," an area of contamination within the Kalamazoo River Operable Unit of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site (sometimes referred to as the "Site" or the "Kalamazoo River Site"). The Site, which is located in Allegan and Kalamazoo Counties, Michigan, is pervasively contaminated with polychlorinated biphenyl (PCB), primarily as the result of waste practices associated with the de-inking of carbonless copy paper. The Site was listed on the NPL on August 30, 1990.

The Plainwell Impoundment is located in Gun Plain and Otsego Townships, downstream of Plainwell, Michigan, at latitude -85.66835 and longitude 42.45543. As described at greater length below, the Plainwell Impoundment extends 8000 feet upstream from the Plainwell Dam,

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and includes 1.5 miles of Kalamazoo River channel, adjacent banks, and 79 acres of floodplains.* The Plainwell Dam impounds 77,000 cubic yards of submerged sediment.

The response actions proposed in this Action Memorandum will mitigate threats to public health, welfare, and the environment presented by the presence of an uncontrolled release of PCB, a hazardous substance, into the food chain of the Kalamazoo River from in-stream sediments, riverbank soils, and floodplain soils located within the Plainwell Impoundment. Due to the contaminated nature of the sediment, the continuing release of contamination into the food chain, and potential exposure to the public, this removal action will be classified as time-critical. The proposed response actions include dredging and/or excavation of sediment, riverbank soils and floodplain soil, containment, monitoring, water treatment, stabilization and on-Site disposal. The response activities will require approximately 400 on-Site working days to complete, and will result in the removal of 132,000 cubic yards of waste material, containing 4,400 pounds (88%) of PCB, from the Plainwell Impoundment.

Subsequent to completion of the removal action, Region 5 will complete its evaluation, through the Superfund remedial process, of the risks to human health and the environment presented by the presence of PCB within the first reach of the Kalamazoo River Operable Unit of the Site (which includes the Plainwell Impoundment). This evaluation will consider data collected and analyses performed as part of the removal action described in this Action Memorandum. U.S. EPA will then issue a Record of Decision (ROD) for the entire first reach of the Kalamazoo River Operable Unit (*i.e.* Morrow Dam to the Plainwell Dam) and, as part of that ROD, will determine whether additional response actions are necessary within the Plainwell Impoundment to address risks to human health and the environment not addressed through the time-critical removal process.

Two of the potentially responsible parties (PRPs) for the Site, Millennium Holdings, LLC (MHLLC) and Georgia-Pacific Corporation (GP), are prepared to conduct the time-critical removal action described in this Action Memorandum. Both of these companies are owners of now-inoperable papermaking facilities at the Site. The companies (or their predecessors-in-interest) engaged in the de-inking of carbonless copy paper, and discharged wastes containing high concentrations of PCB into the Kalamazoo River upstream of the Plainwell Impoundment.

The decision by MHLLC and GP to conduct this response action is the result of more than two years of formal mediation among the two companies, U.S. EPA, the Michigan Department of Environmental Quality (MDEQ), the Michigan Department of Natural Resources (MDNR), the Michigan Department of Attorney General, the U.S. Department of Interior and the National Oceanic and Atmospheric Administration. The United States Department of Justice participated in many of the mediation sessions. On August 28, 2006, MHLLC, GP, U.S. EPA, MDNR, MDEQ, and the Michigan Department of Attorney General entered into an Agreement in

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* As a general matter, volume, area and distance quantities used in this Action Memorandum are approximations, and represent U.S. EPA's best estimates as of the date of this Action Memorandum.

Principle, pursuant to which MHLLC and GP agreed to conduct a time-critical removal action to excavate and/or dredge PCB from the Plainwell Impoundment. MHLLC and GP also agreed to conduct a Supplemental Remedial Investigation and Feasibility Study (SRI/FS) for the Site. Negotiations for both administrative settlements are almost complete.

The State of Michigan will be a signatory to the Administrative Settlement and Consent Agreement for the proposed time-critical removal action (AOC), which will include, as an enforceable exhibit, an engineering design (Design). MHLLC and GP submitted a draft Design on November 13, 2006. All mediation parties consulted on the draft Design, which was approved by the State of Michigan on February 13, 2007. U.S. EPA expects to approve the Design on February 14, 2007.

II. SITE CONDITIONS AND BACKGROUND

CERCLIS ID # MID006007306

A. Physical Location and Description

The Kalamazoo River Site includes approximately 80 miles of the Kalamazoo River between Morrow Dam and Lake Michigan, adjacent floodplains and wetlands, and (to the extent they contribute PCB to the Kalamazoo River system) four paper waste disposal areas and several former paper mill properties. The Site lies within the Great Lakes Basin in the Kalamazoo River watershed of Michigan's Lower Peninsula. The watershed drains 2,020 square miles of southwest Michigan. It reaches 162 miles into south-central Michigan, and ranges in width from 11 to 29 miles.

The main channel of the Kalamazoo River flows northwest for 123 miles before ultimately emptying into Lake Michigan near Saugatuk, Michigan (KRWPAC 1998; BBL 2000b). The river contributes 42 pounds of PCB annually to Lake Michigan.

Site topography is influenced largely by past glacial activity. The area is relatively flat with gentle rolling plains. In general, the land surface slopes gently westward toward Lake Michigan. Ground and terminal moraines, eskers, and drumlins provide the only significant relief over the region. Low elevation areas are typically wetlands or bodies of open water, such as kettle lakes. Drainage patterns center around the former meltwater drainageway, which is now, at its lowest points, occupied by the Kalamazoo River. The river itself drops 540 feet in elevation from its headwaters to its mouth, producing a slow to moderate stream gradient (KRWPAC 1998).

The Plainwell Dam was built in 1902 as a hydroelectric facility. In 1966, Consumers Power decommissioned the Plainwell Dam as a power generator, and donated it (along with the Otsego and Trowbridge dams) to the Lands Division of MDNR. During the 1970s and 1980s, MDNR dismantled the powerhouse structure and some of the spillway about the fixed crest. As a result, the water level at the Plainwell Impoundment dropped, and formerly-submerged sediments became exposed and ultimately vegetated. These formerly-submerged sediments are now generally referred to as "floodplain soils."

The term "Plainwell Impoundment" or "Plainwell Impoundment area" generally refers to that portion of the Kalamazoo River system that was underwater when the Plainwell Dam was intact and fully operational. At that time, the dam had a head of 13 feet and impounded water to an elevation of 712 feet National Geodetic Vertical Datum (NGVD) (Evans, 1966). The impounded water covered an area of 123 acres (Miller 1966). The sill of the dam now has a head of only 5 feet (Johnson et al. 1989), and an impounded surface area of 44 acres. Within the Plainwell Impoundment, the Kalamazoo River currently averages 197 feet in width and 3.7 feet in depth (BBL 1994c). The drainage area around the impoundment covers 1,299 square miles (Hayes 1996b).

According to MDNR, impoundment stages higher than an elevation of 707.0 feet above mean sea level will result in water flowing over parts of the embankment adjacent to the spillway of the former powerhouse. Spillway capacity at an elevation of 707 feet is about 5,700 cubic feet per second (cfs), which approximates the 10-year flood stage (Hayes 1996b).

The topography of the Plainwell Impoundment area is very much a reflection of the bathymetry of the river before removal of the dam's superstructures. The river has two large meander bends that run about a mile upstream of the reduced dam. The insides of the meander bends are wide and flat, with only 1 to 3 feet of relief. These areas mark the primary location of sediment deposition when the river was fully impounded. The outer banks of the meander bends are steep, with 10 to 25 feet of relief. In some areas of the outer banks, there are small, flat areas 10 to 50 feet wide. These areas, too, are depositional relics of the former impoundment water levels, and have the greatest potential for erosion since they border the eroding bank of the river channel. Upstream of the meander bends, the river straightens its channel somewhat and has wide, impoundment-deposited flats on each side of the river. In areas where the depositional flats are not present, the banks are steep, with 10 to 15 feet of relief.

B. Environmental Justice Analysis

To meet Region 5's Environmental Justice (EJ) concern criteria, the area within 1 mile of a site must have a population that is at least twice the state's average low-income percentage and/or twice the state minority percentage. Among all Michigan residents, the low-income percentage is 29% and the minority percentage is 21%. U.S. EPA's EJ analysis of the population within one mile of the Plainwell Impoundment area determined that the low-income percentage is 30% and the minority percentage is 4%. Therefore, the Plainwell Impoundment area does not meet the Region's EJ criteria based on demographics, as identified in "Region 5 Interim Guidelines for Identifying and Addressing a Potential EJ Case, June 1998."

C. Site Assessments

The Administrative Record for the Kalamazoo River Site contains numerous reports which summarize the investigations conducted to date. Attachment 3 to this Action Memorandum

contains short descriptions of many of the major reports for the Site. Detailed information from the reports most relevant to this time-critical removal action is set forth here:

1. RI/FS Data.

Between 1990 and 2000, several PRPs for the Site (including MHLLC and GP) conducted a Site-wide RI/FS pursuant to an administrative agreement with the State of Michigan. During the 1993 and 1994 RI field work, approximately 125 submerged sediment samples were collected from within the channel of the former Plainwell Impoundment. Total PCB concentrations ranged from non-detect to 139 milligrams per kilogram (mg/kg).

The RI field work also included an assessment of the physical characteristics of the riverbanks within the three former impoundments. The PRPs concluded, primarily through visual observation, that the riverbanks were a source of ongoing loading of exposed sediments (and therefore PCB) to the river. The PRPs also identified, again primarily through visual observation, some of the mechanisms involved in such loading. The cohesive nature of the exposed sediments allows significant portions of the impoundments' riverbanks to remain in vertical-to-near-vertical repose. The fine-grained exposed sediments, however, generally overlie non-cohesive sandy sediments or soils. As a result, the faces of the banks are susceptible to erosion through direct contact with the river at higher river stages, and to undercutting by erosion of the underlying non-cohesive sediments or soils. Undercutting progresses until the overlying sediments fail by slumping or calving as blocks that fall into the river. The remnants of such blocks can be observed along the toe of the banks in certain areas. (BBL 2000).

The PRPs also conducted visual observations of the floodplain soils in the impoundment areas. The floodplain soils were often covered by a few inches of brown, silty-to-sandy soil, often mixed with organic material. The thickness of the floodplain soils at the Plainwell Impoundment ranged from several inches in the areas at the upstream end to several feet in areas near the dam sill, with an average thickness of 3.8 feet. Areas of gray clay deposition were observed in locations where the former impoundment water was relatively shallow or where backwater conditions existed.

The PRPs estimated the volume of the floodplain soils within the Plainwell Impoundment to be approximately 360,000 cy (BBL 2000). The PRPs collected 135 floodplain soil samples that had total PCB concentrations ranging from not-detected to 85 mg/kg, with an overall average concentration of 8.9 mg/kg (BBL, 1994a; BBL, 2000a). PCB concentrations were generally found to decrease with depth, and concentrations in subsurface soils tended to decrease with distance from the river.

2. USGS Study.

In 2002, the United States Geological Survey (USGS) and MDEQ prepared a study to define the Kalamazoo River's fluvial sedimentology within the Plainwell, Otsego, and Trowbridge impoundments. The objective of the study was to provide a better estimate of the volume, configuration, character, and distribution of in-stream sediments at the impoundments. The project included creating sediment-depth profiles and performing particle-size analyses from

sediment cores. The sediment cores provided information on both pre- and post-impoundment erosion and deposition. USGS concluded that lacustrine deposits accumulated when the dams were in place. The fine-grained deposits ranged in thickness from zero to 12 feet. Once the dam superstructures were removed, alluvial deposits accumulated on the erosional cut into the lacustrine deposits. These coarser deposits ranged in thickness from zero to 5.5 feet.

USGS used the data it collected to prepare a series of detailed isopach maps for each impoundment area. The maps depict not only sediment thicknesses as they currently exist, but also sediment thicknesses that would result from any dismantling of the dams. USGS estimated that complete removal of the three dams would increase the slope of the Kalamazoo River to more than 2 percent, making the river a moderate-gradient system (USGS 2002).

In 2005, USGS, in cooperation with U.S. EPA and MDEQ, conducted an additional study of the channel characteristics of the Kalamazoo River. This study concluded that the erosion of the "toe" of the bank widens the River's stream, and results in steeper bank angles. Once the bank undercut exceeds its critical bank angle, the inability of the sediments to support themselves results in bank failure.

3. U.S. EPA Supplemental Response Activities.

In order to better determine the areal extent and volume of PCB-contaminated soils and sediments in the Plainwell and Otsego City impoundments, in 2001 U.S. EPA conducted a two-phase sampling program. During Phase I, U.S. EPA obtained in-stream sediment and floodplain soil samples from areas of the river system between Plainwell and Otsego. Phase II involved collecting samples in a radial grid pattern around specific samples collected during Phase I. (The purpose of such radial sampling is to provide U.S. EPA with greater resolution in determining the areal extent of contamination.)

During Phase I sampling of submerged sediments, U.S. EPA collected 53 samples whose total PCB concentrations ranged from not-detected to 33 mg/kg (Weston, 2002). During Phase II sampling, U.S. EPA collected an additional 160 sediment samples from around sample location SD004, which is approximately 1,500 feet upstream of the Plainwell Dam. The results of this effort showed total PCB concentrations ranging from not-detected to 4.2 mg/kg (Weston, 2002).

U.S. EPA collected 147 floodplain soil samples (Phase I), which ranged in total PCB concentration from not-detected to 84 mg/kg (Weston, 2002). The Agency followed up with Phase II radial sampling in three locations, referred to as Grid 1 (218 samples around Sampling Location [SL] 015), Grid 2 (235 samples around SL029), and Grid 6 (159 samples around SL012). Total PCB concentrations in the Phase II samples ranged from not-detected to 158 mg/kg in Grid 1; from not-detected to 45.3 mg/kg in Grid 2; and from not-detected to 65.6 mg/kg in Grid 6 (Weston, 2002).

U.S. EPA's 2001 study confirmed: (1) that the gray clay material in the Plainwell Impoundment is indicative of waste paper residuals; (2) that most of the PCB contamination at these impoundments occurs within the uppermost two feet of sediment or soil; and (3) that "hot spots" of higher PCB concentration are located in the floodplain soils (Weston 2002).

4. PRP-conducted Supplemental Response Work.

a. Bank erosion studies

Since submitting the draft RI/FS Report in 2002, MHLLC and GP have conducted several supplemental studies regarding the nature and extent of PCB loading from the Plainwell Impoundment into the Kalamazoo River. Between 2000 and 2003, MHLLC and GP performed an analysis of the extent and rate of bank erosion by placing erosion pins in the riverbanks. Cross-sectional data from this work was documented in three erosion pin monitoring reports (BBL, June 2001; BBL, March 2002; BBL, January 2003). The PRPs generated evidence of erosion by comparing 1993 transects and a 2003 survey of 74 bank profiles (placed at 100-foot intervals), each of which was used to demarcate bank slope, top of bank, toe of bank, and bank cross-sections (BBL, 2003).

b. Bank characterization study

In 2003 the PRPs performed a bank characterization study which included 87 top-of-bank soil samples (BBL, 2003). Sample results indicated total PCB concentrations in these soils ranging from 0.20 mg/kg to 120 mg/kg. The calculated arithmetic average for PCBs in bank soils, derived from the combined 1993/94 RI field work and 2003 sampling, was 23 mg/kg. These combined data also indicated that PCB concentrations were greater in soils near the river channel, and concentrations decreased with distance from the river (BBL, 2000a; BBL, 2003).

c. In-stream sediment sampling

At the request of U.S. EPA, in 2006 the PRPs collected 222 in-stream sediment samples. Total PCB concentration in these samples ranged from not-detected to 220 mg/kg.

D. Risk Assessments

1. Human Health Risk Assessments.

The Michigan Department of Natural Resources first issued a public health advisory regarding PCB contamination in the Kalamazoo River in 1977. This advisory remains in place today, and warns against eating a variety of fish species from the river.

In December 1991, working under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR), the Michigan Department of Public Health (MDPH) prepared a Public Health Assessment (PHA) for the Kalamazoo River Site. The PHA indicated that the Site was a public health hazard because of the probable exposure to hazardous substances at concentrations that might result in adverse health effects. Potential human exposure pathways of concern included incidental ingestion and inhalation of contaminated soils and ingestion of contaminated biota.

In April 2003, MDNR completed work on the human health risk assessment for the Site. Although the human health risk assessment's data and analysis pertain to the entire Kalamazoo River Operable Unit and not solely to the Plainwell Impoundment, the risk analysis is relevant to

Region 5's determination of imminent and substantial endangerment in this Action Memorandum. The primary human health risks identified in the assessment are summarized here:

- Cancer risks and noncarcinogenic Hazard Quotients (HQ) exceed U.S. EPA and/or MDEQ acceptable risk limits for both sport and subsistence fishermen. Carcinogenic risk from the consumption of fish ranges from 9.0×10^{-5} to 1.7×10^{-3} depending on the river segment being evaluated. Noncarcinogenic HQs for the consumption of fish range from 1.7 to 80 for reproductive effects and 5.3 to 280 for immunological effects.
- Cancer risks from dermal contact exceed MDEQ's thresholds for residents living near the floodplain soil behind the Plainwell Impoundment based on both average and maximum PCB exposure concentrations.
- Cancer risks from dermal contact exceed U.S. EPA's acceptable cancer risk range for residents living near the floodplain soils behind the Plainwell Impoundment based on maximum PCB exposure concentrations.
- HQs exceed the MDEQ and U.S. EPA threshold of 1.0 for immunological effects for residents living near the floodplain soils behind the Plainwell Impoundment based on average and maximum PCB exposure concentrations. The HQ for reproductive effects exceeds the MDEQ and USEPA threshold of 1.0 based on maximum PCB exposure concentrations .
- Cancer risks for recreational users on the floodplain soil behind the Plainwell Impoundment exceed MDEQ's threshold based on maximum PCB exposure concentrations.
- HQs for recreational users on the floodplain soil behind the Plainwell Impoundment exceed the U.S. EPA and MDEQ threshold of 1 for reproductive effects based on maximum PCB exposure concentrations.

2. Ecological Risk Assessment

MDEQ finalized the Ecological Risk Assessment (ERA) for the Kalamazoo River in April 2003. Like the Human Health Risk Assessment, the ERA's data and analysis pertain to the entire Kalamazoo River Operable Unit. Nevertheless, the ERA's findings are also relevant to Region 5's determination of imminent and substantial endangerment at the Plainwell Impoundment. Accordingly, the primary findings from the ERA are explained here.

The ERA focused primarily on assessing population-level risks associated with PCB contamination in abiotic media and biota. Because of the potential for PCBs to accumulate in biological tissues and exert adverse effects in upper trophic level biota, the ERA specifically considered bioaccumulation, food chain effects, and adverse effects in upper trophic level organisms.

The ERA focused on assessing the risks from PCB exposures via direct contact with contaminated surface water, streambed sediment, floodplain (exposed) sediment, and surface soil, as well as ingestion of PCB-contaminated food items.

The ERA concluded that PCB contamination at the Site presents a high to moderate ecological risk for eight animal species. Table 5.3 of the study identifies the estimated risks for all representative species of concern, based on estimated PCB dose (birds and mammals) or on the Site-wide average PCB concentration (aquatic receptors).

More particularly, the ERA found that PCB contamination of surface water and streambed sediment (and floodplain soils that are frequently inundated or have the potential to erode into the river) is likely to adversely affect sensitive piscivorous predators such as mink through consumption of PCB-contaminated prey, especially fish. Other piscivorous predators, such as bald eagles, also appear to be at high risk based on the exposure assumptions presented in the ERA. Terrestrial and semi-aquatic biota may also 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. Omnivorous birds (represented by the robin) that consume substantial numbers of soil invertebrates, such as earthworms, appear to be at moderate but still significant risk.

Finally, the United States Fish and Wildlife Service has identified two federally endangered species, two federally threatened species, and one federal candidate species that can be present in Allegan County. The Karner blue butterfly and the Indiana bat both are endangered. The bald eagle and Pitcher's thistle (a plant) are both threatened in this region. The eastern massasauga rattlesnake is the lone candidate species (BBL 2000b).

The MDNR lists seven species as endangered or threatened (not including the federally-listed species) in or near the Site. Endangered species in this area include the zigzag bladderwort, wild American ginseng, and the log fern (plants), the creek chubsucker (fish), prairie warbler (bird), ottoe skipper (insect), and the spotted turtle (reptile) (BBL 2000b).

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

Conditions present at the Plainwell Impoundment of the Kalamazoo River Site constitute a threat to public health, welfare or the environment based upon the factors set forth in 40 C.F.R. § 300.415(b)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). These include, but may not be limited to, the following:

- Actual or potential exposure to nearby populations, animals, or the food chain from hazardous substances or pollutants or contaminants.

PCB is a hazardous substance, as that term is defined by Section 101(14) of CERCLA. PCBs are also listed as a hazardous substance under Section 311(b)(2) of the Clean Water Act, as set forth in 40 C.F.R. § 116.4 Table A. The Toxic Substances Control Act (TSCA) states that "exposure of human beings or the environment to PCBs... may be significant, depending upon the quantity of PCBs,...the likelihood of exposure to humans and the environment...." U.S. EPA has determined that PCBs are a probable human carcinogen. These chemicals have the potential to biomagnify, which means that they have the potential to increase in concentration as they are transferred from one link in the food chain to another.

The Plainwell Impoundment has PCB levels up to 220 mg/kg for in-stream sediments, 120 mg/kg in top-of-bank soils and 158 mg/kg in floodplain soils. The ongoing, uncontrolled erosion of soils from the riverbanks is a significant source of PCB loading to the Kalamazoo River. PCB-containing waste paper residuals and soils slough off the banks, to be deposited in the river or transported downstream (BBL, 2000a). In-stream sediments and bank soils are primary sources of an ongoing release of PCB into the waters of the Kalamazoo River.

Although the 1977 MDPH advisory is still in effect, the fish consumption advisory is simply that – advisory. MDPH personnel have observed that the Kalamazoo River between Kalamazoo and Plainwell is becoming a popular fishery. It has been reported that anglers have been taking home fish in amounts that may be inconsistent with the consumption advisories issued by the MDPH. It was also reported that turtles have also been taken from the river for human consumption, which would provide for another potential human exposure pathway.

The most significant outcome of the ecological and human health risk assessments is the conclusion that fish consumption is the primary exposure pathway for receptors that may be at risk from PCB within media of the Kalamazoo River. Therefore, the key to reducing exposure and potential risks to important receptors (e.g. fish-eating birds, fish-eating wildlife, and humans) is to reduce PCB concentrations in the fish tissue consumed by these receptors. The greatest factor controlling PCB levels in fish is the bioavailability of PCB in surface sediments and the water column where fish and their prey come in contact with or ingest PCB (BBL 2000).

Finally, MDEQ has identified an area of the Plainwell Impoundment where residential properties are located immediately adjacent to riverbank contamination in excess of 50 mg/kg PCB. Due to the direct contact risk, the proposed removal action will include excavation of these areas to the Michigan residential standard for PCB.

- High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate;

On an annual basis, the Plainwell Impoundment contributes approximately 28 kg of PCB to the Kalamazoo River (BBL 2000). An estimated 2,317 kg (5,097 lbs) of PCB have come to be located within the sediments and soils of the Plainwell Impoundment. As explained above, the sediments and floodplain soils that are located in-stream or near the river's edge are susceptible to erosion and scouring. During high water events, inundation of the floodplain soils and

increases in river velocity create conditions that are likely to cause additional releases of PCB to the Kalamazoo River and, ultimately, Lake Michigan.

- Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released;

The Kalamazoo River is often subjected to extreme weather conditions in the winter and spring, which enhance the threat of a release of PCB. The breakup of ice in the late winter, and the movement of ice floes downstream, cause scouring of the banks and river bottom. Likewise, heavy spring rains and/or summer storms increase stream volume and current velocity, which lead to increased scouring of the river bottom and banks. All of these forces cause an increase in the volume and extent of PCB contamination in the Kalamazoo River and Lake Michigan.

- The availability of other appropriate federal or state response mechanisms to respond to the release;

State and local response mechanisms are not available to respond to this release. Therefore, the Region 5 removal program will implement response actions to address an estimated 132,000 cubic yards of PCB-contaminated material containing approximately 2,000 kg (4,400 lbs) of PCB within the Plainwell Impoundment. Responding to this material prior to future high flow periods will provide added protection to the Kalamazoo River and downstream ecosystems.

IV. ENDANGERMENT DETERMINATION

Given the conditions at the Plainwell Impoundment, the nature of the hazardous substance there, and the potential exposure pathways described above, the actual or threatened release of PCB from the Plainwell Impoundment, if not addressed by implementing the response actions selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

V. PROPOSED ACTIONS

A. Description of the Proposed Action

The preferred response action to mitigate threats associated with PCB-contaminated sediments in the Plainwell Impoundment consists of removing contaminated submerged sediments and floodplain soils. The AOC will specify all required response actions, which will include, but may not be limited to, the following tasks:

1) dredging and/or excavation of PCB contaminated sediments behind the Plainwell Dam; in the 3 discrete sediment areas identified mid-channel; and within 40 feet from the existing bank;

2) cut-back and stabilization of riverbanks to mitigate exposures to PCB-contaminated banks and future erosion;

3) removal of PCB-contaminated floodplain soils in excess of 50 mg/kg PCB;

4) removal of the floodplain areas where residential exposure to PCB-contaminated floodplain soils is in excess of 4 mg/kg PCB, the Michigan residential standard for PCB in soil;

5) dewatering, as necessary, and disposal of all PCB-contaminated sediment and bank and floodplain soils removed pursuant to ¶¶ 1-4 above into existing landfills located at the Allied Paper Operable Unit of the Site;

6) the use of clean soils excavated as part of the bank cutback work to cover floodplain soils contaminated above human health or ecological risk levels;

7) an evaluation of the impact of removing PCB-contaminated sediments abutting the Plainwell Dam on the dam's structural integrity;

8) an evaluation of whether a temporary or permanent lowering of the water level within the river may minimize movement of PCB-contaminated sediments during construction and/or the erosion of banks and floodplains covered with clean soils; and

9) if appropriate in light of the evaluations in 7) and 8), removal of one or more portions of the Plainwell Dam structure as needed to reduce the risk of sudden failure of the Plainwell Dam and/or minimize short- and long-term PCB mobilization from banks and floodplains.

10) Finally, the response action shall ensure that a stable river channel exists post-removal, re-vegetation with native plant species occurs, and that appropriate monitoring is performed both during and after the response action.

The response action will be conducted in a manner not inconsistent with the NCP. The OSC has initiated planning for provision of post-removal site control consistent with the provisions of Section 300.415(l) of the NCP.

The response actions described in this memorandum directly address actual or threatened releases of hazardous substances, pollutants, or contaminants at the Plainwell Impoundment which may pose an imminent and substantial endangerment to public health, welfare and the environment. These response actions do not impose a burden on the affected property disproportionate to the extent to which that property contributes to the conditions being addressed.

These activities will require an estimated 400 on-site working days to complete.

B. Cleanup Standards

As noted above, subsequent to the completion of the proposed time-critical removal action, Region 5 will evaluate any residual risk to human health and the environment in an RI/FS for the first reach of the Kalamazoo River, which includes the Plainwell Impoundment. Remedial cleanup standards will be established in the FS and in the ROD for the entire first reach. For purposes of the proposed time-critical removal action, Region 5 has established the following cleanup standards:

- Mid-channel in-stream sediments: U.S. EPA has identified three mid-channel areas where PCB has been detected at concentrations in excess of 50 mg/kg. These sediments will be removed to either a ≤1 mg/kg PCB standard, or to a "neat line" representing an elevation of 6 inches above pre-impoundment channel bottom.

- In-stream sediments located within 40 feet of the riverbanks: These sediments will be removed to either a ≤1 mg/kg PCB standard, or to a "neat line" representing an elevation of 6 inches above pre-impoundment channel bottom.

- PCB-contaminated soil in excess of 4 mg/kg on the river's north floodplain on or near residential properties upstream of U.S. 131: These soils will be removed to the extent the floodplain can be reasonably accessed.

- PCB-contaminated soils elsewhere within the Plainwell Impoundment: Floodplain soils with PCB concentrations in excess of 50 mg/kg at any depth, based on current data, will be removed. The cleanup goal for these soils is 5 mg/kg.

The Design will specify other project requirements to be completed as part of this removal action.

C. Orderly Transition to Remedial Response

The NCP requires that, if U.S. EPA determines that a removal action will not fully address a release, and that subsequent remedial action may be necessary, then the Agency must ensure an orderly transition from removal to remedial response activities. 40 C.F.R. § 300.415(g). As noted above, subsequent to the removal action selected in this Action Memorandum, Region 5 will complete its evaluation, through the Superfund remedial process, of the risks to human health and the environment within the entire first reach of the Kalamazoo River (which includes the Plainwell Impoundment). Residual risks to human health and the environment remaining within the impoundment after completion of the removal action will be evaluated as part of that

process. If U.S. EPA determines that additional response work is necessary in the Plainwell Impoundment, such work will be required by the ROD.

D. Applicable or Relevant And Appropriate Requirements

All applicable or relevant and appropriate requirements (ARARs) of federal and state law will be complied with to the extent practicable. By letter dated October 23, 2006, Region 5 requested that MDEQ identify potential state ARARs for this response action. Any state ARARs identified in a timely manner for this removal action will be complied with to the extent practicable.

E. Compliance with the PCB Remediation Waste Rule

Most, if not all, of the wastes to be excavated and/or dredged from the Plainwell Impoundment will be at least temporarily disposed in the landfills located at the Allied Paper Operable Unit (OU #1) of the Site. MDEQ is currently in the process of completing the RI for OU #1. The RI Report will identify all potential federal and state ARARs for the OU #1 remedial action.

Region 5 has determined that, with regard to the disposal of wastes from the Plainwell Impoundment with PCB concentrations exceeding 50 mg/kg, the relevant portions of the PCB Remediation Waste Rule, 40 C.F.R. § 761.61 *et seq.*, collectively comprise an ARAR for the proposed removal action. Region 5 also anticipates that the PCB Remediation Waste Rule will be an ARAR for the OU#1 remedy. In the course of determining the remedy for OU #1, the Region 5 TSCA and Superfund programs will evaluate the appropriateness of permanent consolidation and disposal of the sediments and soils from the Plainwell Impoundment in the Allied Paper OU landfills. Accordingly, for purposes of this removal action, compliance with the TSCA ARAR will occur as part of Region 5's selection of the remedy for OU #1.

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Continued risk to public health and the environment will result if response action is delayed or not taken. Delayed action increases the likelihood that human and/or wildlife populations with access to the area will come into direct contact with PCB-contaminated sediments and floodplain soils.

VII. OUTSTANDING POLICY ISSUES

No outstanding policy issues have been identified in relation to the Plainwell Impoundment.

VIII. ENFORCEMENT

For administrative purposes, information concerning the enforcement strategy associated with this removal action is contained in a confidential Enforcement Addendum.

IX. RECOMMENDATION

This decision document represents the selected response action for the Plainwell Impoundment area of the Kalamazoo River Site. It was developed in accordance with CERCLA as amended, and is not inconsistent with the NCP. This decision is based upon the Administrative Record (Attachment 2) for the removal action, an index of which is attached to this Action Memorandum.

Conditions at the Plainwell Impoundment meet the criteria of Section 300.415(b)(2) of the NCP for a removal action, and I recommend your approval of the proposed removal action. Region 5 expects that two potentially responsible parties will perform all removal actions under the oversight of the OSC. You may indicate your decision by signing below.

APPROVE: Richard C Karl DATE: 2-14-07
Richard C. Karl,
Director, Superfund Division

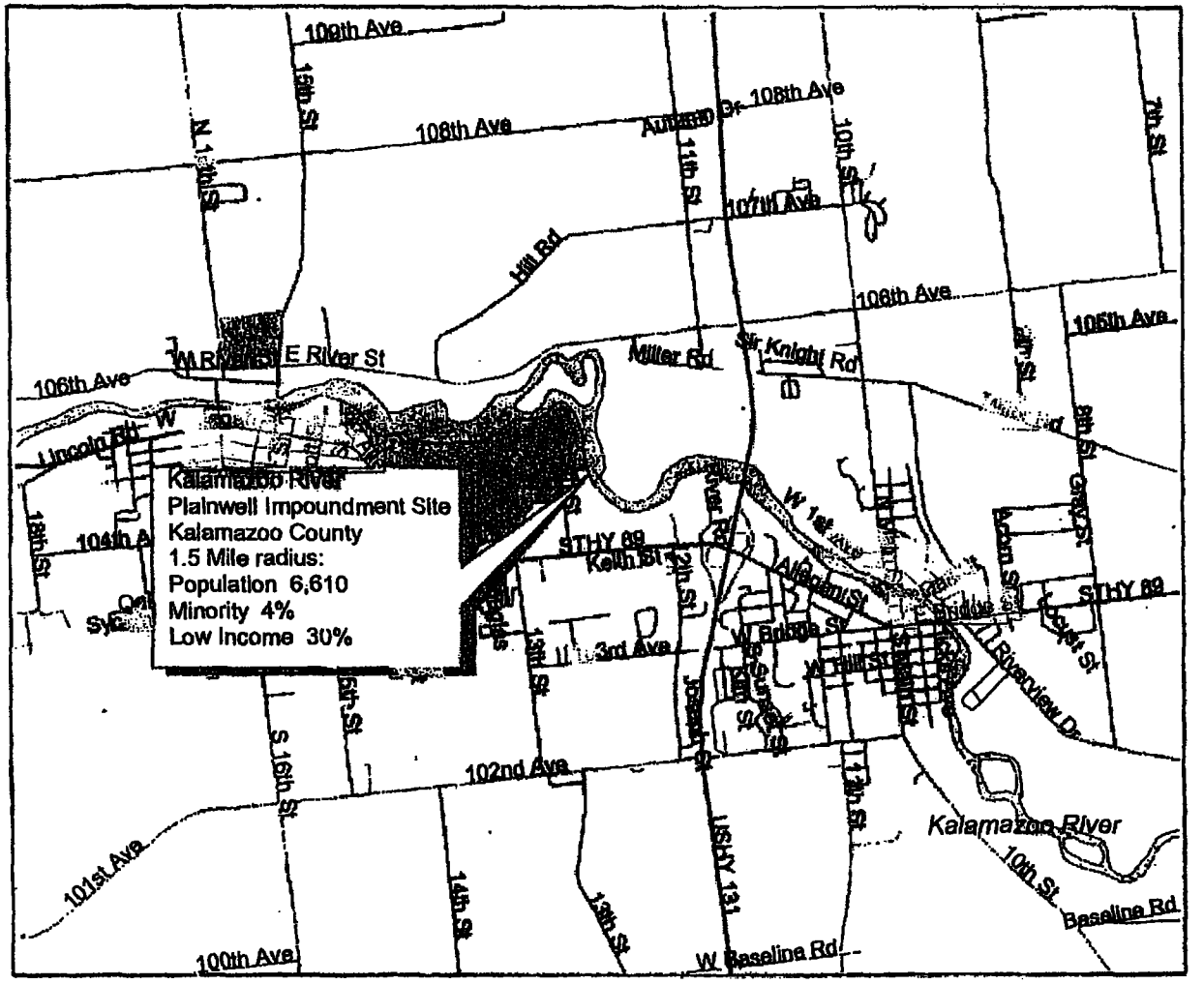
DISAPPROVE:_____ DATE:_____
Richard C. Karl,
Director, Superfund Division

Attachments:
- Enforcement Addendum
- Environmental Justice Analysis
- Attachment 1: Agreement in Principle
- Attachment 2: Administrative Record Index.
- Attachment 3: Description of Previous Site Assessments

cc: D. Chung, U.S. EPA, 5203-G
M. Chezik, U.S. DOI, w/o Enf. Addendum
Steven E. Chester, Director, Michigan DEQ, w/o Enf. Addendum
Michael Cox, Michigan Attorney General, w/o Enf. Addendum

Region 5 Superfund EJ Analysis

Kalamazoo River Plainwell Impoundment Site



State of Michigan averages:
Minority: 21%
Low Income: 29%

U.S. EPA Region 5
Environmental Justice Case Criteria
for State of Michigan

Minority: 42% or greater

Low Income: 58% or greater

0 0.9 1.8 2.7 3.6 Miles

Date of Map: 10/16/06

Source of Map: Census 2000 Database/ ArcView 3.0

Attachment 1

PRIVILEGED AND CONFIDENTIAL: SUBJECT TO FRE 408 AND MEDIATION PRIVILEGE

PLAINWELL SETTLEMENT AGREEMENT IN PRINCIPLE

With the support of all Mediation Parties, the signatories to this instrument reached an agreement in principle ("AIP") to settle certain issues at the Plainwell Impoundment and implement a process for moving forward on the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. This AIP reflects the good faith intentions of the Mediation Parties to negotiate a settlement consistent with the terms set forth below. This AIP, however, does not bind and is not enforceable by any of the Mediation Parties. In particular, Millennium Holdings LLC ("MHLLC") and Georgia Pacific Corporation ("GP") will agree to fund and perform a Time Critical Removal Action (the "Removal Action") at the Plainwell Impoundment subject to the following conditions:

1. MHLLC, GP, U.S. Environmental Protection Agency ("EPA"), and the State of Michigan ("State") shall negotiate a mutually acceptable Administrative Settlement Agreement and Order on Consent ("ASAOC"), based substantially upon EPA's current model Administrative Settlement Agreement and Order on Consent for a Removal Action, pursuant to which MHLLC and GP shall implement the Removal Action, as described in an Action Memorandum authored by EPA. The ASAOC will attach, as an Exhibit, an engineering design ("the Design") for the Removal Action, and the ASAOC shall define the "Work to be Performed" under the ASAOC with reference to the Design. The Design shall be formulated by MHLLC and GP, in consultation with the Mediation Parties, subject to approval by EPA and the State. EPA's signature on the ASAOC with an attached Design shall constitute EPA's approval of the Design.

2. The Design will include: (a) construction and operation of a water level control structure in the channel to facilitate the removal of in-stream and bank material, which may, in turn, necessitate removal of much of the current dam structure; (b) the removal of two defined mid-channel areas with PCB concentrations in excess of 50 ppm; (c) the investigation and potential removal of a third mid-channel area (near sediment sample PGP 23) if additional sampling reveals PCB concentrations in excess of 50 ppm; (d) the removal of near shore sediments along the bank, with bank cutbacks; (e) the removal of sediments within the cofferdam area; (f) to the extent not included in the bank cutbacks, the removal of floodplain soils with PCB concentrations at any depth in excess of 50 ppm, based upon current data; (g) the removal of PCB contaminated soil in excess of 4 ppm from the River's north floodplain on or near residential properties upstream of U.S. 131, to the extent that the floodplain can be reasonably accessed; (h) disposal of PCB impacted sediments and soils in the Allied OU; and (i) use of excavated clean soil as a cover over areas of PCB impacted floodplain soils remaining in the Plainwell Impoundment.

3. The performance standard for the removal of submerged sediments, as outlined in paragraph 2 above, will be either 1 ppm PCB or excavation to a "neat line" representing an elevation of 6 inches above the pre-impoundment channel bottom.

4. The Design will include channel cross sections and plan views showing the extent of channel cutbacks necessary to achieve a stable and, to the extent feasible, natural channel design

consistent with the horizontal extent delineated in the February 22, 2006, Kalamazoo River Study Group proposal Floodplain Soil Removal Areas. This will include the excavation of the PCB-containing layer within at least thirty (30) feet of the current top of the riverbank, designed to isolate PCBs from the new bank face. The Design will specify agreed upon turbidity controls (silt curtains with deflector sheetpile and adaptive management techniques), designed to manage sediment and PCB releases. The Design also will include channel design, revegetation and stabilization, groundwater and other monitoring, and Operation & Maintenance ("O&M") activities.

5. The ASAOC will contain a covenant-not-to-sue for the work performed. The ASAOC will further provide that total oversight billing for the removal action will not exceed $500,000 per year. In the first year, EPA oversight billing for the removal action will not exceed $300,000 and State oversight billing will not exceed $200,000. Thereafter, EPA oversight billing for the removal action will not exceed $325,000 annually and State oversight billing will not exceed $175,000 annually.

6. In the interest of early action and settlement, the EPA and State will, upon execution of the ASAOC, contribute funding and/or participate in the Removal Action as follows:

(a) As to the State:

(i) the DEQ will forgive from any future cost demand that may be issued by the DEQ, $1.5 million of the DEQ's past response activity costs that were deferred from recovery under the 1991 RI/FS Administrative Order between MHLLC, GP and the State and specifically described in Exhibit 1.

(ii) the DNR will: (a) contribute $500,000; and (b) assume the ongoing "O&M" activities for the Plainwell Impoundment as described in the Design after the first three years of O&M (the first three years will be performed by MHLLC and GP); and (c) provide Millennium and GP with access to the Plainwell Impoundment for the Removal Action and supplemental RI/FS work referred to in paragraph 8 below.

(b) The EPA will contribute $1 million of "Special Account" funds toward the work upon terms to be specified in the ASAOC. The parties to this instrument understand that EPA's contribution of special account funds to this settlement is subject to prior written approval of EPA Headquarters.

7. EPA, MHLLC and GP will enter into a separate Administrative Settlement Agreement and Order on Consent for a Supplemental Remedial Investigation/ Feasibility Study for the Site ("Supplemental RI/FS"). Upon signing the RI/FS Administrative Settlement Agreement and Order on Consent ("RI/FS ASAOC") and resolving any then outstanding past oversight cost invoices tendered by the State, the 1991 RI/FS Administrative Order between MHLLC, GP and the State shall be terminated by the parties to that agreement.

8. With respect to the Supplemental RI/FS work for the Plainwell reach, MHLLC, GP and EPA, in cooperation and coordination with the other Mediation Parties, shall agree upon a

focused RI/FS scope of work to fill data gaps upstream of the former Plainwell Impoundment and along Portage Creek. Once the Removal Action is completed, the data collected, along with an analysis of residual risk in the floodplains of the former Plainwell Impoundment, will be used by MHLLC and GP to perform a Focused Feasibility Study to determine whether additional action is needed in the Plainwell reach. In evaluating residual risk, the signatories to this AIP agree that a weighted average concentration analysis may be used.

9. In addition to the focused RI/FS work upstream of the former Plainwell Impoundment, the Supplemental RI/FS ASAOC will include work for the downstream reaches. The signatories to this AIP acknowledge that some portions of the downstream Supplemental RI/FS work may need to be phased to account for potential effects any upstream response activities, including the removal action to be taken pursuant to this proposed settlement, may have on downstream characterization under the Supplemental RI/FS.

10. EPA's present intention is to issue a separate ROD for the Plainwell reach after completion of the Supplemental RI/FS work for the Plainwell reach. After EPA issues a ROD for the Plainwell reach, MHLLC, GP and EPA (and any additional PRPs who receive special notice and agree to enter into RD/RA negotiations) will engage in negotiations of an RD/RA Consent Decree in accordance with CERCLA and applicable EPA RD/RA negotiation policies. EPA contemplates that, provided that settling defendants make appropriate commitments in such an RD/RA Decree, any such Decree will provide MHLLC and GP with a covenant-not-to-sue no less favorable than the one contained in the current model RD/RA Consent Decree and will include the entire first reach of the River, including the area addressed by, and work performed during, the Removal Action. If EPA selects a no-action ROD, then MHLLC, GP and EPA will negotiate an agreement or agreements (for cost recovery or for other appropriate consideration), which will provide MHLLC and GP with a similar covenant in exchange for appropriate commitments. Assuming the State concurs with the ROD, the State also will provide MHLLC and GP with a covenant-not-to-sue comparable to the covenant provided in EPA's current model RD/RA Consent Decree. The signatories to this AIP understand that, notwithstanding the undertakings set forth in this paragraph, the final terms of any federal consent decree are subject to approval by authorized government officials, and entry of any such consent decree is subject to public comment and approval by the court.

11. MHLLC, GP, EPA and the State will develop a mutually agreeable process for conducting a peer review of the ecological risk assessment work and ecological studies that have been performed to date with respect to floodplain soils. However, the residual risk analysis of the Plainwell Impoundment will proceed without awaiting the results of this process, unless the peer review process has been completed by the time residual risk analysis is commenced, in which case, the results of the peer review will be considered in that residual risk analysis.

12. EPA agrees to renew its efforts to identify and pursue other PRPs at the Kalamazoo River Superfund Site. MHLLC and GP agree to cooperate with EPA in its PRP search efforts.

13. The Mediation Parties agree to continue to cooperate regarding the timing and substance of communications to the public relative to the matters discussed pursuant to the Kalamazoo River Mediation Agreement.

14. The Mediation Parties have agreed to use their best efforts to finalize all agreements contemplated by this instrument, and all documents associated with such agreements, on or before November 30, 2006.

15. This AIP is covered by the confidentiality provisions of the Kalamazoo River Mediation Agreement.

16. This AIP may be signed in counterparts, each of which shall constitute an original.

By signing below, the signatories to this AIP confirm that the foregoing reflects the agreement reached as a result of the mediation:

GEORGIA PACIFIC

Date: August 28, 2006

By: _____

MILLENNIUM HOLDINGS LLC

Date: _____

By: _____

14. The Mediation Parties have agreed to use their best efforts to finalize all agreements contemplated by this instrument, and all documents associated with such agreements, on or before November 30, 2006.

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16. This AIP may be signed in counterparts, each of which shall constitute an original.

By signing below, the signatories to this AIP confirm that the foregoing reflects the agreement reached as a result of the mediation:

GEORGIA PACIFIC

Date: _____ By: _____

MILLENNIUM HOLDINGS LLC

Date: _____ By: Deborah W. Kryak
Deborah W. Kryak

STATE OF MICHIGAN

Date: 8/25/06

By: _____
Suzanne D. Sonneborn
Assistant Attorney General
Environment, Natural Resources,
and Agriculture Division
Michigan Department of
Attorney General

Date: 8/22/06

By: _____
Elizabeth M. Browne
Chief, Superfund Section
Remediation and Redevelopment
Division
Michigan Department of
Environmental Quality

Date: 8/25/06

By: _____
Mindy Koch
Resource Management Deputy
Michigan Department of Natural
Resources

UNITED STATES ENVIRONMENTAL
PROTECTION AGENCY

Date: 8-28-06

By: Richard C Karl
Richard C. Karl
Director
Superfund Division
Region 5, U.S. EPA

EXHIBIT 1

Summary of MDEQ's Response Activity Costs to be Forgiven

The costs identified below were incurred in association with the Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site and were deferred from recovery under the 1990 RI/FS AOC entered into by MHLLC, GP, and the State, or their predecessors. These costs will be forgiven from any future cost demand that may be issued by the MDEQ pursuant to Paragraph 6(a)(i) of the Plainwell Settlement AIP:

Period Covered	Amount Invoiced	Amount Deferred	Amount to be Forgiven
1991	$ 105,928.34	$ 7,500.21	$ 7,500.21
1992	$ 200,052.16	$ 0.00	$ 0.00
1993	$ 235,523.71	$ 0.00	$ 0.00
1994	$ 777,684.33	$ 0.00	$ 0.00
1995	$ 308,049.80	$ 4,281.60	$ 4,281.60
1996	$ 285,585.39	$ 0.00	$ 0.00
1997	$ 261,477.98	$ 0.00	$ 0.00
1998	$ 180,962.51	$ 0.00	$ 0.00
1999	$1,236,854.54	$ 617,656.60	$ 499,768.88[1]
2000	$2,550,650.00	$ 258,559.38	$ 258,559.38
2001	$2,554.966.98	$ 729,889.93	$ 729,889.93
		TOTAL	**$1,500,000.00**

[1] The amount of $499,767.89 consists of CDM contractual costs as follows: $388,877.97 incurred in performing response activities associated with non-dam related activities and $160,890.91 incurred in conducting response activities related to the evaluation of the dams.

ATTACHMENT 2

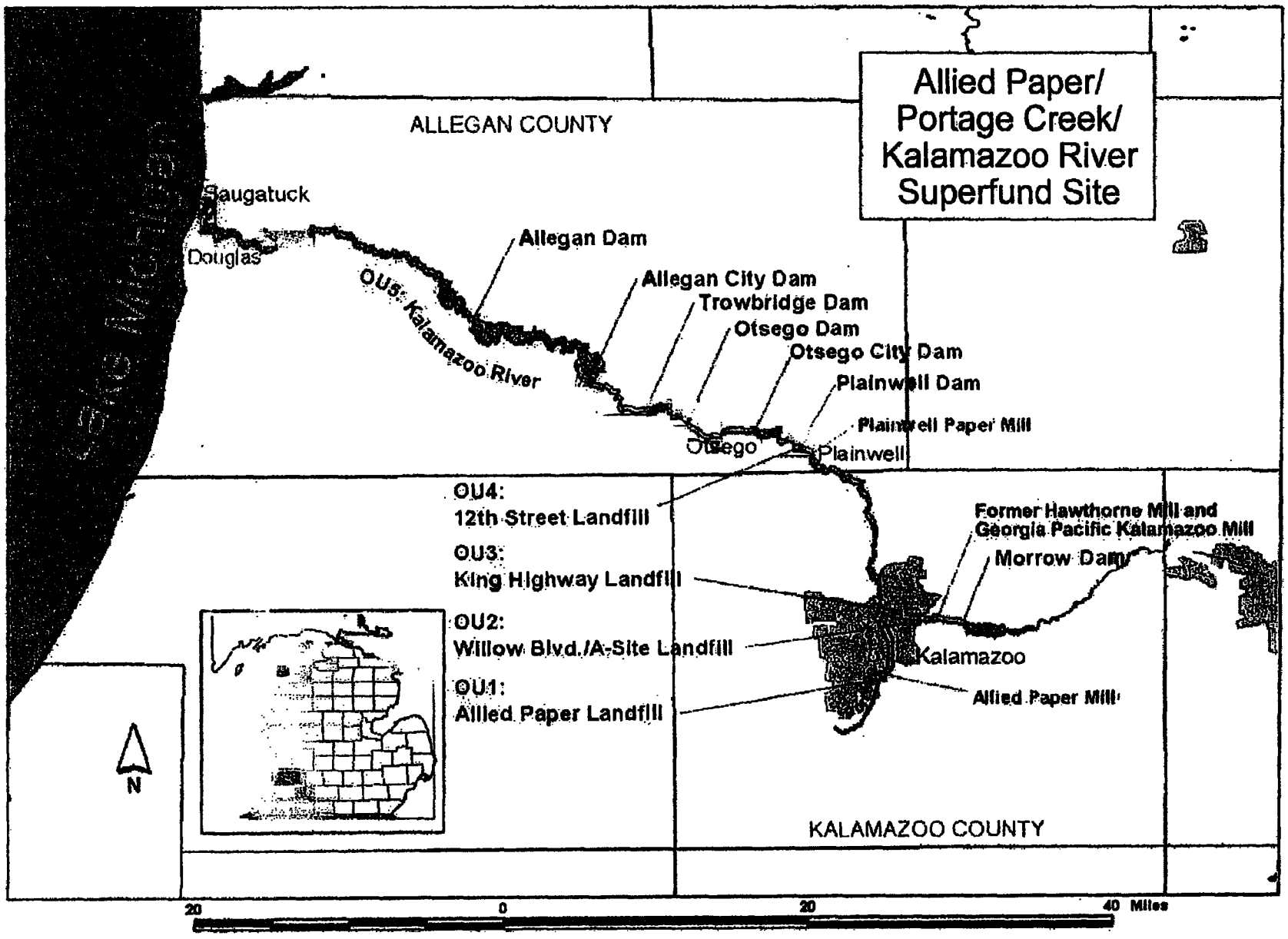
U.S. ENVIRONMENTAL PROTECTION AGENCY
REMOVAL ACTION

ADMINISTRATIVE RECORD
FOR
ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER SITE
OPERABLE UNIT #5
PLAINWELL IMPOUNDMENT
KALAMAZOO, KALAMAZOO COUNTY, MICHIGAN

ORIGINAL
FEBRUARY 12, 2007

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	12/23/91	ATSDR	U.S. EPA	Preliminary Health Assessment for the Allied Corp. Kalamazoo Plant	41
2	10/00/00	Blasland, Bouck & Lee, Inc.	U.S. EPA	Feasibility Study Report - Phase I for the Allied Paper/Portage Creek/Kalamazoo River Site **(DRAFT FOR STATE AND FEDERAL REVIEW)**	407
3	10/00/00	Blasland, Bouck & Lee, Inc.	U.S. EPA	Remedial Investigation Report - Phase I for the Allied Paper/Portage Creek/Kalamazoo River Site **(DRAFT FOR STATE AND FEDERAL REVIEW)**	653
4	02/01/02	Roy F. Weston, Inc.	U.S. EPA	Removal Assessment Report for the Allied Paper-Kalamazoo River Site	742
5	04/00/03	Camp, Dresser & McKee	U.S. EPA	Baseline Ecological Risk Assessment for the Allied Paper/Portage Creek/ Kalamazoo River Site (FINAL REVISED)	140
6	04/00/03	CH2M Hill	U.S. EPA	Remedial Investigation Report for the Allied Paper/Portage Creek/ Kalamazoo River Site **(U.S. EPA INTERNAL DRAFT)**	102
7	05/00/03	Camp, Dresser & McKee	U.S. EPA	Human Health Risk Assessment for the Allied Paper/ Portage Creek/Kalamazoo River Site (FINAL REVISED)	109

APPENDIX 2


Allied Paper/
Portage Creek/
Kalamazoo River
Superfund Site
ALLEGAN COUNTY
Saugatuck
Douglas
OU5: Kalamazoo River
Allegan Dam
Allegan City Dam
Trowbridge Dam
Otsego Dam
Otsego City Dam
Plainwell Dam
Plainwell Paper Mill
Otsego
Plainwell
OU4:
12th Street Landfill
OU3:
King Highway Landfill
OU2:
Willow Blvd./A-Site Landfill
OU1:
Allied Paper Landfill
Former Hawthorne Mill and
Georgia Pacific Kalamazoo Mill
Morrow Dam
Kalamazoo
Allied Paper Mill
KALAMAZOO COUNTY
N
20
0
20
40 Miles

APPENDIX 3

Summary of MDEQ's Response Activity Costs to be Forgiven

The costs identified below were incurred in association with the Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site and were deferred from recovery under the 1990 RI/FS AOC entered into by MHLLC, GP, and the State, or their predecessors. These costs will be forgiven from any future cost demand that may be issued by the MDEQ pursuant to Paragraph 6(a)(i) of the Plainwell Settlement AIP:

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		TOTAL	**$1,500,000.00**

[1] The amount of $499,767.89 consists of CDM contractual costs as follows: $388,877.97 incurred in performing response activities associated with non-dam related activities and $160,890.91 incurred in conducting response activities related to the evaluation of the dams.

Appendix 4 is the Work Plan, which was approved by U.S. EPA on February 14, 2007. The removal program has received a hard copy of the final, approved work plan, which is too voluminous to include in this sign-off package. Please contact Sam Borries to see a copy.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF
SE-5J

MEMORANDUM

DATE: JUN 03 2009

SUBJECT: ENFORCEMENT ACTION MEMORANDUM: Determination of an Imminent and Substantial Threat to Public Health and the Environment at Plainwell Dam #2 of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site, Allegan County, Michigan (Site ID# 059B)

FROM: Michael Ribordy, On-Scene Coordinator
Emergency Response Branch 2 - Section 3

THRU: Linda M. Nachowicz, Chief
Emergency Response Branch 2

TO: Richard C. Karl, Director
Superfund Division

I. PURPOSE

The purpose of this Action Memorandum is to document the determination of an imminent and substantial threat to public health and the environment at "Plainwell Dam #2," an area of contamination within Area 1 of the Kalamazoo River Operable Unit (OU) of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site (sometimes referred to as the "Site" or the "Kalamazoo River Site"). The Site, which is located in Allegan and Kalamazoo Counties, Michigan, is pervasively contaminated with polychlorinated biphenyl (PCB), primarily as the result of waste practices associated with the de-inking of carbonless copy paper. The Site was listed on the NPL on August 30, 1990.

The Plainwell Dam #2 is located approximately 3.5 miles upstream of the former Plainwell Dam in the Township of Gun Plain, T 1N, R 11 W, in portions of Sections 32 and 33 upstream to the Penn Central Railroad Bridge. Plainwell Dam #2 includes a

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2473

series of four historical structures constructed to partially divert the Kalamazoo River through the Plainwell mill race.

The response actions proposed in this Action Memorandum will mitigate threats to public health, welfare, and the environment presented by the presence of an uncontrolled release of PCBs, a hazardous substance, into the food chain of the Kalamazoo River from in-stream sediments, riverbank soils, and floodplain soils located within the Plainwell Dam #2. Due to the contaminated nature of the sediment, the continuing release of contamination into the food chain, and potential exposure to the public, this removal action will be classified as time-critical. The proposed response actions include dredging and/or excavation of sediment, riverbank soils and floodplain soil, containment, monitoring, water treatment, stabilization and off-Site disposal of excavated material in accordance with federal PCB regulations at 40 C.F.R. § 761.61. The response activities will require approximately 200 on-Site working days to complete, and will result in the removal of approximately 12,000 cubic yards of waste material, containing approximately 89% of the PCBs in the Plainwell Dam #2.

Subsequent to completion of the removal action and through the Superfund remedial process, Region 5 will complete its evaluation of the risks to human health and the environment presented by the presence of PCBs within the first reach of the Kalamazoo River OU of the Site (which includes the Plainwell Dam #2). This evaluation will consider data collected and analyses performed as part of the removal action described in this Action Memorandum. U.S. EPA will then issue a Record of Decision (ROD) for the entire first reach of the Kalamazoo River OU (*i.e.* Morrow Dam to the Plainwell Dam or Area 1) and, as part of that ROD, will determine whether additional response actions are necessary within the Plainwell Dam #2 to address risks to human health and the environment not addressed through the time-critical removal process.

One of the potentially responsible parties (PRPs) for the Site, Georgia-Pacific Corporation (GP), is prepared to conduct the time-critical removal action described in this Action Memorandum. GP is the owner of a now-inoperable papermaking facility at the Site. GP (or its predecessors-in-interest) engaged in the de-inking of carbonless copy paper, and discharged wastes containing high concentrations of PCB into the Kalamazoo River upstream of the Plainwell Dam #2.

II. SITE CONDITIONS AND BACKGROUND

CERCLIS ID # MID006007306

A. Physical Location and Description

The Kalamazoo River Site includes approximately 80 miles of the Kalamazoo River between Morrow Dam and Lake Michigan, adjacent floodplains and wetlands, and four paper waste disposal areas and several former paper mill properties (to the extent they contribute PCB to the Kalamazoo River system). The Site lies within the Great Lakes

Basin in the Kalamazoo River watershed of Michigan's Lower Peninsula. The watershed drains 2,020 square miles of southwest Michigan. It reaches 162 miles into south-central Michigan, and ranges in width from 11 to 29 miles.

The main channel of the Kalamazoo River flows northwest for 123 miles before ultimately emptying into Lake Michigan near Saugatuk, Michigan. The river contributes 42 pounds of PCB annually to Lake Michigan.

Site topography is influenced largely by past glacial activity. The area is relatively flat with gentle rolling plains. In general, the land surface slopes gently westward toward Lake Michigan. Ground and terminal moraines, eskers, and drumlins provide the only significant relief over the region. Low elevation areas are typically wetlands or bodies of open water, such as kettle lakes. Drainage patterns center around the former meltwater drainageway, which is now, at its lowest points, occupied by the Kalamazoo River. The river itself drops 540 feet in elevation from its headwaters to its mouth, producing a slow to moderate stream gradient.

Plainwell Dam #2 is located on the Kalamazoo River approximately 3.5 miles upstream of the former Plainwell Dam in the city of Plainwell and Gun Plain Township, Allegan County. Plainwell Dam #2 includes a series of four historical structures constructed to partially divert the Kalamazoo River through the Plainwell mill race. The mill race and the Kalamazoo River encircle the City of Plainwell, giving Plainwell its identity as the "Island City." State and local officials have expressed intentions to leave the Plainwell Dam #2 structures in place to continue to provide flow through the mill race and preserve the character of the city.

The remnant structures—a waste gate structure, a right diversion structure, a left diversion structure, and a head gate structure —were initially constructed in 1856 by the Plainwell Water Power Company. Earthen embankments, approximately 2,520 feet in total length, are also present to connect two diversion structures. These right and left diversion structures consist of concrete spillway gate bays and a concrete spillway, respectively (no gates remain in the right diversion structure). An earthen embankment connects the left abutment of the left diversion structure and the head gate structure. The diversion structures direct water from the main stem of the river into a mill race/power canal that was once used to generate water power for a flour mill, the City of Plainwell, and several other businesses. The head gate and waste gate structures in the power canal were formerly used to regulate the head and discharge through the powerhouse. The head gate structure consists of a concrete spillway with no control devices. The waste gate structure consisted of two sluice ways for which the gates are no longer in place.

Plainwell Dam #2 did not significantly alter the shape or surface area of the river, nor did it create lake-like impoundments as in the case of downstream former dams. It did serve to alter flooding characteristics of the river to some degree upstream of the dam. According to the Michigan Department of Environmental Quality (MDEQ), the Plainwell Dam #2 and associated structures were partially removed in the early 1980s. The

waste gate structure's lift gate and stoplog guides were still present in 1980, and at that time there were no active operational procedures in place other than to permanently leave all discharge control structures adjusted so that they would permit maximum discharge capacity.

In 1979, Plainwell Dam #2 was classified as a small size dam with high hazard potential in accordance with the National Dam Safety Program Criteria. Following the partial removal of the dam and associated structures in the 1980s, the dam was reclassified as a low hazard potential. The primary continuing purpose of the remaining structures is to maintain flow through the mill race/power canal, which along with the Kalamazoo River, encircles the city of Plainwell.

B. Environmental Justice Analysis

To meet Region 5's Environmental Justice (EJ) concern criteria, the area within 1 mile of a site must have a population that is at least twice the state's average low-income percentage and/or twice the state minority percentage. Among all Michigan residents, the low-income percentage is 29% and the minority percentage is 21%. U.S. EPA's EJ analysis of the population within 1 mile of the Plainwell Dam #2 determined that the low-income percentage is 24% and the minority percentage is 6%. Therefore, the Plainwell Dam #2 does not meet the Region's EJ criteria based on demographics, as identified in "Region 5 Interim Guidelines for Identifying and Addressing a Potential EJ Case, June 1998."

C. Site Assessments

The Administrative Record for the Kalamazoo River Site contains numerous reports which summarize the investigations conducted to date. Detailed information from the reports most relevant to this time-critical removal action is set forth here:

1. Remedial Investigation/Feasibility Study (RI/FS)

Between 1990 and 2000, several PRPs for the Site (including GP) conducted a Site-wide RI/FS pursuant to an administrative agreement with the State of Michigan. The RI field work included an assessment of the physical characteristics of the riverbanks within the three former impoundments. The PRPs concluded, primarily through visual observation, that the riverbanks were a source of ongoing loading of exposed sediments (and therefore PCB) to the river. The PRPs also identified, again primarily through visual observation, some of the mechanisms involved in such loading. The cohesive nature of the exposed sediments allows significant portions of the impoundments' riverbanks to remain in vertical-to-near-vertical repose. The fine-grained exposed sediments, however, generally overlie non-cohesive sandy sediments or soils. As a result, the faces of the banks are susceptible to erosion through direct contact with the river at higher river stages, and to undercutting by erosion of the underlying non-cohesive sediments or soils. Undercutting progresses until the overlying sediments fail by slumping or calving as blocks that fall into the river. The remnants of such blocks

could be observed along the toe of the banks in certain areas. Although the assessment pertains to the entire Kalamazoo River OU and not solely to the Plainwell Dam #2, the risk analysis is relevant to Region 5's determination of imminent and substantial endangerment in this Action Memorandum.

2. USGS Study.

In 2005, USGS, in cooperation with U.S. EPA and MDEQ, conducted an additional study of the channel characteristics of the Kalamazoo River. This study concluded that the erosion of the "toe" of the bank widens the River's stream, and results in steeper bank bangles. Once the bank undercut exceeds its critical bank angle, the inability of the sediments to support themselves results in bank failure.

3. PRP-Supplemental Remedial Investigation/Feasibility Study

Beginning in 2007 and continuing through 2008, investigations in Area 1 of the Kalamazoo River OU, including Plainwell Dam #2, were conducted as part of the Supplemental Remedial Investigation/Feasibility Study (SRI/FS). Phase 1 of that work involved the delineation of frequently inundated areas of the floodplain upstream of Plainwell Dam #2. Phase 2 of the investigation involved the sampling of Plainwell Dam #2. Results of the Phase 2 investigation of Plainwell Dam #2 found elevated levels of PCBs in bank and floodplain soils and, to a limited extent, in in-stream sediment. Samples were collected at 94 locations from a uniform grid in the floodplain, including in-stream islands. A total of 302 individual samples were collected from the floodplain, and total PCB concentrations ranged from non-detect to 60 milligrams per kilogram (mg/kg). Bank soil samples were collected from 78 locations. A total of 265 samples were analyzed for PCBs, with total PCB concentrations ranging from non-detect to 45 mg/kg. Sediment samples were collected from 60 locations, resulting in 267 samples analyzed for PCBs. PCB concentrations in sediment ranged from non-detect to 100 mg/kg. A summary of the investigation results is presented in the Plainwell No. 2 Conceptual Design Report.

MDEQ Plainwell Dam #2 Sampling

On December 10 and 11, 2008, MDEQ collected 30 sediment cores and 18 bank cores. A total of 50 individual sediment and 25 soil samples were analyzed for PCBs. Total PCB concentrations in sediment ranged from non-detect to 80.2 mg/kg. Total PCB concentrations in soil ranged from non-detect to 80.5 mg/kg.

D. Risk Assessments

1. Human Health Risk Assessments.

The Michigan Department of Natural Resources first issued a public health advisory regarding PCB contamination in the Kalamazoo River in 1977. This advisory remains in place today and warns against eating a variety of fish species from the river.

In December 1991, working under a cooperative agreement with the federal Agency for Toxic Substances and Disease Registry (ATSDR), the Michigan Department of Public Health (MDPH) prepared a Public Health Assessment (PHA) for the Kalamazoo River Site. The PHA indicated that the Site was a public health hazard because of the probable exposure to hazardous substances at concentrations that might result in adverse health effects. Potential human exposure pathways of concern included incidental ingestion, inhalation of contaminated soils, and ingestion of contaminated biota.

In April 2003, MDNR completed work on the human health risk assessment for the Site. Although the human health risk assessment's data and analysis pertain to the entire Kalamazoo River OU and not solely to the Plainwell Dam #2, the risk analysis is relevant to Region 5's determination of imminent and substantial endangerment in this Action Memorandum. The primary human health risks identified in the assessment are summarized here:

- Cancer risks and noncarcinogenic Hazard Quotients (HQ) exceed U.S. EPA and/or MDEQ acceptable risk limits[1] (cumulative carcinogenic risk greater than 10^{-4}, and the non-carcinogenic hazard quotient is greater than 1) for both sport and subsistence fishermen. Carcinogenic risk from the consumption of fish ranges from 9.0×10^{-5} to 1.7×10^{-3} depending on the river segment being evaluated. Noncarcinogenic HQs for the consumption of fish range from 1.7 to 80 for reproductive effects and 5.3 to 280 for immunological effects.

- Cancer risks for recreational users on the floodplain soil in the vicinity of the Plainwell Dam #2 exceed MDEQ's threshold based on maximum PCB exposure concentrations.

- HQs for recreational users on the floodplain soil in the vicinity of the Plainwell Dam #2 exceed the U.S. EPA and MDEQ threshold of 1 for reproductive effects based on maximum PCB exposure concentrations.

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[1] MDEQ has established a cancer risk target value of 1 in 100,000 (10^{-5}). Where cumulative cancer risks exceed this threshold, MDEQ risk managers may determine that some action to reduce exposure and risk may be necessary. The MDEQ risk target falls in the middle of U.S. EPA's risk range of 1 in 1,000,000 (10^{-6}) to 1 in 10,000 (10^{-4}). U.S. EPA generally considers risks within this range "acceptable," but considerations such as size of affected population may indicate that some action to reduce risk is appropriate. Above this range, U.S. EPA risk managers will ordinarily determine that such action is necessary. Both MDEQ and U.S. EPA have HQ thresholds of 1.

2. Ecological Risk Assessment

MDEQ finalized the Ecological Risk Assessment (ERA) for the Kalamazoo River in April 2003. Like the Human Health Risk Assessment, the ERA's data and analysis pertain to the entire Kalamazoo River OU. Nevertheless, the ERA's findings are also relevant to Region 5's determination of imminent and substantial endangerment at the Plainwell Dam #2. Accordingly, the primary findings from the ERA are explained here.

The ERA focused primarily on assessing population-level risks associated with PCB contamination in abiotic media and biota. Because of the potential for PCBs to accumulate in biological tissues and exert adverse effects in upper trophic level biota, the ERA specifically considered bioaccumulation, food chain effects, and adverse effects in upper trophic level organisms.

The ERA focused on assessing the risks from PCB exposures via direct contact with contaminated surface water, streambed sediment, floodplain (exposed) sediment, and surface soil, as well as ingestion of PCB-contaminated food items.

The ERA concluded that PCB contamination at the Site presents a high to moderate ecological risk for eight animal species. Table 5.3 of the study identifies the estimated risks for all representative species of concern, based on estimated PCB dose (birds and mammals) or on the Site-wide average PCB concentration (aquatic receptors).

More particularly, the ERA found that PCB contamination of surface water and streambed sediment (and floodplain soils that are frequently inundated or have the potential to erode into the river) is likely to adversely affect sensitive piscivorous predators such as mink through consumption of PCB-contaminated prey, especially fish. Other piscivorous predators, such as bald eagles, also appear to be at high risk based on the exposure assumptions presented in the ERA. Terrestrial and semi-aquatic biota may also 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. Omnivorous birds (represented by the robin) that consume substantial numbers of soil invertebrates, such as earthworms, appear to be at moderate but still significant risk.

Finally, the United States Fish and Wildlife Service has identified two federally endangered species, two federally threatened species, and one federal candidate species that can be present in Allegan County. The Karner blue butterfly and the Indiana bat both are endangered. The bald eagle and Pitcher's thistle (a plant) are both threatened in this region. The eastern massasauga rattlesnake is the lone candidate species (BBL 2000b).

The MDNR lists seven species as endangered or threatened (not including the federally-listed species) in or near the Site. Endangered species in this area include the zigzag bladderwort, wild American ginseng, and the log fern (plants), the creek

chubsucker (fish), prairie warbler (bird), ottoe skipper (insect), and the spotted turtle (reptile) (BBL 2000b).

III. THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

Conditions present at the Plainwell Dam #2 of the Kalamazoo River Site constitute a threat to public health, welfare or the environment based upon the factors set forth in 40 C.F.R. § 300.415(b)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). These include, but may not be limited to, the following:

- Actual or potential exposure to nearby populations, animals, or the food chain from hazardous substances or pollutants or contaminants.

PCBs are a hazardous substance, as that term is defined by Section 101(14) of CERCLA. PCBs are also listed as a hazardous substance under Section 311(b)(2) of the Clean Water Act, as set forth in 40 C.F.R. § 116.4 Table A. The Toxic Substances Control Act (TSCA) states that "exposure of human beings or the environment to PCBs... may be significant, depending upon the quantity of PCBs,...the likelihood of exposure to humans and the environment...." U.S. EPA has determined that PCBs are a probable human carcinogen. These chemicals have the potential to biomagnify, which means that they have the potential to increase in concentration as they are transferred from one link in the food chain to another.

Plainwell Dam #2 has PCB levels up to 100 mg/kg for in-stream sediments, 80.5 mg/kg in top-of-bank soils and 60 mg/kg in floodplain soils. The ongoing, uncontrolled erosion of soils from the riverbanks is a significant source of PCB loading to the Kalamazoo River. The RI/FS determined PCB-containing waste paper residuals and soils slough off the banks, to be deposited in the river or transported downstream. In-stream sediments and bank soils are primary sources of an ongoing release of PCBs into the waters of the Kalamazoo River.

Although the 1977 MDPH advisory is still in effect, the fish consumption advisory is simply that – advisory. MDPH personnel have observed that the Kalamazoo River between Kalamazoo and Plainwell is becoming a popular fishery. It has been reported that anglers have been taking home fish in amounts that may be inconsistent with the consumption advisories issued by the MDPH. It was also reported that turtles have also been taken from the river for human consumption, which would provide for another potential human exposure pathway.

The most significant outcome of the ecological and human health risk assessments is the conclusion that fish consumption is the primary exposure pathway for receptors that may be at risk from PCB within media of the Kalamazoo River. Therefore, the key to reducing exposure and potential risks to important receptors (e.g. fish-eating birds, fish-

eating wildlife, and humans) is to reduce PCB concentrations in the fish tissue consumed by these receptors. The RI/FS concluded the greatest factor controlling PCB levels in fish is the bioavailability of PCB in surface sediments and the water column where fish and their prey come in contact with or ingest PCB.

- High levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate;

Total PCB concentrations of up to 100 mg/kg have been found in the sediments, bank and floodplain soils of the Plainwell Dam #2. As explained above, the sediments, bank and floodplain soils that are located in-stream or near the river's edge are susceptible to erosion and scouring. During high water events, inundation of the floodplain soils and increases in river velocity create conditions that are likely to cause additional releases of PCB to the Kalamazoo River and, ultimately, Lake Michigan.

- Weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released;

The Kalamazoo River is often subjected to extreme weather conditions in the winter and spring, which enhance the threat of a release of PCB. The breakup of ice in the late winter, and the movement of ice floes downstream, may cause scouring of the banks and river bottom. Likewise, heavy spring rains and/or summer storms increase stream volume and current velocity, which lead to increased scouring of the river bottom and banks. All of these forces cause an increase in the volume and extent of PCB contamination in the Kalamazoo River and Lake Michigan.

IV. ENDANGERMENT DETERMINATION

Given the conditions at the Plainwell Dam #2, the nature of the hazardous substance there, and the potential exposure pathways described above, the actual or threatened release of PCB from the Plainwell Dam #2, if not addressed by implementing the response actions selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment.

V. PROPOSED ACTIONS

A. Description of the Proposed Action

The preferred response action to mitigate threats associated with PCB-contaminated sediments in the Plainwell Dam #2 consists of removing contaminated submerged sediments, bank and floodplain soils. The administrative settlement agreement and order on consent to perform the work will specify all required response actions, which will include, but may not be limited to, the following tasks:

1) dredging and/or excavation of PCB contaminated sediments with elevated PCB concentrations in those areas specified in the U.S. EPA approved workplan;

2) cut-back and stabilization of riverbanks to mitigate exposures to PCB-contaminated banks and future erosion;

3) removal of PCB-contaminated floodplain soils in excess of 50 mg/kg PCB;

4) dewatering, as necessary, and disposal off-site of all PCB-contaminated sediment, bank and floodplain soils removed pursuant to ¶¶ 1-3 above. PCB contaminated material with PCB concentrations equal to or greater than 50 mg/kg shall be transported off-site to a chemical waste landfill that is in compliance with all state and federal regulatory requirements. PCB contaminated material with PCB concentrations less than 50 mg/kg shall be transported off-Site and disposed in an appropriately licensed and permitted commercial landfill in compliance with all state and local laws.

5) monitoring during implementation of the response action; and

6) the response action shall ensure that a stable river channel exists post-removal, re-vegetation with native plant species occurs, and that appropriate monitoring and maintenance is performed both during and after the response action.

The response action will be conducted in a manner not inconsistent with the NCP. The OSC has initiated planning for provision of post-removal site control consistent with the provisions of Section 300.415(l) of the NCP. Post removal control activities will be performed by one of the PRPs per the removal administrative order on consent.

The response actions described in this memorandum directly address actual or threatened releases of hazardous substances, pollutants, or contaminants at the Plainwell Dam #2 which may pose an imminent and substantial endangerment to public health, welfare and the environment. These response actions do not impose a burden on the affected property disproportionate to the extent to which that property contributes to the conditions being addressed.

These activities will require an estimated 200 on-site working days to complete.

B. Cleanup Standards

As noted above, subsequent to the completion of the proposed time-critical removal action, Region 5 will evaluate any residual risk to human health and the environment in an RI/FS for the first reach of the Kalamazoo River, which includes the Plainwell Dam #2. Remedial cleanup standards will be established in the FS and in the ROD for the entire first reach. For purposes of the proposed time-critical removal action, Region 5 has established the following cleanup standards:

- Designated in-stream sediments: The cleanup goal for sediment is ≤1 mg/kg PCB standard. Reasonable efforts will be made to reach this goal including excavating to a "neat line" representing an elevation where Supplemental RI/FS data from this area indicates PCB concentrations at or below the cleanup goal.

- PCB-contaminated soils within the Plainwell Dam #2 area and floodplain soils: The cleanup goal for these soils is 5 mg/kg.

The Design Report will specify other project requirements to be completed as part of this removal action.

C. Orderly Transition to Remedial Response

The NCP requires that, if U.S. EPA determines that a removal action will not fully address a release, and that subsequent remedial action may be necessary, then the Agency must ensure an orderly transition from removal to remedial response activities. 40 C.F.R. § 300.415(g). As noted above, subsequent to the removal action selected in this Action Memorandum, Region 5 will complete its evaluation, through the Superfund remedial process, of the risks to human health and the environment within the entire Area 1 of the Kalamazoo River OU (which includes the Plainwell Dam #2). Residual risks to human health and the environment remaining within Plainwell Dam #2 after completion of the removal action will be evaluated as part of that process. If U.S. EPA determines that additional response work is necessary in Plainwell Dam #2, such work will be required by the ROD.

D. Applicable or Relevant And Appropriate Requirements

All applicable or relevant and appropriate requirements (ARARs) of federal and state law will be complied with to the extent practicable. By letter dated May 21, 2009, Region 5 requested that MDEQ identify potential state ARARs for this response action. Any state ARARs identified in a timely manner for this removal action will be complied with to the extent practicable.

E. Compliance with the PCB Remediation Waste Rule

The PCB Remediation Waste Rule, 40 C.F.R. § 761.61 *et seq.*, promulgated pursuant to TSCA is an ARAR for the proposed removal action. U.S. EPA has evaluated the necessary information required for approving the method of risk-based disposal of PCB remediation waste and such information is in the administrative record. 40 C.F.R. § 761.61(a)(3) and § 761.61(c). Based on this evaluation and after consultation with the Region 5 TSCA program, the Region 5 Superfund Division Director has determined that the disposal method proposed in Paragraph 4 of Section V.A. of this Action Memorandum does not pose an unreasonable risk of injury to public health or the environment. By signature on this Action Memorandum, and pursuant to 40 C.F.R. §

761.61(c), the Region 5 Superfund Division Director approves the risk-based disposal of PCB-contaminated material in the manner described in Paragraph 4 of Section V.A.

VI. EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

Continued risk to public health and the environment will result if response action is delayed or not taken. Delayed action increases the likelihood that human and/or wildlife populations with access to the area will come into direct contact with PCB-contaminated sediments and floodplain soils.

VII. OUTSTANDING POLICY ISSUES

No outstanding policy issues have been identified in relation to Plainwell Dam #2.

IX. RECOMMENDATION

This decision document represents the selected response action for the Plainwell Dam #2 area of the Kalamazoo River Site. It was developed in accordance with CERCLA as amended, and is not inconsistent with the NCP. This decision is based upon the Administrative Record (Attachment 2) for the removal action, an index of which is attached to this Action Memorandum.

Conditions at the Plainwell Dam #2 meet the criteria of Section 300.415(b)(2) of the NCP for a removal action, and I recommend your approval of the proposed removal action. Region 5 expects that a potentially responsible party will perform all removal actions under the oversight of the OSC. You may indicate your decision by signing below.

APPROVE: _____ DATE: 6/8/09
Richard C. Karl,
Director, Superfund Division

DISAPPROVE: _____ DATE: _____
Richard C. Karl,
Director, Superfund Division

Enforcement Addendum

Attachments:

Environmental Justice Analysis
Administrative Record Index

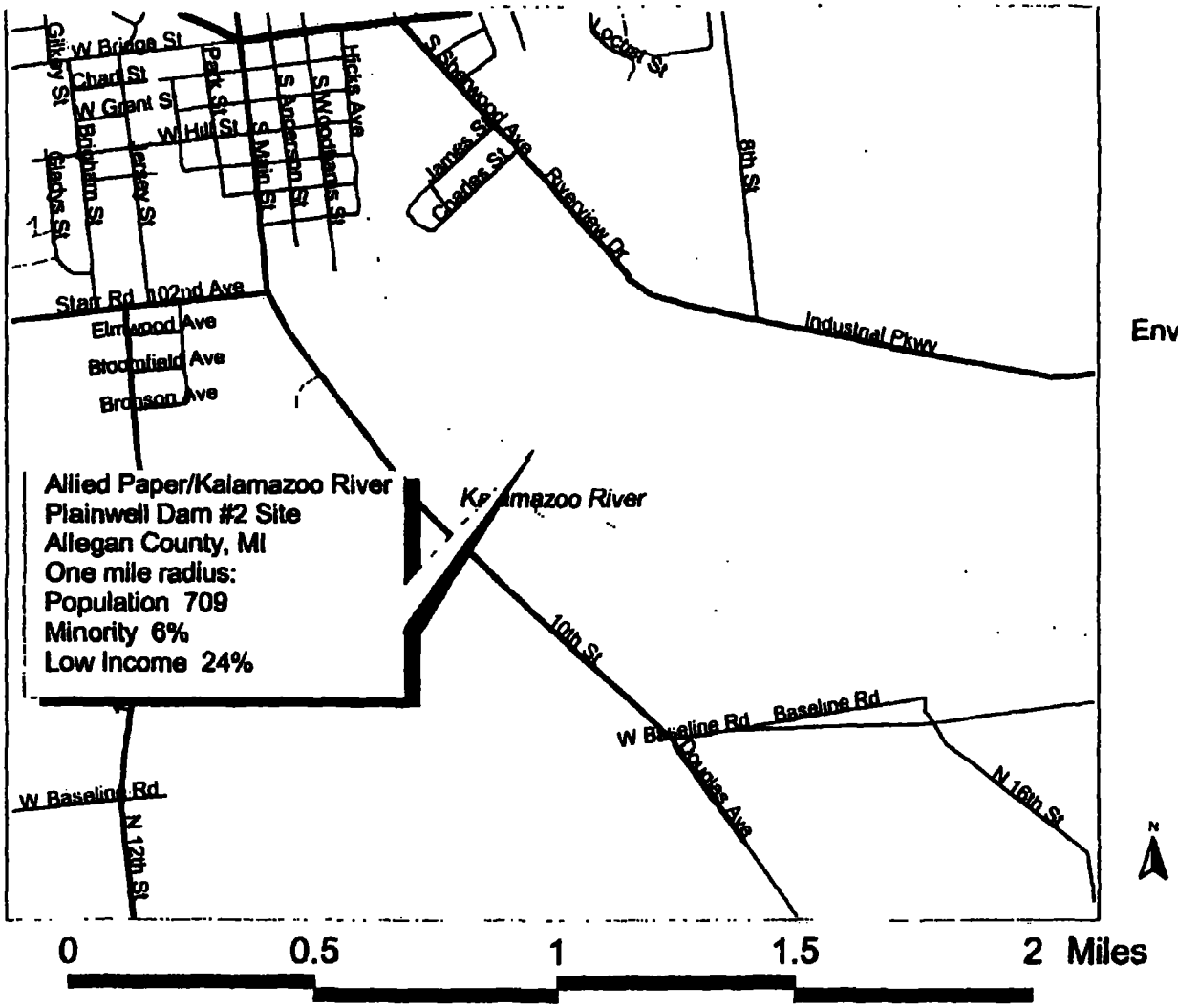
cc: D. Chung, U.S. EPA, 5203-G
M. Chezik, U.S. DOI, w/o Enf. Addendum
Steven E. Chester, Director, Michigan DEQ, w/o Enf. Addendum
Michael Cox, Michigan Attorney General, w/o Enf. Addendum

Attachment 1

EJ Analysis

Region 5 Superfund EJ Analysis

Allied Paper/Kalamazoo River
Plainwell Dam #2 Site



State of Michigan averages:
Minority: 21%
Low Income: 29%

U.S. EPA Region 5
Environmental Justice Case Criteria
for State of Michigan

Minority: 42% or greater

Low Income: 58% or greater

Date of Map 4/16/09

Source of Map Census 2000 Database/
ArcView 3.0

Attachment 2

Administrative Record Index

ATTACHMENT 2

U.S. ENVIRONMENTAL PROTECTION AGENCY
REMOVAL ACTION

ADMINISTRATIVE RECORD
FOR
ALLIED PAPER/PORTAGE CREEK/KALAMAZOO RIVER SITE
PLAINWELL DAM #2
KALAMAZOO, KALAMAZOO COUNTY, MICHIGAN

ORIGINAL
JUNE 8, 2009

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
1	12/23/91	ATSDR	U.S. EPA	Preliminary Health Assessment for the Allied Corp. Kalamazoo Plant (SDMS ID: 167821)	42
2	10/00/00	Blasland, Bouck & Lee, Inc.	U.S. EPA	Feasibility Study Report - Phase I for the Allied Paper/Portage Creek/Kalamazoo River Site (DRAFT FOR STATE AND FEDERAL REVIEW) (SDMS ID: 249488)	407
3	10/00/00	Blasland, Bouck & Lee, Inc.	U.S. EPA	Remedial Investigation Report - Phase I for the Allied Paper/Portage Creek/Kalamazoo River Site (DRAFT FOR STATE AND FEDERAL REVIEW) (SDMS ID: 249490)	653
4	02/01/02	Roy F. Weston, Inc.	U.S. EPA	Removal Assessment Report for the Allied Paper-Kalamazoo River Site (SDMS ID: 205878)	777
5	04/00/03	Camp, Dresser & McKee	U.S. EPA	Baseline Ecological Risk Assessment for the Allied Paper/Portage Creek/ Kalamazoo River Site (FINAL REVISED) (SDMS ID: 249487)	140
6	04/00/03	CH2M Hill	U.S. EPA	Remedial Investigation Report for the Allied Paper/Portage Creek/ Kalamazoo River Site (U.S. EPA INTERNAL DRAFT) (SDMS ID: 249495)	103
7	05/00/03	Camp, Dresser & McKee	U.S. EPA	Human Health Risk Assessment for the Allied Paper/ Portage Creek/Kalamazoo River Site (FINAL REVISED) (SDMS ID: 249486)	109

NO.	DATE	AUTHOR	RECIPIENT	TITLE/DESCRIPTION	PAGES
8	07/25/06	ATSDR	File	Health Consultation: ATSDR Response to Public Advisory Council for Kalamazoo River Area of Concern RAP Comments on the Public Health Assessment for the Allied Paper/Portage Creek/Kalamazoo River Site (SDMS ID: 249492)	18
9	02/14/07	Borries, S., U.S. EPA	Karl, R., U.S. EPA	Enforcement Action Memorandom: Determination of an Imminent and Substantial Threat to Public Health and the Environment at the Plainwell Impoundment Area of the Allied Paper/Portage Creek/ Kalamazoo River Site (PORTIONS OF THIS DOCUMENT HAVE BEEN REDACTED) (SDMS ID: 290423)	15
10	11/04/08	Erickson, M., ARCADIS	Saric, J., U.S. EPA	Conceptual Design Report for Bank Removal and Restoration Plainwell No. 2 Dam Area	
11	12/29/08	Camp, Dresser & McKee	U.S. EPA	Certificates of Analysis, Chain of Custody Records and Sediment Core Logs for the Plainwell Dam #2 Investigation	
12	05/21/09	Ribordy, M., U.S. EPA	Bucholtz, P., MDEQ	Letter re: Request for State ARARs for the Plainwell Dam #2 Site	
13	00/00/00	Ribordy, M., U.S. EPA	Karl, R., U.S. EPA	Enforcement Action Memorandum: Determination of an Imminent and Substantial Threat to Public Health and the Environment at Plainwell Dam #2 of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site (PENDING)	

Appendix 2

APPENDIX 2

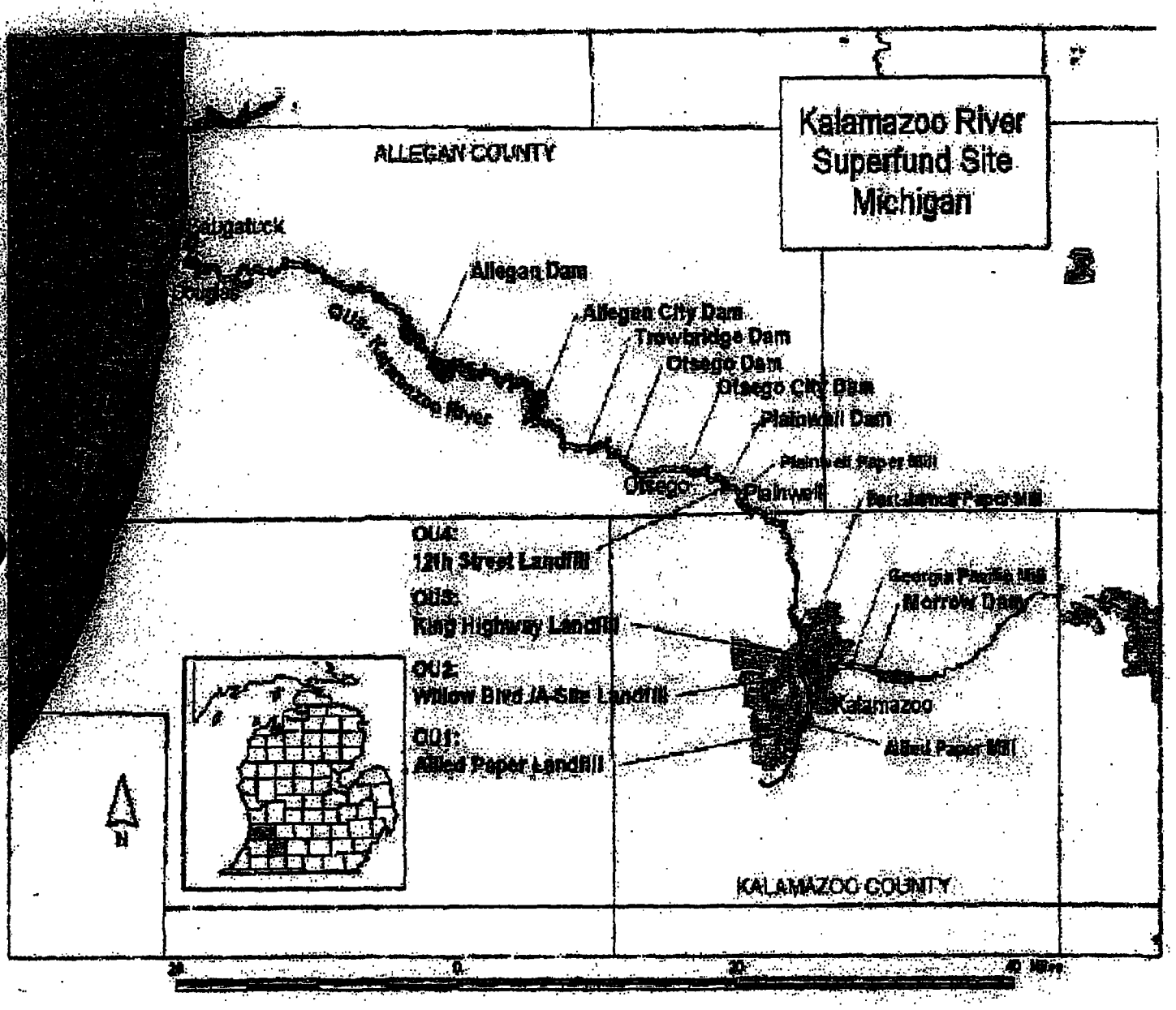
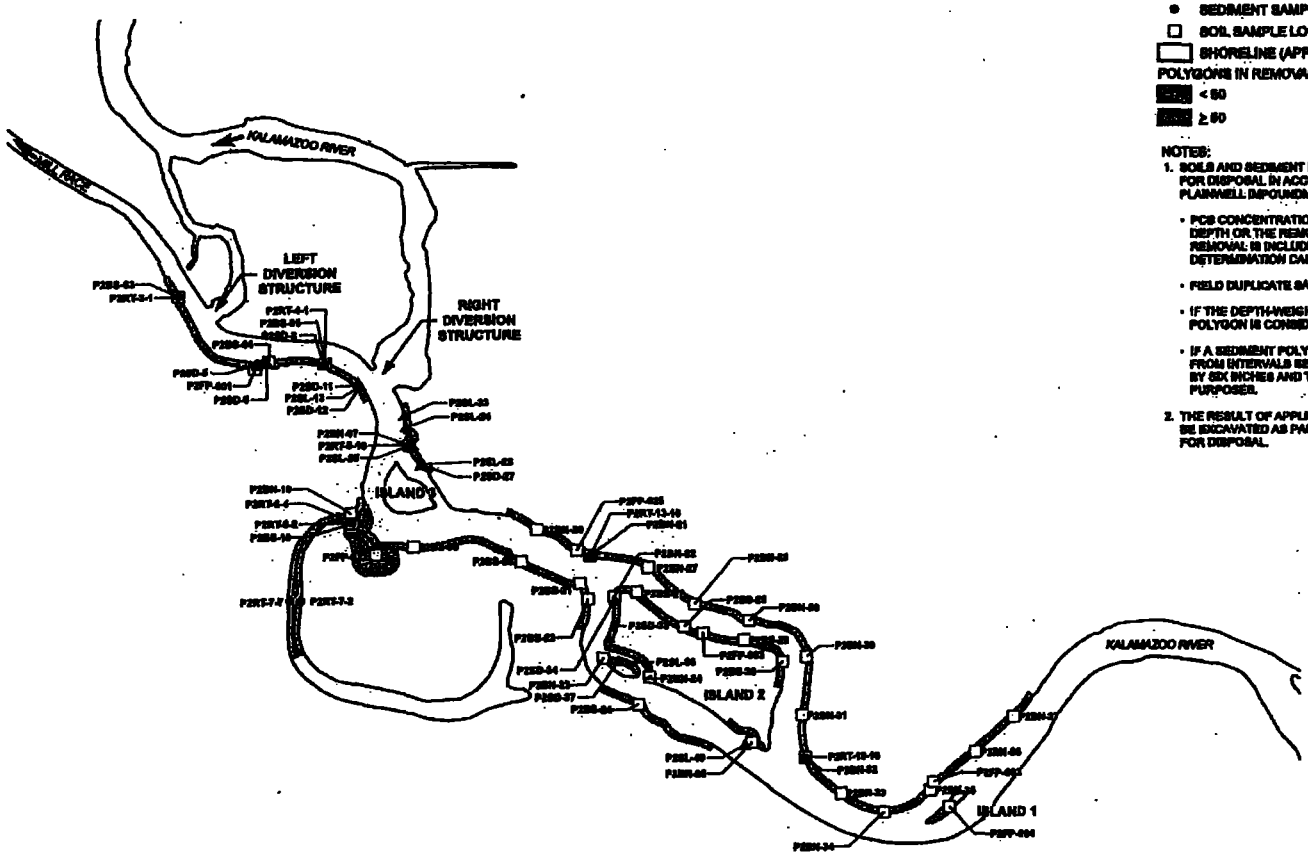

Kalamazoo River
Superfund Site
Michigan
ALLEGAN COUNTY
Allegan Dam
Allegan City Dam
Trowbridge Dam
Otsego Dam
Otsego City Dam
Plainwell Dam
Otsego
Plainwell
OU4:
12th Street Landfill
OU3:
King Highway Landfill
OU2:
Willow Blvd /A-Site Landfill
OU1:
Allied Paper Landfill
Morrow Dam
Kalamazoo
Allied Paper Mill
N
KALAMAZOO COUNTY
0
20
40 Miles

Figure 1



LEGEND:

- ▲ MDEQ DECEMBER 2006 SAMPLE LOCATION (APPROXIMATE) IN REMOVAL POLYGON
- ● SEDIMENT SAMPLE LOCATION FROM ARCADIS 2008 INVESTIGATION IN REMOVAL POLYGON
- □ SOIL SAMPLE LOCATION FROM ARCADIS 2008 INVESTIGATION IN REMOVAL POLYGON
- SHORELINE (APPROXIMATE)

POLYGONS IN REMOVAL AREAS DEPTH-WEIGHTED PCB (mg/kg)

- < 50
- ≥ 50

NOTES:

1. SOILS AND SEDIMENT REMOVAL AREAS WERE CLASSIFIED AS EITHER TSCA OR NON-TSCA MATERIALS FOR DISPOSAL IN ACCORDANCE WITH THE METHODOLOGY APPROVED BY U.S.EPA FOR THE FORMER PLAINWELL IMPOUNDMENT TCRA. THE METHODOLOGY IS AS FOLLOWS:
   - PCB CONCENTRATIONS ARE DEPTH-WEIGHTED AVERAGED TO THE BOTTOM OF PCB DATA, A 30-INCH DEPTH OR THE REMOVAL DEPTH, WHICHEVER IS SHALLOWEST. (ONLY MATERIAL DESIGNATED FOR REMOVAL IS INCLUDED IN CALCULATION. MATERIAL BELOW REMOVAL DEPTH IS NOT INCLUDED IN TSCA DETERMINATION CALCULATIONS.)
   - FIELD DUPLICATE SAMPLES ARE AVERAGED PRIOR TO ALL OTHER CALCULATIONS.
   - IF THE DEPTH-WEIGHTED PCB CONCENTRATION IS GREATER THAN OR EQUAL TO 50 MG/KG, THAT REMOVAL POLYGON IS CONSIDERED TSCA MATERIAL.
   - IF A SEDIMENT POLYGON IS DETERMINED TO CONTAIN TSCA MATERIAL AND NO PCB DATA IS AVAILABLE FROM INTERVALS BENEATH THE REMOVAL DEPTH, THE REMOVAL DEPTH IN THE FIELD WILL BE INCREASED BY SIX INCHES AND THE ADDITIONAL MATERIAL WILL ALSO BE CONSIDERED TO BE TSCA FOR DISPOSAL PURPOSES.
2. THE RESULT OF APPLICATION OF THIS METHODOLOGY IS THAT NONE OF THE REMOVAL AREAS TO BE EXCAVATED AS PART OF PLAINWELL NO. 2 DAM AREA TCRA ARE CLASSIFIED AS TSCA MATERIAL FOR DISPOSAL.

0 600 1,200 Feet

GRAPHIC SCALE

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

CLASSIFICATION OF SOIL AND SEDIMENT REMOVAL AREAS BY PCB CONCENTRATIONS

FIGURE 1

100% Recycled 30% PCW

IN THE UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF MICHIGAN
SOUTHERN DIVISION

GEORGIA-PACIFIC CONSUMER PRODUCTS LP, FORT JAMES CORPORATION, and GEORGIA-PACIFIC LLC,	)	
Plaintiffs,	)	No: 1:11-cv-00483
v.	)	Judge Robert J. Jonker
NCR CORPORATION, INTERNATIONAL PAPER CO., and WEYERHAEUSER CO.,	)	
Defendants.	)	

NCR CORPORATION'S RESPONSES AND OBJECTIONS
TO GEORGIA-PACIFIC'S INTERROGATORIES TO THE OTHER PARTIES

Pursuant to Rules 26 and 33 of the Federal Rules of Civil Procedure, Defendant NCR Corporation ("NCR"), by and through its undersigned counsel, hereby responds and objects to Plaintiffs Georgia-Pacific Consumer Products LP, Fort James Corporation and Georgia-Pacific LLC's (collectively, "Georgia-Pacific") Interrogatories to the Other Parties ("Interrogatories").

GENERAL OBJECTIONS

The following General Objections apply to each of Georgia-Pacific's Interrogatories and shall have the same force and effect as if set forth in full in response to each. Any failure to repeat all or part of these General Objections in any specific response shall not constitute a waiver or relinquishment of such objection.

1. NCR has not completed its investigation or discovery in this litigation. NCR's Responses and Objections to Georgia-Pacific's Interrogatories are based upon the information presently known to NCR and are given without prejudice to NCR's right to adduce or analyze

evidence subsequent to the date of these responses. NCR expressly reserves the right to revise, supplement or otherwise amend these Responses and Objections to the extent permitted by the Federal Rules of Civil Procedure, the Local Rules of Practice and Procedure for the United States District Court for the Western District of Michigan, and/or other applicable law (collectively, the "Rules").

2. NCR objects to these Interrogatories to the extent that they are premature and to the extent that they seek information and analysis that will be the subject of expert testimony. NCR will timely comply with the Court's operative scheduling order and other orders entered in this case as they relate to expert disclosures and will supplement its response to these Interrogatories as required.

3. NCR objects to each of Georgia-Pacific's Interrogatories to the extent that it is overly broad, unduly burdensome and/or seeks irrelevant information or information that is not reasonably calculated to lead to the discovery of admissible evidence.

4. NCR objects to each of the Interrogatories to the extent that it seeks, or may be construed to seek, information or documents protected from disclosure by the attorney-client privilege, the work-product doctrine, the joint-defense or common-interest privilege and/or any other applicable privilege or applicable discovery protection. Any disclosure of information or documents protected from discovery by the attorney-client privilege, the work-product doctrine, or any other applicable privilege, protection, immunity, law or rule is inadvertent and does not constitute a waiver of any claim of privilege or other protection, all of which are expressly reserved. NCR reserves the right to demand the return of such information or documents, prohibit its use in any manner and/or demand the destruction of any such documents or information inadvertently produced in response to the Interrogatories.

5. NCR objects to each of the Interrogatories to the extent that it seeks, or may be construed to seek, information from NCR that is in the possession, custody or control of other parties or entities. NCR's Responses and Objections to the Interrogatories are tendered on behalf of NCR only, and not on behalf of any other party or entity.

6. NCR objects to each of the Interrogatories to the extent that it seeks, or may be construed to seek, information that is publicly available; that has previously been produced in this litigation; that is already in the possession, custody or control of Georgia-Pacific; or that is available to Georgia-Pacific from another source, to the extent that such information is equally available to Georgia-Pacific and the burden and expense of obtaining such information is no greater for Georgia-Pacific than it is for NCR.

7. NCR objects to each of the Interrogatories to the extent that it seeks, or may be construed to seek, to impose burdens or obligations on NCR that are inconsistent with the Rules.

8. NCR objects to each of the Interrogatories to the extent that it is not reasonably limited in scope, rendering the Interrogatory overly broad or unduly burdensome.

9. NCR reserves all objections as to the competence, relevance, materiality, authenticity, admissibility and privilege of documents and responses to the Interrogatories or the subject matter thereof; all rights to object on any ground to any other discovery request concerning the subject matter of the Interrogatories; and all rights to object on any ground to the use of any document, or the subject matter therein, in any subsequent proceeding, including without limitation the trial of this or any other action.

10. Each of the foregoing General Objections is incorporated into the Specific Responses and Objections given to each individual Interrogatory, and those Specific Responses and Objections are made subject to and without waiving any of the General Objections.

SPECIFIC RESPONSES AND OBJECTIONS TO INTERROGATORIES

1. Please identify each item of cost on Georgia-Pacific's Cost Disclosure that you contend is inconsistent with the NCP and provide the specific legal and factual basis for each item of cost you contend is inconsistent with the NCP.

OBJECTION: NCR objects to this Interrogatory on the ground that Georgia-Pacific has not disclosed all information necessary to assess its claim for costs, discovery is ongoing, and Georgia-Pacific bears the burden of proof with regard to proving its costs. NCR is continuing its review of Georgia-Pacific's cost disclosures, deposition testimony and documents related to the costs that Georgia-Pacific alleges it has incurred, and identifies the below issues at this time.

NCR further objects to this Interrogatory to the extent that it calls for expert testimony. NCR will serve its expert disclosures pursuant to the schedule set forth in the Court's operative scheduling order.

NCR further objects to this Interrogatory to the extent that it seeks information or documents protected from disclosure by the attorney-client privilege, the work-product doctrine, the joint defense privilege, the common interest doctrine, or any other applicable privilege or applicable discovery protection.

RESPONSE: Subject to and without waiving these objections, or any of its General Objections, NCR has listed certain general categories of cost that, at this point in fact discovery, NCR contends are not necessary or not consistent with the NCP. For each category, NCR has stated briefly the basis for its contention, recognizing that NCR expects to identify additional evidence relating to these issues as discovery continues. At this point in discovery, NCR contends that at least the following categories of costs are not necessary or not consistent with the NCP:

- Costs that Georgia-Pacific has allegedly incurred that are not "response" costs, as that term is defined in the NCP, including but not limited to (i) costs at the Kalamazoo Mill and Hawthorne Mill Sites (the "former GP Mill Site"), which were for redevelopment purposes rather than to respond to the presence of hazardous substances; (ii) costs related to natural resource damages assessment and restoration; and (iii) litigation-related and public relations costs.

- Costs that Georgia-Pacific has allegedly incurred that were not required by the governing Administrative Order on Consent, were not conducted subject to agency oversight, and/or were incurred in producing deliverables that were rejected by the response agencies. Examples of this category of costs include but are not limited to (i) costs related to voluntary response actions taken at Willow Boulevard / A-Site Operable Unit ("OU2") and King Highway Landfill Operable Unit ("OU3"); and (ii) costs related to the "Supplemental RI/FS" prepared by the Kalamazoo River Study Group in 1999 and 2000.

- Costs that Georgia-Pacific has allegedly incurred with respect to three purported Time Critical Removal Actions ("TCRAs")—at the Plainwell Impoundment, Plainwell No. 2 Dam and the former GP Mill Site—were not incurred consistent with the NCP. These actions, although described as TCRAs, should have been subject to the NCP requirements for non-time-critical removal actions or remedial actions. Georgia-Pacific worked with the U.S. Environmental Protection Agency ("EPA") and Michigan Department of Environmental Quality to treat these actions as TCRAs to avoid the procedural requirements of the NCP for a non-time-critical removal action or remedial action. As a result, the costs of performing those actions were not incurred consistent with the NCP.

NCR's investigation is ongoing. NCR expects to elicit expert opinion testimony on whether the costs that Georgia-Pacific alleges it has incurred are necessary and consistent with the NCP. Because this is an issue on which Georgia-Pacific bears the burden of proof, NCR currently expects to serve its expert disclosure for this topic by January 16, 2015, pursuant to the Court's scheduling order. NCR will supplement this response if the Rules so require.

2. Please identify each item of cost on Georgia-Pacific's Cost Disclosure that you contend is time barred and provide the specific legal and factual basis for each item of cost you contend is time barred.

OBJECTION: NCR objects to this Interrogatory on the ground that Georgia-Pacific has not disclosed all information necessary to assess its claim for costs, discovery is ongoing, and Georgia-Pacific bears the burden of proof with regard to proving its costs. NCR is

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IN THE UNITED STATES DISTRICT COURT

FOR THE WESTERN DISTRICT OF MICHIGAN

SOUTHERN DIVISION

GEORGIA-PACIFIC CONSUMER PRODUCTS LP and FORT JAMES CORPORATION and GEORGIA-PACIFIC LLC Plaintiffs, v. NCR CORPORATION and INTERNATIONAL PAPER CO. and WEYERHAEUSER COMPANY Defendants	:	No. 11-CV-00483

EXPERT REBUTTAL REPORT OF JEFFREY ZELIKSON

January 30, 2015

Jeffrey Zelikson
Director
Gnarus Advisors LLC
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January 30, 2015

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SECTION 1 – EXPERT OPINIONS OF JEFFREY ZELIKSON

I. Qualifications

I am a Director with Gnarus Advisors LLC (Gnarus). Gnarus provides analytic and expert services to businesses, government agencies and law firms facing complex challenges arising from uncertainty, potential litigation, and other disputes. My consulting practice focuses on strategic and management consulting and expert assignments related to environmental matters, especially for matters related to management and remediation of hazardous substances.

Prior to joining Gnarus Advisors in February, 2010 I was with LECG, LLC (LECG), a leading economics, finance, accounting, environmental and health care consulting firm. I joined LECG in 2001.

Prior to joining LECG, I was with the environmental consulting practice of the PA Consulting Group, PHB Hagler Bailly, and before that Putnam, Hayes & Bartlett, Inc. (PHB). The environmental consulting practice of the PA Consulting Group moved to LECG in April, 2001. PHB and PHB Hagler Bailly were both predecessor companies to the PA Consulting Group.

Since 1995, I have been retained on many matters involving expert testimony on recovery of remediation costs. My expert analysis and testimony has focused on consistency with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), and on matters related to the necessity, appropriateness and reasonableness of remediation costs and other related issues. I have been retained to provide consulting services and expert testimony in a number of private party Superfund cost recovery actions, for both plaintiffs and defendants.

Prior to joining PHB in 1995, I served the U.S. Environmental Protection Agency (US EPA) for 25 years. I held executive level positions at US EPA regional offices in New York and San Francisco. I also served as the state of New Jersey's chief water resource official in the 1970s. From 1987 through 1995, I was Director of the Hazardous Waste Management Division for US EPA's Western Regional Office in San Francisco. Among other matters, my responsibilities included the direction of US EPA Region IX's hazardous waste regulatory and site cleanup (Superfund) programs and oversight of similar programs for the states of California, Arizona, Nevada and Hawaii.

I have had extensive experience across a range of environmental matters, with particular focus on the remediation of hazardous waste sites. I have over 35 years of experience in this particular

environmental specialty, dating back to the discovery of the first hazardous waste sites in the country in the late 1970s.

While Director of the Hazardous Waste Management Division for US EPA Region IX, I oversaw the investigation and cleanup of more than 125 Superfund sites on the National Priorities List (NPL). For these sites, I was responsible for making hundreds of decisions that were governed by the NCP, and I was ultimately responsible for assuring that compliance was achieved with the NCP in investigating and cleaning up the Superfund sites under my direction. In addition, I was responsible for the oversight of other government agencies' efforts to remediate Superfund sites consistent with the requirements of the NCP.

I received a Bachelor of Science degree in mechanical engineering from the City University of New York and completed graduate courses in mechanical engineering at the Stevens Institute of Technology. I am a registered professional engineer in New York and New Jersey. Before joining the US EPA in 1971, I designed petrochemical facilities for the foreign affiliates of the Exxon Corporation for five years.

My fee for professional services is $490 per hour.

II. Assignment

Sidley Austin LLP, counsel for defendant NCR Corporation (NCR), has asked me to provide an analysis and rebuttal opinion to the Expert Report of Mr. Robert M. Zoch, which was submitted in this matter on December 5, 2014 regarding certain costs incurred at the Allied Paper, Inc/Portage Creek/Kalamazoo River Site (Site).[1] Mr. Zoch was retained by Georgia-Pacific Consumer Products LP (GP). Counsel has also asked me to focus my opinions on whether the response actions taken and the costs incurred by GP were necessary and consistent with the applicable requirements of the NCP.[2,3]

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1 See Expert Report of Robert M. Zoch Jr., PE. December 5, 2014.

2 Section 300.700(c)(2) states that "Responsible parties shall be liable for necessary costs of response actions to releases of hazardous substances incurred by any other person consistent with the NCP." Section 300.700(c)(3)(i) states that "A private party response action will be considered "consistent with the NCP", if the action, when evaluated as a whole is in substantial compliance with the applicable requirements in paragraphs (5) and (6) of this section...."

3 While my expert report focuses on NCP issues as they relate to the costs GP has claimed at the Site, it should be noted that other PRPs also incurred associated costs as part of the historical cost sharing agreement between the members of the Kalamazoo River Study Group. My opinions on the necessity and consistency of the costs incurred by GP would also apply to the associated costs incurred by other PRPs.

III. Summary of Opinions

Opinion 1. Mr. Zoch did not provide sufficient information in his Expert Report of December 5, 2014 to substantiate the bases for his opinions regarding GP's claimed costs and their necessity and consistency with the NCP.

Opinion 2. $23.6 million out of the total amount identified as recoverable costs for the performance of two OU-5[4] sediment-related removal actions in Mr. Zoch's Expert Report were not incurred consistent with the requirements of the NCP and therefore are not recoverable from other parties.

Opinion 3. $11.6 million out of the total amount identified as recoverable costs for the performance of the October 2000 OU-5 Supplement to the Remedial Investigation/Feasibility Study (RI/FS) and associated studies included in Mr. Zoch's Expert Report were not necessary costs under the NCP and therefore are not recoverable from other parties.

Opinion 4. $4.2 million out of the total amount identified as recoverable costs for OU-6 in Mr. Zoch's Expert Report were not incurred consistent with the requirements of the NCP and therefore are not recoverable from other parties.

Opinion 5. In addition to the costs identified above, $2.5 million out of the total amount in costs identified as recoverable costs in Mr. Zoch's Expert Report are not response costs under the NCP, and as such are not recoverable costs under the NCP.

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[4] OUs are "operable units" established for a site that divide the site into segments for purposes of investigation and remediation. For example, "OU-5" is the fifth operable unit at the Site.

IV. Work Performed

In forming my opinions in this matter I reviewed, and supervised my staff's review of numerous documents related to the activities at the Site. These included investigation reports, cleanup completion reports, correspondence between the KRSG and the Agencies (defined as MDNR, MDEQ, and/or US EPA), documents relating to involvement of the community, Agency guidance, and other documents.

My review of documents began with the receipt of Michigan Department of Environmental Quality (MDEQ) document production indices in an excel workbook, as provided by counsel. Based on the MDEQ production indices, we searched for and gathered documents from a database of documents produced by the various parties in the case. In addition to database searches, we also reviewed in detail the US EPA websites for the Site, the MDEQ website, and the website maintained by GP.

At no time during our document review did counsel provide or instruct us to review specific documents; all documents were obtained either through reviews of entire document productions, searches on the database, or independent searches of publicly available information and guidance.

In this report I provide rebuttal opinions to the Expert Report submitted by Mr. Zoch, dated December 5, 2014. My evaluation and opinions are based on my 35 years of experience in the cleanup of hazardous waste sites, on the regulations, guidance and common professional practice governing response actions and on the information provided to me in this matter as described above and experiences related to the cleanup of hazardous waste across the United States.

Prior to preparation of this report, I have had discussions with counsel for NCR to obtain historical knowledge of the activities at the Site. I also performed a site visit on September 17, 2014.

A complete list of the documents that I have considered in forming my opinions is enclosed in Section 4 of this report.

V. Additional Work to be Performed

I expect to prepare for and attend a deposition in this matter and, based on direction from counsel, I may be asked to evaluate additional expert reports from the other experts and to prepare additional rebuttal expert reports.

I also expect to provide an opinion at trial in this matter based on further direction from counsel.

My opinions are based on information reviewed as of January 30, 2015.

VI. Site Response and Regulatory History

Site Overview

The Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site (Site) is located in Allegan and Kalamazoo Counties, Michigan. Numerous paper mills historically operated in the region, and between the 1950s and 1970s some of these paper mills processed carbonless copy paper which contained polychlorinated biphenyls (PCBs).[5]

In August 1990, the Site was placed on the NPL and designated as state lead (meaning that the Michigan Department of Natural Resources (MDNR) would have responsibility for overseeing the investigation and remediation of the Site). Shortly thereafter, several potentially responsible parties (PRPs) including Millennium Holdings LLC, Georgia-Pacific LLC, and Plainwell Inc. formed a group referred to as the Kalamazoo River Study Group (KRSG).[6] They signed an Administrative Order by Consent (AOC) in December 1990 with MDNR to prepare and perform a Remedial Investigation/Feasibility Study (RI/FS) for the Site, and to reimburse MDNR oversight costs for the RI/FS.[7]

While MDNR initially had responsibility for overseeing the investigation and remediation of the Site, during the following decades there were two changes in lead agency assignment. In 1995, the Michigan Department of Environmental Quality (MDEQ) was formed, and lead agency responsibility for the Site was transferred from MDNR to this new agency.[8] And in July 2001, MDEQ requested that US EPA take over lead agency responsibility for the Site.[9] In July 2002, MDEQ transitioned lead agency responsibility at several areas of the Site to US EPA.[10]

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5 See US EPA. October 2012. Second Five-Year Review Report for Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. WY660824 – WY661122; at page WY660840.

6 Fort James later joined this group as a fourth member.

7 See MDNR. December 28, 1990. Administrative Order by Consent. WY665594 – WY665628.

8 See MDEQ. December 23, 2014. History of DEQ. Retrieved from http://www.michigan.gov/deq/0,1607,7-135-3306-13142--,00.html.

9 See R. Harding (MDEQ). July 24, 2001. Letter to D. Ullrich (US EPA). WYDQ002614 – WYDQ002615.

10 OU-2, OU-4 and OU-5 were immediately transferred to US EPA in 2002, while OU-1 was transferred to US EPA in 2008. Responsibility for OU-3 has stayed with MDEQ.

The Site has been divided into multiple operable units (OUs) for the purpose of study and evaluation of potential response actions. These are:[11]

- OU-1 – Allied Paper, Inc./Bryant Mill Pond
- OU-2 – Willow Boulevard/A-Site Landfill
- OU-3 – King Highway Landfill
- OU-4 – 12th Street Landfill
- OU-5 – 80 miles of the Kalamazoo River including a 3-mile stretch of Portage Creek (Kalamazoo River)
- OU-7 – Former Plainwell Paper Mill Property

In addition to the above OUs, OU-6 has been reserved for any additional mill properties that are found to be a source of PCBs to the Site.[12] While currently unassigned, in the mid-2000s the GP-owned Kalamazoo and Hawthorne Mill Sites were briefly designated as OU-6 while they were investigated and evaluated for potential response actions.[13] In this report, the GP-owned former mill sites will be referred to as:

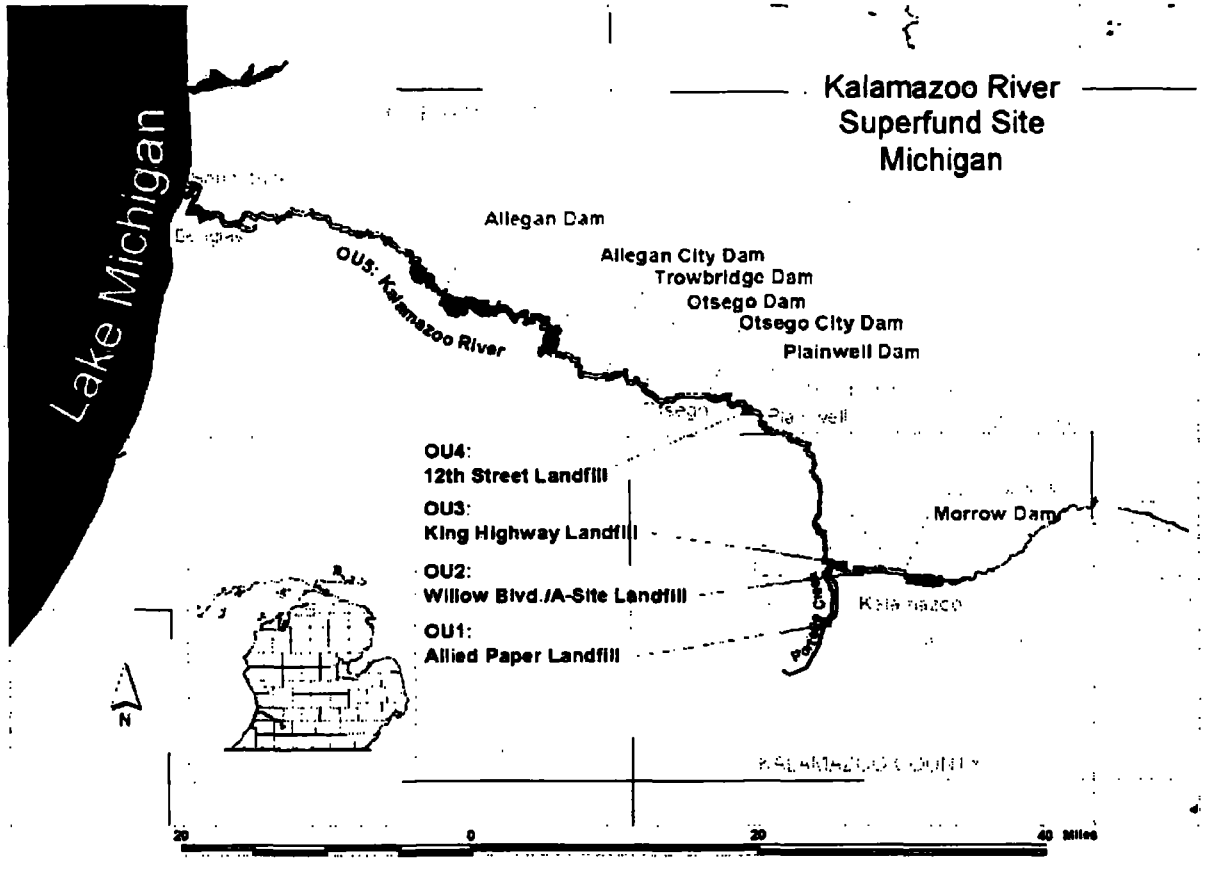
- Former OU-6 – Former GP Kalamazoo and Hawthorne Paper Mill Properties (GP Mill Sites)

See US EPA. October 2012. Second Five-Year Review Report for Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. WY660824 – WY661122; at page WY660842.

[11] See US EPA. October 2012. Second Five-Year Review Report for Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. WY660824 – WY661122; at page WY660841.

[12] See US EPA. October 2012. Second Five-Year Review Report for Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. WY660824 – WY661122; at page WY660830.

[13] See US EPA. October 2007. First Five-Year Review Report for Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. KZ00167169 – KZ00167342; at page KZ00167184.



Areas of the Site Included in GP's Claim

As presented in Mr. Zoch's Expert Report of December 5, 2014, Georgia-Pacific has claimed response costs at four areas of the Site. These are:[14]

- OU-2 Willow Boulevard/A-Site Landfill – $20.91 million
- OU-3 King Highway Landfill – $13.81 million
- OU-5 Kalamazoo River – $66.37 million ($18.05 million for Plainwell TCRA #1, $6.83 million for Plainwell TCRA #2, and $41.49 million for the RI/FS and SRI/FS)
- Former OU-6 GP Mill Sites – $5.95 million

Because the other areas of the Site (OU-1, OU-4, and OU-7) are not included in this claim for cost recovery, they are not addressed in this report.

[14] See Expert Report of Robert M. Zoch Jr., PE. December 5, 2014; at page 27.

Summary of OU-2 Response Actions

OU-2 (Willow Boulevard/A-Site Landfill) consists of two adjacent landfills occupying 32 acres along the south bank of the Kalamazoo River in Kalamazoo, Michigan. GP is the current owner of both landfills, and has been responsible for performing the response actions.

The RI/FS for OU-2 was performed under the 1990 AOC which was signed on December 28, 1990.[15] While undertaking initial investigations in 1992, GP voluntarily installed fencing around the A-Site landfill and reseeded the western portion of that landfill.[16] Investigations continued through the mid-1990s, and in 1997 the draft Remedial Investigation/Focused Feasibility Study (RI/FFS) for OU-2 was submitted by the KRSG. The draft was revised several times by the KRSG over the next four years until November 2001, when responsibility for completing the document was transferred from the KRSG to MDEQ.[17] The final RI/FFS was submitted in November 2004.[18]

While the draft RI/FFS was under revision, in 1998 GP performed a second voluntary action to install 1,500 linear feet of sheet piling between the A-Site Landfill and the Kalamazoo River.[19] Between 1999 and 2000, GP performed a third voluntary action to excavate 7,000 cubic yards (cy) of sediments from the Kalamazoo River (adjacent to the OU-2 landfills), with placement of excavated sediment in the OU-2 landfills.[20,21]

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15 See MDNR. December 28, 1990. Administrative Order by Consent. WY665594 – WY665628; at page WY665628.

16 See US EPA. October 2012. Second Five-Year Review Report for Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. WY660824 – WY661122; at page WY660848.

17 See A. Howard (MDEQ). November 19, 2001. Letter to M. Brown (BBL). NCRKZOO0030453 – NCRKZOO0030454.

18 See MDEQ. November 2004. Remedial Investigation/Focused Feasibility Study, Operable Unit Two, Willow Boulevard/A-Site Landfill. NCRKZOO0031811 – NCRKZOO0032131.

19 See US EPA. October 2012. Second Five-Year Review Report for Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. WY660824 – WY661122; at page WY660848.

20 See US EPA. October 2012. Second Five-Year Review Report for Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. WY660824 – WY661122; at pages WY660848 – WY660849.

21 The costs associated with this voluntary sediment excavation are categorized as OU-2 costs in GP's cost recovery claim and in the Expert Report of Robert M. Zoch.

In July 2005 US EPA released a Proposed Plan,[22] and a Record of Decision (ROD) was issued in September 2006. The selected remedy in the ROD was for the consolidation and containment of landfill materials, with bank stabilization along the Kalamazoo River. Additionally, contaminated soil which was concurrently being excavated across the river at the Former OU-6 GP Mill Sites was to be placed in the OU-2 landfills prior to closure (this was conducted in late 2006). The estimated cost of the remedy was $11.5 million.[23]

A Consent Decree was signed between GP and the US EPA on May 18, 2009 to design and implement the response action selected in the 2006 ROD, and to reimburse costs incurred by US EPA.[24] The response action began in May 2011 and was completed in June 2014.[25] A final completion report was submitted on September 18, 2014 and accepted by US EPA on September 25, 2014.[26]

I do not further opine on the OU-2 response actions in this report.

Summary of OU-3 Response Actions

OU-3 (King Highway Landfill) consists of a 23-acre landfill located along the south bank of the Kalamazoo River in Kalamazoo, Michigan. GP is the current owner of the landfill, and has been responsible for performing the response actions.

The RI/FS for OU-3 was performed under the 1990 AOC which was signed on December 28, 1990.[27] Initial OU-3 investigations were performed in the early 1990s, and in 1994 the draft RI/FFS was

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22 See US EPA. July 2005. EPA Proposes Cleanup Plan for Landfill Paper Waste. NCRKZOO0033646 – NCRKZOO0033655.

23 See US EPA. September 2006. Willow Boulevard/A-Site Landfill Operable Unit 2 Record of Decision. NCRKZOO0035035 – NCRKZ0035159; at page NCRKZOO0035081.

24 See United States of America v. Georgia-Pacific, LLC, Civil Action 1-09-cv-429. May 18, 2009. Consent Decree for the Design and Implementation of Certain Response Actions at Operable 2 of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. NCRKZOO0177382 – NCRKZOO0177556.

25 See Arcadis. September 2014. Willow Boulevard/A-Site Landfill Operable Unit 2, Completion of Remedial Action Report. NCRKZOO0433267 – NCRKZOO0433409.

26 See T. Short (US EPA). September 25, 2014. Letter to G. Griffith (Georgia Pacific) re: Approval of Certification of Completion of the OU2 Remedial Action Completion Report. NCRKZOO0433410.

27 See MDNR. December 28, 1990. Administrative Order by Consent. WY665594 – WY665628; at page WY665628.

submitted by the KRSG.[28,29] Shortly thereafter MDNR released the Proposed Plan.[30] The preferred remedy was closure of the landfill; this remedy was revised over the subsequent three years to allow time to place excavated soil from several off-site locations in the landfill prior to closure.[31] This preferred remedy was formally selected in a February 1998 ROD, with an estimated cost of $3-4 million.[32]

While the proposed plan was being evaluated, in 1994 GP performed a voluntary action to repair a dike and install 120 linear feet of sheet piling between OU-3 and the Kalamazoo River.[33] In 1996, GP performed a second voluntary action to install an additional 900 linear feet of sheet piling along the river.[34,35]

In 1999 after the ROD had been issued, GP performed a series of response actions. These involved the excavation of more than 49,000 cy soil from areas outside OU-3, with consolidation and placement of that material in the OU-3 landfill. These actions were not performed pursuant to any legal agreement with the regulatory agencies.

An AOC was signed between GP and MDEQ on February 8, 2000 to perform response actions at OU-3 and the Mill Lagoons.[36] The response action was performed between 1996 and 2003, and a draft final

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28 See BBL. July 1994. Remedial Investigation Report, King Highway Landfill Operable Unit. KB60500001 – KB60500066.

29 See BBL. September 1994. Focused Feasibility Study, King Highway Landfill Operable Unit. KB50002081 – KB50002145.

30 See MDNR. August 1994. Proposed Plan Fact Sheet, King Highway Landfill Operable Unit. KB10303162 – KB10303175.

31 See MDEQ. July 1997. Revised Proposed Plan Fact Sheet, King Highway Landfill Operable Unit 3. NCRKZOO0100326 – NCRKZOO0100339; at pages NCRKZOO0100327 – NCRKZOO0100328.

32 See MDEQ. February 1998. King Highway Landfill Operable Unit 3 Record of Decision. NCRKZOO0024037 – NCRKZ0024093; at page NCRKZOO0024075.

33 See MDEQ. July 1997. Revised Proposed Plan Fact Sheet, King Highway Landfill Operable Unit 3. NCRKZOO0100326 – NCRKZOO0100339; at page NCRKZOO0100332.

34 See MDEQ. July 1997. Revised Proposed Plan Fact Sheet, King Highway Landfill Operable Unit 3. NCRKZOO0100326 – NCRKZOO0100339; at page NCRKZOO0100332.

35 The costs associated with this voluntary sheet pile installation are categorized as OU-3 costs in GP's cost recovery claim and the Zoch Report.

36 See MDEQ. February 8, 2000. Administrative Order by Consent for Response Activity, King Highway Landfill. NCRKZOO0193590 – NCRKZOO0193723.

completion report was submitted in May 2004.[37] The majority of the work as outlined in the ROD appears to have been completed as of the draft completion report. However, there were several minor additional actions performed at MDEQ's request in the mid to late 2000s. A final completion report was issued on May 6, 2013,[38] and MDEQ approved the report and issued a Certificate of Completion on June 26, 2013.[39]

I do not further opine on the OU-3 response actions in this report.

Summary of OU-5 Response Actions

OU-5 (Kalamazoo River) consists of 80 miles of the Kalamazoo River from the Morrow Lake Dam to Lake Michigan. It also includes a portion of Portage Creek.

The KRSG has been performing the response actions at the OU. Originally consisting of Georgia-Pacific, Fort James, Simpson Plainwell, and Millennium Holdings, the group currently consists of just Georgia-Pacific.

The RI/FS for OU-5 was performed under the 1990 AOC which was signed on December 28, 1990.[40] The majority of RI field efforts were completed between 1993 and 1994, however the RI report continued to be drafted throughout the late 1990s.[41] Concurrent with the preparation of the RI/FS, the KRSG began conducting voluntary investigations and analyses in 1999. These investigations and analyses were not conducted at the direction of or under the oversight of the Agencies, as MDEQ

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[37] See BBL. May 2004. Final Report for Completion of Construction, King Highway Landfill Operable Unit 3 and Five Former Georgia-Pacific Mill Lagoons, Volume 1 of 9. KZ00276863 – KZ00276951; at page KZ00276873.

[38] See Arcadis. May 6, 2013. Final Report for Completion of Construction, King Highway Landfill Operable Unit 3 and Five Former Georgia-Pacific Mill Lagoons. WY864488 – WY864683.

[39] See D. Kline (MDEQ). June 26, 2013. Letter to P. McGuire (Arcadis) re: Certificate of Completion of Construction. KZ00252511 – KZ00252512.

[40] See MDNR. December 28, 1990. Administrative Order by Consent. WY665594 – WY665628; at page WY665628.

[41] See BBL. October 2000. Remedial Investigation Report – Phase I. WY803179 – WY803940; at page WY803193.

declined to participate in development of the studies, indicated that the studies would be considered outside the scope of the 1990 AOC, and requested that they not be included in the RI/FS.[42]

In October 2000, the KRSG submitted a draft RI/FS for OU-5. The preferred remedy was Bank Stabilization and Monitored Natural Attenuation.[43] Accompanying the RI/FS was a "Supplement to the RI/FS" which contained the results of the voluntary KRSG-led investigations and studies.[44] After public review and input, in 2002 MDEQ rejected both RI/FS documents and requested that US EPA take over as lead agency for the Site.[45]

On February 21, 2007, following several years of negotiations and mediation between the KRSG and US EPA, the parties entered into an Administrative Settlement Agreement and Order on Consent (ASAOC) for the preparation and performance of another RI/FS for OU-5 (referred to as the Supplemental RI/FS or SRI/FS), and for the reimbursement of related future response costs incurred by US EPA.[46] At the same time, a separate ASAOC was entered into by the KRSG and US EPA for the performance of a time-critical removal action (TCRA) at the Plainwell Impoundment area of OU-5. The Plainwell Impoundment area is a portion of the Kalamazoo River that extends roughly 8,000 feet upstream from the former Plainwell Dam.[47]

The scope of the TCRA included the excavation of 132,000 cy of sediment and floodplain soil from the Kalamazoo River, with disposal in the OU-1 landfill.[48] As the TCRA was about to begin in March 2007, the community, which had not previously been informed of the details about and the basis for

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[42] See MDEQ. 2001. Consolidated Comments, Remedial Investigation, Feasibility Study, Supplemental Investigation, Former Impoundment Approaches. NCRKZOO0431957 – NCRKZOO0432140; at page NCRKZOO0431968.

[43] See BBL. October 2000. Feasibility Study Report – Phase I. NCRKZOO0168608 – NCRKZOO0169014; at page NCRKZOO0168729.

[44] See BBL. October 2000. Supplement to the Kalamazoo River RI/FS – Phase I. WY803941 – WY805495; at page WY803956.

[45] See B. von Gunten (MDEQ). July 11, 2002. Letter to S. Kolak (US EPA). WYDQ004244 – WYDQ004245.

[46] See US EPA. February 21, 2007. Administrative Settlement Agreement and Order on Consent for Remedial Investigation/Feasibility Study. WY794345 – WY794418; at page WY794347.

[47] See US EPA. February 21, 2007. Administrative Settlement Agreement and Order on Consent for Removal Action. WY906273 – WY906319; at page WY906278.

[48] See US EPA. February 14, 2007. Enforcement Action Memorandum: Plainwell Impoundment Area. WY847799 – WY847819; at pages WY847800, WY847810.

the TCRA being planned and its implications, objected to the disposal location of the excavated sediment; as a result, the TCRA design was modified to allow for the off-site disposal of excavated sediment in a commercial landfill at a significantly higher cost.[49,50,51]

The TCRA construction began in May 2007 and was completed in June 2009, and ultimately involved the excavation and off-site disposal of 126,700 cy of material.[52] The final completion report was submitted on March 5, 2010, and indicated that the approximate total cost to perform the TCRA was $28 million,[53] however the 2nd five year review report states total costs of $30 million.[54] US EPA approved the completion report on March 30, 2010.[55]

Following the Plainwell Impoundment TCRA, another ASAOC was signed on June 8, 2009 between GP and US EPA to perform a TCRA at the Plainwell No. 2 Dam, and to reimburse related response costs incurred by the United States.[56] The Plainwell No. 2 Dam area is a portion of the Kalamazoo River located 3.5 miles upstream of the former Plainwell Dam.

The scope of the TCRA included the excavation of 12,000 cy of sediments from the Kalamazoo River, with disposal in an off-site commercial landfill.[57] The TCRA began in August 2009 and was completed

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[49] See S. Borries (EPA). May 8, 2007. Letter to S. Garbaciak (Arcadis) re: Modification to Work Plan for the Plainwell Impoundment Time-Critical Removal Action. NCRKZOO0187456 – NCRKZOO0187458.

[50] See Deposition of Chase Fortenberry. November 11, 2014. Georgia-Pacific Consumer Products LP vs. NCR Corporation; at 112:14 – 113:14.

[51] See B. Merchant (City of Kalamazoo). March 22, 2007. Letter to E. Sackley (US House of Representatives). NCRKZOO0186182 – NCRKZOO0186184; at page NCRKZOO0186183.

[52] See Arcadis. March 2010. Final Construction Completion Report, Former Plainwell Impoundment Time-Critical Removal Action. NCRKZOO0096528 – NCRKZOO0096781; at page NCRKZOO0096633.

[53] See Arcadis. March 2010. Final Construction Completion Report, Former Plainwell Impoundment Time-Critical Removal Action. NCRKZOO0096528 – NCRKZOO0096781; at page NCRKZOO0096633.

[54] While the total cost of the removal action was $28-30 million, this cost was shared between KRSG members (prior to Millennium's bankruptcy in 2009 it was responsible for 55% of costs). Additionally, US EPA and MDEQ paid some costs associated with the removal action.

[55] See S. Borries (US EPA). March 30, 2010. Letter to S. Garbaciak (Arcadis) re: Notice of Completion of Work. KZ00248600 – KZ00248602.

[56] See US EPA. June 8, 2009. Administrative Settlement Agreement and Order on Consent for Removal Action. KZ00306689 – KZ00306748; at page KZ00306692.

[57] See US EPA. June 8, 2009. Enforcement Action Memorandum: Plainwell #2 Dam. WY853538 – WY853558; at pages WY853539, WY853547.

in October 2010, and ultimately involved the excavation of 15,700 cy of material.[58] The final completion report was submitted on February 25, 2011, and indicated that the approximate total cost to perform the TCRA was $8 million.[59] US EPA approved the completion report on March 1, 2011.[60]

Subsequent to the two sediment TCRAs, Supplemental RI reports were submitted for several segments of OU-5 (referred to as Areas in the ASAOC), and a FS report was submitted for the first segment (Area 1).[61] The final Area 1 Supplemental RI was submitted and approved on August 21, 2012.[62] The final Area 1 FS was submitted and approved on December 19, 2014.[63]

Summary of Former OU-6 Response Actions

The GP Mill Sites consist of two former paper mills located on the north bank of the Kalamazoo River in Kalamazoo, Michigan – the Kalamazoo Mill and the adjacent Hawthorne Mill. Both properties were operated by GP and/or its predecessors, and the mill sites are currently owned by GP. GP has been responsible for performing the response actions at these properties.

GP began studying the possibility of divesting the mill properties in 2002.[64] Based on their studies, a TCRA was recommended and an ASAOC was executed on November 20, 2006 between GP and US EPA for the performance of a removal action at the Kalamazoo and Hawthorne Mill properties

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58 See Arcadis. February 2011. Final Construction Completion Report, Plainwell No. 2 Dam Area Time-Critical Removal Action. KZ00424707 – KZ00424794; at page KZ00424778.

59 While the total cost of the removal action was $8 million, this does not account for agency payments; GP is claiming it incurred $6.8 million.

See Arcadis. February 2011. Final Construction Completion Report, Plainwell No. 2 Dam Area Time-Critical Removal Action. KZ00424707 – KZ00424794; at page KZ00424778.

60 See S. Borries (US EPA). March 1, 2011. Letter to S. Garbaciak (Arcadis) re: Notice of Completion of Work. KZ00248596 – KZ00248599.

61 See US EPA. June 2014. Allied Paper, Inc./Portage Creek/Kalamazoo River NPL Site Summary. Retrieved from http://www.epa.gov/region5/superfund/npl/michigan/MID006007306.html.

62 See M. Erickson (Arcadis). August 21, 2012. Letter to J. Saric (US EPA) re: Area 1 Supplemental Remedial Investigation Report. KZ00189753 – KZ00189754.

63 See C. Fortenberry (GP). December 19, 2014. Letter to J. Saric (US EPA) re: Area 1 Final Feasibility Study. NCRKZOO0434120 – NCRKZOO0434886; at page NCRKZOO0434120.

64 See BBL. March 4, 2003. Kalamazoo Paper Mill Property Divestiture Study – Supporting Materials. NCRKZOO0034965 – NCRKZOO0035030; at page NCRKZOO0034966.

(specifically the excavation of 35,000 cy of soil from the mill sites, with disposal in the OU-2 landfill), and for the reimbursement of related response costs incurred by the United States.[65,66] The TCRA began on November 27, 2006 and was completed on June 15, 2007.[67] The TCRA excavated approximately 53,075 cy at an estimated cost of $3.03 million.[68] The final completion report was submitted on April 29, 2008[69] (it had received prior approval from US EPA on April 16, 2008).[70] On June 30, 2009, US EPA determined that no further investigation of the mill sites was required under CERCLA.[71]

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[65] See US EPA. October 27, 2006. Enforcement Action Memorandum: Georgia-Pacific Kalamazoo and Hawthorne Mills. KZ00271285 – KZ00271302; at page KZ00271285.

[66] See US EPA. November 16, 2006. Administrative Settlement Agreement and Order on Consent for Removal Action. KZ00150632 – KZ00150741.

[67] See Arcadis. April 29, 2008. Time Critical Removal Action Final Report for the Refuse Area at the Georgia-Pacific Corporation Kalamazoo Mill Property and the Oxbow Area at the Former Hawthorne Mill Property. KZ00348620 – KZ00348914; at page KZ00348626.

[68] See US EPA. September 28, 2007. Georgia-Pacific Kalamazoo and Former Hawthorne Mills Removal Action Completion of Action – Pollution Report #1. NCRKZOO0173280 – NCRKZOO0173285; at pages NCRKZOO0173283 – NCRKZOO0173284.

[69] See Arcadis. April 29, 2008. Time Critical Removal Action Final Report for the Refuse Area at the Georgia-Pacific Corporation Kalamazoo Mill Property and the Oxbow Area at the Former Hawthorne Mill Property. KZ00348620 – KZ00348914.

[70] See S. Chummar (US EPA). April 16, 2008. Letter to C. Fortenberry (GP) re: Approval of Final Report. KZ00348915.

[71] See R. Karl (US EPA). June 30, 2009. Letter to C. Fortenberry (GP) re: Georgia-Pacific Kalamazoo Mill and Former Hawthorne Mill Source Investigation. KZ00245538 – KZ00245539.

VII. Basis for Opinions

Opinion 1

Mr. Zoch did not provide sufficient information in his Expert Report of December 5, 2014 to substantiate the bases for his opinions regarding GP's claimed costs and their necessity and consistency with the NCP.

Private parties seeking recovery of costs from other private parties must show that their response actions were both necessary and consistent with the NCP.[72] Mr. Zoch fails to show that these requirements have been met.

Mr. Zoch's Generally Provides Insufficient Support for His Opinions

Mr. Zoch' Expert Report provides little support for the statements made. There are no citations to documents produced by the parties in this case, other than two legal filings made by NCR and Weyerhaeuser. Furthermore, in Exhibit 1 Mr. Zoch provides a list of approximately 4,000 bates numbers that represent documents he considered. His report does not identify specific documents that he relied upon in forming each of his opinions. As a result, it is difficult to evaluate his expert opinion and verify the basis for his opinions.

For example, Mr. Zoch states that he interviewed representatives of Georgia-Pacific to help form and support his opinions.[73] Yet nowhere are those representatives named, and no interview notes have been provided. He then relies on these interviews for several statements throughout his report. Another example concerns his exclusion of certain cost categories. Mr. Zoch notes that he excluded Mill Property "Betterment" costs from the current cost claim.[74] However, no further support or information is provided to describe how he identified and quantified these excluded costs, or allow

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[72] A private party response action will be considered consistent with the NCP if the action, when evaluated as a whole, is in substantial compliance with the applicable requirements of the NCP.

See National Contingency Plan Section 300.700(c)(2) and Section 300.700(c)(3)(i).

[73] See Expert Report of Robert M. Zoch Jr., PE. December 5, 2014; at page 2.

[74] See Expert Report of Robert M. Zoch Jr., PE. December 5, 2014; at page 25.

one to independently evaluate and confirm whether Mr. Zoch captured all betterment costs in his excluded category.

Mr. Zoch's Evaluation of Consistency with the NCP is Insufficient and Unsupported

Mr. Zoch's Expert Report provides insufficient information to support his assertion that the $107 million in costs claimed by GP were incurred consistent with the NCP. Mr. Zoch makes many statements regarding NCP consistency in his Expert Report but does not provide the needed supporting documentation for his statements that would enable an evaluation of his opinions.

For example, Mr. Zoch states that health and safety plans were made available and were in compliance with OSHA standards for worker protection.[75] However, these plans are not listed or cited, nor does he identify whether health and safety plans were available for all OUs and all response actions conducted at the Site. In my opinion, a blanket statement that plans exist and comply with OSHA is not sufficient documentation to show compliance with the NCP.

Mr. Zoch makes similar blanket statements with regard to identification of site specific applicable or relevant and appropriate requirements (ARARs) and for removal/remedial site evaluations.[76] Mr. Zoch's report does not discuss Sampling and Analysis Plans or Quality Assurance and Quality Control Plans, both of which are required by the NCP.[77]

As a result, Mr. Zoch does not provide a sufficient basis to justify a significant portion of GP's cost claim. I perform my own analysis of the necessity and consistency with the NCP of GP's cost claim in the following opinions below, and conclude that some of the GP incurred costs were either not response costs, not necessary costs, or costs incurred inconsistent with the NCP.

Mr. Zoch's Evaluation of Cost Documentation is Inadequate

In order to recover costs under the NCP, there are certain requirements for the documentation of incurred costs:

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[75] See Expert Report of Robert M. Zoch Jr., PE. December 5, 2014; at page 17.

[76] See Expert Report of Robert M. Zoch Jr., PE. December 5, 2014; at page 18.

[77] See National Contingency Plan Section 300.415(b)(4)(ii) and Section 300.430(b)(8).

> *In general, documentation shall be sufficient to provide the source and circumstances of the release, the identity of responsible parties, the response action taken, accurate accounting of federal, state, or private party costs incurred for response actions, and impacts and potential impacts to the public health and welfare and the environment.*[78]

Mr. Zoch does not identify and evaluate cost documentation for the claimed costs in a manner consistent with the NCP. In my experience and based on common professional practice, evaluating costs under the NCP requires identifying and quantifying the costs associated with each response action undertaken at the Site. This cost categorization is also necessary to determine which sections of the NCP apply to the specific actions and costs being evaluated and claimed. In addition to the examples discussed above, Mr. Zoch has not identified and quantified the costs associated with specific voluntary actions at OU-2 and OU-3 or the October 2000 Supplement to the RI/FS.

Furthermore, Mr. Zoch appears to have accepted GP's claimed costs without having independently reviewed specific invoices to confirm that the invoices relate to response actions conducted at the Site consistent with the requirements of the NCP. For example, Opinion 5 of my report includes the results of a detailed review and analysis of the invoices underlying the cost claim in this case; there are instances of claimed costs which are not response costs.

Other Specific Examples of Mr. Zoch's Unsupported Opinions and Statements

Throughout his expert report, Mr. Zoch makes numerous statements which appear to be speculation, rely on unsupported statements made by others, or otherwise have no factual support. Furthermore, the lack of factual support makes it difficult or impossible to evaluate and rebut these statements.

Mr. Zoch makes several statements concerning the data generated in the October 2000 Supplement to the RI/FS, all of which have no factual support and several of which appear to be speculation on his part:

- When discussing that the Supplement to the RI/FS was not approved by the MDEQ, Mr. Zoch states that "a senior official of the agency authorized use of the data contained therein as reference material for the RI/FS."[79] No support is provided as to who authorized the data,

[78] See National Contingency Plan Section 300.160(a)(1).

[79] See Expert Report of Robert M. Zoch Jr., PE. December 5, 2014; at page 15.

exactly when that authorization was provided, the scope of the authorization (whether it was to be authorized in part or in full, for qualitative or quantitative use), or any other context around the decision to authorize the use of the data.

- Mr. Zoch states that after the signing of the 2007 ASAOC to perform a SRI/FS for OU-5, "essentially all elements of the RI/FS Supplement have been utilized to evaluate Site conditions, risk and remedial options" and that "[t]he consensus reached among the parties relied heavily upon the data contained within the RI/FS Supplement."[80] It is unclear whether these statements represent his expert opinion, or whether he is relying on statements made or opinions given by GP or the Agencies. Regardless of the source of the statement no supporting documents are identified in Mr. Zoch's report.
- Regarding the KRSG voluntary hiring of Michigan State University to support the MDNR baseline ecological risk assessment, Mr. Zoch states that "[a]ll of this information is under review by the EPA for interpretation of the RI database to support selection of decontamination objectives and remedial alternatives for OU5."[81] He further states that "I am advised that this latter action has contributed to reasonable, scientifically-based PCB cleanup objectives which will significantly benefit the OU5 remediation program."[82] Mr. Zoch does not indicate how he knows that US EPA is reviewing <u>all</u> of the data generated by MSU, how he knows that US EPA will use it to support its selection of OU-5 alternatives, and who has advised him as to how thoroughly the MSU work has been incorporated into US EPA's decision-making.

One other area where Mr. Zoch makes unsupported statements is in regards to GP-initiated Natural Resource Damage (NRD) Assessment and Restoration costs. Mr. Zoch states that it is "reasonable that Georgia-Pacific anticipate NRD as a future issue"[83], and that by GP initiating these actions, it "improves the ecological quality of the response" and "may serve to off-set future NRD

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[80] See Expert Report of Robert M. Zoch Jr., PE. December 5, 2014; at page 15.

[81] See Expert Report of Robert M. Zoch Jr., PE. December 5, 2014; at page 21.

[82] See Expert Report of Robert M. Zoch Jr., PE. December 5, 2014; at page 31.

[83] See Expert Report of Robert M. Zoch Jr., PE. December 5, 2014; at page 29.

compensatory requirements by the trustees."[84] No evaluation of these costs, how they benefit the Site, or how they will be evaluated and used by the trustees is provided. Furthermore, no support is provided for why GP anticipating NRD as a future issue justifies its performing voluntary NRD-related actions and seeking to recover those voluntary actions and costs from other parties as response costs under the NCP.

Mr. Zoch's Incorrect Statements

In addition to the aforementioned unsupported statements, Mr. Zoch makes several other statements which are factually incorrect.

Mr. Zoch states that under CERCLA 107(a), responsible parties are "liable for necessary costs of response incurred by any other person consistent with the NCP and for damages to natural resources, including the reasonable costs of assessing such damage."[85] CERCLA 107(a) does indeed specify that responsible parties are liable for necessary costs of response incurred by any other person consistent with the NCP. However, the "any other person" provision is absent from the discussion of natural resources.[86] In fact, the NCP dictates that NRD Assessments are to be performed by state or federal trustees, not "any other person". There is no provision under CERCLA or the NCP Section 300.700 for the recovery of NRD-related costs by private parties.

Regarding NRD-related costs, Mr. Zoch also states that "[c]osts of these actions are response costs under the NCP requirements..."[87] This is factually incorrect; costs related to NRD or NRD Assessments are not response costs as they are not costs incurred for the cleanup or removal of hazardous substances. As is discussed further in Opinion 5, the NCP Section 300.5 and CERCLA Section 101(25) define response costs as "remove, removal, remedy, or remedial action," all of which concern the response to a release of a hazardous substance. Neither the NCP nor CERCLA identifies NRD or NRD Assessments as response costs.

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[84] See Expert Report of Robert M. Zoch Jr., PE. December 5, 2014; at page 30.

[85] See Expert Report of Robert M. Zoch Jr., PE. December 5, 2014; at page 14.

[86] See CERCLA Section 107(a)(4)(B) and 107(a)(4)(C)

[87] See Expert Report of Robert M. Zoch Jr., PE. December 5, 2014; at page 30.

Mr. Zoch also states that "[c]osts associated with site investigation and monitoring are generally recoverable under CERCLA without regard to NCP consistency."[88] There is no indication whether this is based on his personal opinion, or his interpretation of regulatory guidance or legal precedent. However, in my experience both as a regulator and as a professional evaluating investigation costs under the NCP, it is certainly not the case that they are recoverable without regard to NCP consistency. The NCP provides requirements detailing the investigation process, the performance of the Remedial Investigation and its removal counterpart Engineering Evaluation/Cost Analysis (EE/CA), and the various work plans, community involvement, and procedures required to perform these investigations. In fact, Mr. Zoch discusses several of these provisions in Section 3.2.5 of his report. These provisions cannot be ignored in a proper evaluation of NCP consistency and in a determination of recoverability of costs under the NCP.

Regarding the TCRAs performed at OU-5 and OU-6, Mr. Zoch states that the decision to implement these removal actions as time-critical was "reasonable, given that RODs had previously been issued for OU2 and OU3, in which the administrative record had fully evaluated alternatives and selected containment remedies for remedial actions at those two locations."[89] This statement is confusing as Mr. Zoch appears to believe that since RODs were signed for OU-2 and OU-3, the remedies for OU-5 and OU-6 were straightforward and should be considered time-critical. However, other than the OUs involving the same contaminant (PCBs), there is very little in common between the remedies selected at OU-2 and OU-3 from the remedies implemented at OU-5 and OU-6. OU-2 and OU-3 were landfill closure remedies, whereas the OU-5 TCRAs were sediment and floodplain dredging and the OU-6 TCRA was closure of a plant site with soil excavation. These are fundamentally different remedies.

One significant error in Mr. Zoch's report concerns the categorization of the RI/FS costs. Mr. Zoch attributes $34.2 million of past costs to the 1990 AOC signed between MDNR and the KRSG.[90] These costs include those expended on the October 2000 Supplement to the RI/FS. However, statements by the MDNR explicitly reject attributing this supplement to the AOC. For instance, in October 2000

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[88] See Expert Report of Robert M. Zoch Jr., PE. December 5, 2014; at page 16.

[89] See Expert Report of Robert M. Zoch Jr., PE. December 5, 2014; at page 19.

[90] See Expert Report of Robert M. Zoch Jr., PE. December 5, 2014; at page 26.

MDEQ stated that "[i]n the decision-making process for the site, the Michigan Department of Environmental Quality (MDEQ) has agreed to review additional data collected by the KRSG outside of the Administrative Order by Consent."(emphasis added)[91] MDEQ further elaborated on this position in January 2001 when they stated that "[t]he scope of the [Supplemental Information] was not approved by MDEQ; the data collected without oversight and is outside of the scope of Administrative Order of Consent (AOC)."[92] It is clear that MDEQ, the lead agency under the 1990 AOC (as successor to MDNR), did not consider the Supplement to the RI/FS to have been performed under the 1990 AOC. Therefore, it is incorrect for Mr. Zoch to retroactively assert that indeed the Supplement was covered by the 1990 AOC.

Finally, Mr. Zoch states that regarding the former GP Mill Site redevelopment costs, "[c]osts for actions in response to Site safety concerns, however, are considered response costs, and include responses to remnant structures outfall pipes, deteriorating retaining walls, and steep banks adjacent to the River."[93] As previously discussed at length, response costs relate to the release of hazardous substances. Site safety concerns, absent such releases, are not response costs. The costs in question include those costs incurred after OU-6 had been delisted, and the response to hazardous substances was considered by US EPA to have been completed. Physical safety concerns such as old pipes and walls and steep banks are not covered by CERCLA; they may be required by other local, state or federal statutes, but they are not response costs and are not recoverable from other parties under the NCP.

Opinion 2

$23.6 million[94] out of the total amount identified as recoverable costs for the performance of two OU-5 sediment-related removal actions included in Mr. Zoch's Expert Report were

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91 See B. von Gunten (MDEQ). October 24, 2000. Letter to M. Brown (BBL). WYDQ004264 – WYDQ004265.

92 See MDEQ. 2001. Consolidated Comments, Remedial Investigation, Feasibility Study, Supplemental Investigation, Former Impoundment Approaches. NCRKZOO0431957 – NCRKZOO0432140; at page NCRKZOO0431972.

93 See Expert Report of Robert M. Zoch Jr., PE. December 5, 2014; at page 29.

94 See Schedules 1, 2 and 3 for a summary of these costs.

not incurred consistent with the requirements of the NCP and therefore are not recoverable from other parties.

Framework for Evaluating Consistency with the NCP for these Sediment Response Actions

Over the last 25 to 30 years the approach to addressing releases of hazardous substances from sites has developed within the framework established under the NCP and common practice by environmental professionals in the field. It has been well established, for sites with the degree of complexity exhibited by the Site in this matter, that the response action approach include some initial investigation/characterization activities, identification of the potential for early, time-sensitive, actions to address portions of the site that are releasing hazardous substances into the environment and then to perform longer-term studies and remedial actions to address the remaining elements of the site posing risk from actual or potential releases of hazardous substances.

The NCP and US EPA guidance for conducting response actions have also established this approach and embodied it in regulations and guidance documents. Generally, the approach involves employing short-term, time-sensitive, less complex removal actions and longer-term and more complex remedial actions, as appropriate.[95] In the NCP removal actions are further broken down into time-critical and non-time-critical approaches. In situations where there is an environmental or public health need for an immediate action, time-critical removal actions (TCRAs) are employed. These are often situations involving immediate threats such as hazardous substances improperly stored near waterways or residential neighborhoods. In situations where a planning period of six months or more exists, non-time-critical removals are to be employed.[96] Non-time-critical removal actions (NTCRAs) require studies and analysis (referred to as an Engineering Evaluation/Cost Analysis or EE/CA) and public involvement in the remedy selection process.[97]

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[95] See US EPA. February 14, 2000. Use of Non-Time Critical Removal Authority in Superfund Response Actions. WY935007 – WY935013; at page WY935010.

[96] See Association of State and Territorial Solid Waste Management Officials. June 30, 2007. Removal Actions at Federal Facilities. NCRKZOO0431892 – NCRKZOO0431951; at pages NCRKZOO0431896 – NCRKZOO0431897.

[97] See US EPA. February 14, 2000. Use of Non-Time Critical Removal Authority in Superfund Response Actions. WY935007 – 935013; at page WY935012.

NTCRAs differ from remedial actions and are to be reserved for more time sensitive, non-complex and lower cost response actions as compared to remedial actions.[98] As the site-specific facts show as discussed below, GP has approached the removal actions at OU-5 in a manner that is inconsistent with the approaches discussed above.

OU-5 Plainwell Impoundment Removal Action ($18.1 Million)[99]

As previously discussed, the Plainwell Impoundment removal action was conducted as a TCRA between 2007 and 2009, and involved the excavation of 126,700 cy of sediments and floodplain soils at a total cost of $28-30 million[100] (GP has incurred costs of $18.1 million, while the remainder was incurred by other PRPs and state and federal government).

In evaluating the Plainwell Impoundment removal action, I examined the history of investigations and studies leading up to the decision to conduct a removal action. From that examination, it is clear that there were many years of planning time available prior to the start of the removal action. As a reminder, TCRAs are defined as removal actions which respond to releases requiring action within six months.[101,102]

The Plainwell Impoundment removal action began in May 2007. A brief timeline of various investigations, studies and milestones preceding the start of the removal action is provided below:

- In February 2001 an Impoundment Approaches report was prepared by GP's consultants which presented various options for addressing contaminated soil and sediment in three former impoundments (one of which was Plainwell).[103] This was more than six years prior to the start of the Plainwell Impoundment TCRA.

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98 See US EPA. February 14, 2000. Use of Non-Time Critical Removal Authority in Superfund Response Actions. WY935007 – 935013; at pages WY935010 – WY935011.

99 See Schedules 1 and 2 for a listing of these costs.

100 See Arcadis. March 2010. Final Construction Completion Report, Former Plainwell Impoundment Time-Critical Removal Action. NCRKZOO0096528 – NCRKZOO0096781; at page NCRKZOO0096633.

101 See US EPA. August 1993. Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA. NCRKZOO0431807 – NCRKZOO0431876; at page NCRKZOO0431821.

102 See NCP Section 300.415(n)(2).

103 See BBL. February 2001. Former Impoundment Approaches. NCRKZOO0055890 – NCRKZOO0056185; at page NCRKZOO0055893.

- In February 2002 US EPA issued a Removal Assessment Report for two former impoundments – Plainwell and Otsego.[104] Removal assessment reports of this type normally serve as the formal initiation of the removal action process per the NCP. The report was prepared more than five years prior to the start of the Plainwell Impoundment TCRA.
- In July 2003 a RI/FS specific to the Plainwell and Otsego Impoundments was drafted by US EPA, four years prior to the start of the Plainwell Impoundment TCRA.[105]
- In February 2006 the KRSG presented a proposal to the Agencies to conduct a removal action at the Plainwell Impoundment. This proposal was 15 months prior to the start of the Plainwell Impoundment TCRA. Of note, the proposal indicated that 125,000 cy of sediments and floodplain soils were to be excavated, virtually the same amount as was ultimately included in the formal TCRA action memorandum a year later.[106] Thus, the scope of the removal action was fully known 15 months prior to initiation of the TCRA.
- In August 2006 members of the KRSG signed a Settlement Agreement in Principle with US EPA and the State of Michigan to fund and perform a removal action at the Plainwell Impoundment. This was nine months prior to the start of the Plainwell Impoundment TCRA.[107]

As the above timeline indicates, the Plainwell Impoundment was <u>not</u> time-critical as envisioned by the guidance for TCRAs issued by US EPA. Contamination issues at the Plainwell Impoundment were known for years,[108] and regulatory agencies had begun studying remedial approaches to remediation there as early as 1999. Sediment sites typically involve a complex analysis of alternatives and the

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[104] See US EPA. February 2002. Removal Assessment Report for Allied Paper – Kalamazoo River Site. NCRKZOO0165157 – NCRKZOO0165933; at page NCRKZOO0165168.

[105] See US EPA. July 2003. Plainwell and Otsego City Impoundment Floodplain Soils Draft Feasibility Study Report. NCRKZOO0432542 – NCRKZOO0432777.

[106] See BBL. February 22, 2006. Former Plainwell Impoundment Removal Action Proposal. NCRKZOO0433135 – NCRKZOO0433203; at page NCRKZOO0433142.

[107] See US EPA. February 21, 2007. Administrative Settlement Agreement and Order on Consent for Removal Action, Appendix 1 – Enforcement Action Memorandum: Plainwell Impoundment Area, Attachment 1 – Plainwell Settlement Agreement in Principle. WY011926 – WY012001; at pages WY011990 – WY011993.

[108] See Deposition of Chase Fortenberry. November 11, 2014. Georgia-Pacific Consumer Products LP vs. NCR Corporation; at 111:23-112:4.

selection of remedies is not typically straightforward and requires an analysis of alternate approaches, costs and other factors.

Also of note, in the US EPA action memorandum authorizing the TCRA there is no justification for why the action is time-critical other than "the contaminated nature of the sediment, the continuing release of contamination into the food chain, and potential exposure to the public,"[109] all of which had been known or was ongoing for years. This same statement can be made for the contaminated sediments for the remaining stretches of the river which are being handled as remedial actions.

Given the above facts it is clear that more than six months existed prior to the onset of the removal action, therefore the performance of this response action falls under the NTCRA or remedial action criteria and requirements of the NCP.

Additionally, the scope and cost of the Plainwell Impoundment removal action was far larger than is normally associated with TCRAs. The Plainwell Impoundment TCRA cost $30 million and took two years to complete. As an example of how this relates to typical Superfund sites, it is useful to examine the formation of the National Remedy Review Board (NRRB) in 1995. The NRRB was formed to help control Superfund remedy costs and promote cost-effective decisions at Superfund sites. To fulfill this mandate, the NRRB was tasked to review proposed remedial actions with remedy costs greater than $30 million[110] (this was later revised to $25 million in March 2005[111]).

In 1997, the NRRB's mandate was expanded to include the review of NTCRA decisions, as the use of removal actions had increased in recent years. However, the NRRB did not believe there would be many high cost NTCRAs, and stated "most NTCRAs are likely to cost less than $5 million."[112] Of note, the NRRB review process makes no mention of reviewing TCRAs. This is supportive of the general

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[109] See US EPA. February 14, 2007. Enforcement Action Memorandum: Plainwell Impoundment Area. WY847799 – WY847819; at page WY847800.

[110] See US EPA. September 26, 1996. Memorandum re: National Remedy Review Board. NCRKZOO0431877 – NCRKZOO0431884; at page NCRKZOO0431882.

[111] See US EPA. March 21, 2005. Memorandum re: National Remedy Review Board Criteria Revision. NCRKZOO0431888 – NCRKZOO0431891; at page NCRKZOO0431888.

[112] See US EPA. December 18, 1997. Memorandum re: Review of Non-Time-Critical Removal Actions by the National Remedy Review Board. NCRKZOO0431885 – NCRKZOO0431887; at page NCRKZOO0431886.

understanding that TCRAs are typically low cost, non-complex remedies that certainly would not be expected to cost upwards of $25 or $30 million.

Given the above facts it is clear that due to the cost ($30 million) and scope (126,700 cy) of the response action, that the performance should have fallen under the NTCRA or remedial action criteria and requirements of the NCP. Furthermore, had the Plainwell Impoundment been appropriately conducted under those criteria, a NRRB review may have been initiated due to the cost of the action exceeding their review criteria.

For private party response actions the NCP language for cost recovery states that "responsible parties shall be liable for necessary costs of response actions to releases of hazardous substances incurred by any other person consistent with the NCP"[113] and that "[a] private party response action will be considered "consistent with the NCP" if the action, when evaluated as a whole, is in substantial compliance with the applicable requirements in paragraphs (5) and (6) of this section..."[114]

For the purposes of this analysis, I will focus on the applicable sections of the NCP for Removal Actions and Public Participation and Community Relations.

The NCP states that:

> *Whenever a planning period of at least six months exists before on-site activities must be initiated, and the lead agency determines, based on a site evaluation, that a removal action is appropriate: (i) The lead agency shall conduct an engineering evaluation/cost analysis (EE/CA) or its equivalent. The EE/CA is an analysis of removal alternatives for a site.*[115]

GP did not conduct an EE/CA for the Plainwell Impoundment. The preliminary evaluations of remedial approaches prepared by the regulatory agencies and GP in the late 1990s and early 2000s were only prepared in draft form, were not specific to the Plainwell Impoundment area, and were not finalized and released to the public for comment. Once GP and the regulators decided in 2006 to

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[113] See National Contingency Plan Section 300.700(c)(2).

[114] See National Contingency Plan Section 300.700(c)(3)(i).

[115] See National Contingency Plan Section 300.415(b)(4).

move forward with a removal action, no alternatives were developed or evaluated other than excavation of sediment and floodplain soils with disposal at the OU-1 landfill.

The NCP states that:

> *Where, based on the site evaluation, the lead agency determines that a CERCLA removal action is appropriate and that a planning period of at least six months exists prior to initiation of the on-site removal activities, the lead agency shall at a minimum... (ii) Publish a notice of availability and brief description of the EE/CA in a major local newspaper of general circulation... (iii) Provide a reasonable opportunity, not less than 30 calendar days, for submission of written and oral comments after completion of the EE/CA... Upon timely request, the lead agency will extend the public comment period by a minimum of 15 days; and (iv) Prepare a written response to significant comments...*[116]

The failure to prepare an EE/CA for the Plainwell Impoundment removal action and make it available for public comment is a substantive and significant inconsistency with the requirements of the NCP.

The importance of involving the public in response action decisions is a fundamental element of the NCP and is also emphasized in other US EPA guidance documents. The December 1992 interim guidance to Superfund Accelerated Cleanup Model Regional Decision Teams states that:

> *The success of SACM will depend to a large degree on public acceptance of our actions at the site level. Maintaining a strong focus on the local community (our primary "customer") will contribute immensely to this success...Using non-time-critical removal actions, as compared to time-critical removal actions, will allow prior public comment, and are encouraged where time allows.*[117]

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[116] See National Contingency Plan Section 300.415(n)(4).

[117] From the same guidance, when evaluating sites in an Advanced Assessment Stage (defined as those where investigations have proceeded beyond the initial preliminary assessment, such as through preparation of a RI), the guidance states that "[a]t this stage, response actions generally would fall in the non-time-critical removal, early remedial action category, or in the long-term action category." Time-critical removal is typically more appropriate for sites very early in the investigation process.

See US EPA. December 1992. SACM Regional Decision Teams – Interim Guidance. NRCKZOO0431803 – NCRKZOO0431806.

Furthermore, as the Association of State and Territorial Solid Waste Management Officials indicate in their 2007 paper on removal actions:

> *[I]t would not be appropriate to use a TCRA just for the sake of expediency or to avoid complying with the additional planning and community involvement requirements of a NTCRA...States have observed that, many times, DOD and (CFAs) will use removal actions, and TCRAs when a situation may not be imminent (e.g., contaminated sites that have been known for many years without any remediation are subject to TCRAs rather than following the RI/FS process).*[118]

Because the public was not given the opportunity to be involved in the TCRA decision-making process, it is perhaps not surprising that when the public did learn that the ASAOC to perform a TCRA had been signed and the TCRA was about to begin, they objected to the chosen response action. In a March 15, 2007 public meeting held a month after the signing of the ASAOC and shortly before construction activities were to commence, numerous objections were raised to the selected response action.

In particular, the City of Kalamazoo objected to the disposal component of the response action, which would have resulted in excavating material located in Plainwell and transporting and disposing of that material at the OU-1 landfill located in Kalamazoo. The City of Kalamazoo was concerned about the significant amount of truck traffic, noise, and community disturbance, as well as potential drinking water protection issues.[119,120] Additional community member concerns included substantial increases in the height of the OU-1 landfill due to the Plainwell material, frustration at the lack of opportunity for public input, and a desire to keep Plainwell contaminated material in Plainwell.[121]

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[118] See Association of State and Territorial Solid Waste Management Officials. June 30, 2007. Removal Actions at Federal Facilities. NCRKZOO0431892 – NCRKZOO0431951; at page NCRKZOO0431896.

[119] See B. Merchant (City of Kalamazoo). March 7, 2007. Email to US EPA re: Plainwell Impoundment Clean-up on the Kalamazoo River. KZ00272553.

[120] See B. Merchant (City of Kalamazoo). March 7, 2007. Issues with EPA Kalamazoo River Clean-up Initiative. KZ00272554 – KZ00272555.

[121] See Weyerhaeuser. March 15, 2007. Draft Information from the U. S. EPA' s March 15, 2007, Open House and Public Meeting for the Time-Critical Removal Action in the Former Plainwell Impoundment of the Kalamazoo River That May Be Pertinent to Weyerhaeuser's Implementation of the Consent Decree for the 12th Street Landfill and the Plainwell Mill. WY051624 – WY051643; at page WY051625.

Community members also issued complaints that eventually involved state and federal politicians. For example, in a letter to Congressman Fred Upton, the City of Kalamazoo stated that:

> *The City wants the Kalamazoo River to be cleaned up but not to the detriment of the City of Kalamazoo. We have been informed by USEPA-Region 5 officials that this is a completed settlement under the "time-critical site remediation" process under the CERCLA or "Superfund" legislation. As you well know, the PCB problem in the Kalamazoo River has been an ongoing issue for at least 20 years. We're curious as to how this is suddenly a "time-critical" issue for the USEPA.*[122]

In subsequent letters, the community frustration becomes more apparent:

> *Resolutions are being circulated, civil disobedience is being suggested, environmental racism is being alleged, the Kalamazoo Gazette is editorializing and our cadre of local elected officials (city, county, state and federal) is perplexed.*[123]

Based on mounting community opposition, US EPA delayed the start of the TCRA.[124] A month later, a change to the response action was made; instead of disposal at the Allied Landfill, material was to be segregated into Toxic Substances Control Act (TSCA) and non-TSCA waste streams, and disposed of at licensed, offsite disposal facilities.[125] This change in disposal location resulted in significant added cost to the designed response action. Even though the cost of the TCRA increased, no alternatives analysis was conducted to compare this now much higher cost against potential alternatives.

It should also be noted that by agreeing to perform the TCRA, GP received financial concessions from the Agencies. As early as 2006 in its proposal to conduct the TCRA, GP stated that it would perform the TCRA in exchange for "State's waiver of all past oversight costs under existing ACO, State's waiver

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[122] See B. Merchant (City of Kalamazoo). March 15, 2007. Email to F. Upton (US House of Representatives). NCRKZOO0186189 – NCRKZOO0186191; at page NCRKZOO0186191.

[123] See B. Merchant (City of Kalamazoo). March 22, 2007. Email to E. Sackley (US House of Representatives) re: Three Public Documents on Plainwell Impoundment. NCRKZOO0186182 – NCRKZOO0186184; at page NCRKZOO0186182.

[124] See US EPA. April 13, 2007. News Release re: Kalamazoo River cleanup delayed; additional community input planned. KZ00274793 – KZ00274794.

[125] See S. Borries (EPA). May 8, 2007. Letter to S. Garbaciak (Arcadis) re: Modification to Work Plan for the Plainwell Impoundment Time-Critical Removal Action. NCRKZOO0187456 – NCRKZOO0187458.

of all other past costs (long-term monitoring, other non-ACO costs, and costs removed from invoices over time)..."[126] And per the signed ASAOC to perform the Plainwell Impoundment TCRA, concessions included: 1) US EPA funding of $1 million towards the TCRA; 2) MDNR funding of $500,000 towards the TCRA, along with assuming responsibility for post-removal site control; 3) the State of Michigan waiving its right to recover $1.5 million in past costs.[127]

OU-5 Plainwell No. 2 Dam Removal Action ($6.8 Million)[128]

As previously discussed, the Plainwell No. 2 Dam removal action was conducted as a TCRA between 2009 and 2010, and involved the excavation of 16,000 cy of sediments and floodplain soils at a total cost of $8 million.[129]

Similar to the evaluation above for the Plainwell Impoundment removal action, I examined the history of investigations and studies leading up to the decision to conduct a removal action. From that examination, it is clear that there were many years of planning time available prior to the start of the removal action. As discussed in the Plainwell Impoundment section, TCRAs are response actions where less than six months is available for planning.

The Plainwell No. 2 Dam removal action began in August 2009. A brief timeline of various investigations and milestones preceding the start of the removal action is provided below:

- In October 2008 the KRSG presented a proposal to US EPA and MDEQ to conduct several removal actions in OU-5, including at the Plainwell No. 2 Dam area.[130] This was nine months prior to the start of the Plainwell No. 2 Dam TCRA.

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126 See BBL. February 22, 2006. Former Plainwell Impoundment Removal Action Proposal. NCRKZOO0433135 – NCRKZOO0433203; at page NCRKZOO0433193.

127 See US EPA. February 21, 2007. Administrative Settlement Agreement and Order on Consent for Removal Action, Appendix 1 – Enforcement Action Memorandum: Plainwell Impoundment Area, Attachment 1 – Plainwell Settlement Agreement in Principle. WY011926 – WY012001; at pages WY011935, WY012000.

128 See Schedules 1 and 3 for a listing of these costs.

129 See Arcadis. February 2011. Final Construction Completion Report, Plainwell No. 2 Dam Area Time-Critical Removal Action. KZ00424707 – KZ00424794; at pages KZ00424774, KZ00424778.

130 See Arcadis. October 7, 2008. Next Steps for Cleanup and Restoration of the Kalamazoo River. KZ00478210 – KZ00478244; at page KZ00478213.

- In November 2008 the KRSG submitted a Conceptual Design Report for the Plainwell No. 2 Dam TCRA, eight months prior to the start of the TCRA. Of note, the report indicated that the schedule for implementation of the TCRA would be dependent on discussion of the design report with US EPA, MDEQ, and the Natural Resource Trustees.[131] The report did not indicate that the schedule would be dictated by time-sensitive threats to human health or the environment.
- In February 2009 US EPA held a public meeting on the entire Superfund Site; in this meeting it was indicated that the Plainwell No. 2 Dam expedited work was "on hold" while US EPA evaluated the CERCLA authorities to pursue implementation of the project.[132] The decision to put the TCRA on hold was six months prior to the eventual start of the TCRA.

As the above timeline indicates, the Plainwell No 2 Dam response action was <u>not</u> time-critical as envisioned by the guidance for TCRAs issued by US EPA. Contamination issues at the Plainwell No. 2 Dam area were known for years,[133] and regulatory agencies had begun studying approaches to remediation there as early as 1999.

Also of note, in the US EPA action memorandum authorizing the TCRA there is no justification for why the action is time-critical other than "the contaminated nature of the sediment, the continuing release of contamination into the food chain, and potential exposure to the public,"[134] all of which had been known or was ongoing for years. This same statement can be made for the contaminated sediments for the remaining stretches of the river which are being handled as remedial actions.

Given that more than six months existed prior to the onset of the removal action, I evaluated the performance of this removal action under the criteria of the NCP for NTCRAs.

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[131] See Arcadis. November 4, 2008. Conceptual Design Report, Bank Removal and Resotration – Plainwell No. 2 Dam Area. NCRKZOO0177702 – NCRKZOO0177888; at page NCRKZOO0177734.

[132] See US EPA. February 26, 2009. Presentation re: Update on Site Progress. NCRKZOO0431952 – NCRKZOO0431956; at page NCRKZOO0431955.

[133] See Deposition of Chase Fortenberry. November 11, 2014. Georgia-Pacific Consumer Products LP vs. NCR Corporation; at 119:15-17.

[134] See US EPA. June 8, 2009. Enforcement Action Memorandum: Plainwell #2 Dam. WY853538 – WY853558; at page WY853539.

For private party response actions the NCP language for cost recovery states that "responsible parties shall be liable for necessary costs of response actions to releases of hazardous substances incurred by any other person consistent with the NCP"[135] and that "[a] private party response action will be considered "consistent with the NCP" if the action, when evaluated as a whole, is in substantial compliance with the applicable requirements in paragraphs (5) and (6) of this section..."[136]

As for the Plainwell Impoundment removal action analysis above, I will focus on the sections of the NCP related to Removal Actions and Public Participation and Community Relations.

Section 300.415(b)(4) of the NCP states that:

> *Whenever a planning period of at least six months exists before on-site activities must be initiated, and the lead agency determines, based on a site evaluation, that a removal action is appropriate: (i) The lead agency shall conduct an engineering evaluation/cost analysis (EE/CA) or its equivalent. The EE/CA is an analysis of removal alternatives for a site.*

GP did not conduct an EE/CA for the Plainwell No. 2 Dam area. No analysis of removal alternatives was performed prior to the planned removal action. Once GP and the regulators decided in 2008 to move forward with a removal action, no alternatives were developed or evaluated other than excavation of sediment and floodplain soils with disposal at the OU-1 landfill.

Section 300.415(n)(4) of the NCP states that:

> *Where, based on the site evaluation, the lead agency determines that a CERCLA removal action is appropriate and that a planning period of at least six months exists prior to initiation of the on-site removal activities, the lead agency shall at a minimum... (ii) Publish a notice of availability and brief description of the EE/CA in a major local newspaper of general circulation... (iii) Provide a reasonable opportunity, not less than 30 calendar days, for submission of written and oral comments after completion of the EE/CA... Upon timely request, the lead agency will extend the public comment period by a minimum of 15 days; and (iv) Prepare a written response to significant comments...*

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[135] See National Contingency Plan Section 300.700(c)(2).

[136] See National Contingency Plan Section 300.700(c)(3)(i).

The failure to prepare an EE/CA for the Plainwell No. 2 Dam removal action denied the community the opportunity to review and comment on the development and evaluation of potential alternatives.

Based on a review of the documents in the case, it is apparent that GP advocated the use of the TCRA authority at the Plainwell No. 2 Dam area. As early as late 2007/early 2008, the KRSG was proposing early action at the Plainwell No. 2 Dam area, and the KRSG performed voluntary investigations towards this end.[137] The proposal was formalized in an October 2008 presentation to regulators, outlining the Plainwell No. 2 Dam TCRA and other proposed downstream TCRAs.[138]

Specific Responses to Mr. Zoch's Statements Regarding the TCRAs

Mr. Zoch justifies the use of TCRAs at OU-5 with a number of problematic statements. First, Mr. Zoch states that by using the TCRA procedure, GP "avoided potentially lengthy, costly and duplicative engineering evaluations and cost analyses."[139] However, there is specific guidance available that discourages the use of TCRAs solely to speed up the response action. "It would not be appropriate to use a TCRA just for the sake of expediency or to avoid complying with the additional planning and community involvement requirements of a NTCRA..."[140] (Of note, Mr. Zoch also discusses this quote but incorrectly attributes it to US EPA guidance). Furthermore, the NCP is specific that the decision to conduct a TCRA is solely determinant on the amount of time (less than six months) available for the planning process; there is no discussion of lowering cost, speeding up the remedy process, or avoiding duplication with earlier efforts.

Second, Mr. Zoch asserts that TCRA projects are "generally relatively straightforward" and that the TCRAs conducted by the KRSG were also relatively straightforward.[141] Based on a review of the documents surrounding each of the TCRAs, it does not appear that any of them were

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137 See Arcadis. November 4, 2008. Conceptual Design Report, Bank Removal and Restoration – Plainwell No. 2 Dam Area. NCRKZOO0177702 – NCRKZOO0177888; at page NCRKZOO0177712.

138 See Arcadis. October 7, 2008. Next Steps for Cleanup and Restoration of the Kalamazoo River. KZ00478210 – KZ00478244; at page KZ00478213.

139 See Expert Report of Robert M. Zoch Jr., PE. December 5, 2014; at page 19.

140 See Association of State and Territorial Solid Waste Management Officials. June 30, 2007. Removal Actions at Federal Facilities. NCRKZOO0431892 – NCRKZOO0431951; at page NCRKZOO0431896.

141 See Expert Report of Robert M. Zoch Jr., PE. December 5, 2014; at page 32.

straightforward. Each TCRA had years of study and proposed workplans. Additionally, the Plainwell Impoundment TCRA took over two years to complete, involved dredging over 100,000 cy of sediment and floodplain soil, and had a significant last minute change in the response action due to community concerns.

Finally, Mr. Zoch relies on his interpretation of NCP Section 300.700(c)(3)(ii) and "presumptive consistency" as support for why the TCRAs (and in fact most of the response actions at the Site conducted under agency orders) are presumed to be consistent with the NCP. The 1990 Preamble to the NCP contains some additional clarification on this section of the NCP:

> *As to section 106/122 orders or decrees, those documents implement remedies that have been selected in accordance with CERCLA and the NCP, and they contain the cleanup standards necessary for consistency with the NCP. EPA believes that defendants will have acted "consistent with the NCP" when they comply with a section 106 order or a section 122 consent decree.*[142] (emphasis added)

In my opinion, the concept of "presumptive consistency" relies upon the presumption that the remedies conducted under section 106/122 orders or decrees were in fact selected in accordance with CERCLA and the NCP. However, as has previously been discussed, this presumption fails for the TCRAs at this site as the response actions clearly should have been conducted as NTCRAs or remedial actions and been subject to the more stringent remedy selection and community involvement criteria required under the NCP. Since the section 106/122 orders did not implement remedies that were selected in proper accordance with CERCLA in the NCP, it is not appropriate to assume that the remedies are "presumptively consistent" with the NCP as Mr. Zoch opines.

Based on the information above it is my opinion that the aforementioned actions and the $23.6 million in claimed costs for the Plainwell Impoundment and Plainwell No. 2 Dam incurred by GP were not incurred in substantial compliance with applicable requirements of the NCP and therefore are not recoverable from other parties. See Schedules 2 and 3 for a listing of these costs and invoices.

[142] See 55 FR 8797, 1990 Preamble to the NCP.

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$11.6 million[143] out of the total amount identified as recoverable costs for the performance of the October 2000 OU-5 Supplement to the Remedial Investigation/Feasibility Study (RI/FS) and associated studies in Mr. Zoch's Expert Report were not necessary costs under the NCP and therefore are not recoverable from other parties.

Framework for Evaluating Necessity

For private party response actions the NCP language for cost recovery states that, "responsible parties shall be liable for necessary costs of response actions to releases of hazardous substances incurred by any other person consistent with the NCP."[144]

Parties seeking recovery of response costs must show that their actions and costs were both necessary and consistent with the applicable requirements of the NCP. To evaluate whether the response actions and costs presented by Mr. Zoch in his Expert Report and claimed by GP were necessary I considered the following three factors: [1] was there a release of hazardous substances at the Site?; [2] were the actions taken to address the releases of hazardous substances?; and [3] were the actions necessary to meet regulatory requirements?[145]

Regarding the first question there is ample evidence that there were releases of hazardous substances at the Site, as evidenced by the RI/FS's and RODs.

Regarding the second question it is my opinion, based on a review of the documents in this matter, that the KRSG and Agencies, with some exceptions that are described in Opinion 5, generally took the response actions to address the releases of hazardous substances at the Site.

However, regarding the third question it is clear that some of the GP actions and costs were not necessary to meet regulatory requirements as described below.

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[143] See Schedules 1 and 4 for a summary of these costs.

[144] See National Contingency Plan Section 300.700(c)(2).

[145] The NCP does not define necessary however I have used this reasoned three-pronged test in all of my expert analysis and reports over the past 20 years. This is based on my experience and legal analyses performed by counsel in previous cases for which I was retained as an expert.

Concurrent with the preparation of the OU-5 RI/FS, in 1999 the KRSG began conducting voluntary studies.[146] Specifically, nine voluntary studies were conducted at OU-5, as well as ecological and human health risk assessments, an update of the Site conceptual model, and a comprehensive sediment and PCB fate and transport model. These studies were outside of the scope of work which was outlined in the AOC that was governing the RI/FS actions between GP and the agencies. The studies were initially conducted in 1999 and 2000, and were presented in a "Supplement" to the RI/FS that was submitted as a separate document in October 2000, at the same time the KRSG submitted the RI/FS itself.[147] After the RI/FS Supplement was submitted, work on the studies continued until approximately 2004, although no further reports were submitted to MDEQ or US EPA documenting that work.

Regarding the performance of the RI, the NCP states that "[t]he purpose of the remedial investigation (RI) is to collect data necessary to adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives."[148] Regarding the FS, the NCP states that "[t]he primary objective of the feasibility study (FS) is to ensure that appropriate remedial alternatives are developed and evaluated such that relevant information concerning the remedial action options can be presented to a decision-maker and an appropriate remedy selected."[149]

To summarize, the purpose of the RI/FS is to gather data and develop remedy alternatives which allow the decision-maker (in this case, the regulatory agencies MDEQ and US EPA) to evaluate and select a remedy for the site.

Necessity of Supplement to the RI/FS and Related Studies

In reviewing the documents and correspondence with the agencies surrounding the Supplement to the RI/FS and related studies that continued after its submission, it is clear that the Supplement to the RI/FS was developed outside the scope of the AOC, was not subject to regulatory oversight or

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146 Note that GP's expert Mr. Zoch also considers these actions and costs to have been voluntary in nature. See Expert Report of Robert M. Zoch Jr., PE. December 5, 2014; at page 15.

147 See BBL. October 2000. Supplement to the Kalamazoo River RI/FS – Phase I. WY803941 – WY805495; at page WY803956.

148 See National Contingency Plan Section 300.430(d)(1).

149 See National Contingency Plan Section 300.430(e)(1).

approval, and was not necessary for the regulatory agencies' decision-making. Therefore, these studies were not necessary response actions under the NCP. The basis for this is further discussed below.

In late 1998 the KRSG first approached Dr. John Giesy at Michigan State University (MSU) to perform some additional field studies and an ecological risk assessment. As part of his engagement, the KRSG agreed to fund his laboratory and provide MSU with research funding. In exchange, Dr. Giesy would assist the KRSG to develop a "shadow refined CERCLA ecological risk assessment"[150] as the Agencies were responsible for developing the official risk assessment. The first payment to Dr. Giesy was made in November 1998,[151] however work appears to have begun on a large scale in early 1999.[152,153]

One of the other subcontractors engaged early on to perform the Supplement to the RI/FS was Limno Tech Inc. (LTI). Based on a review of the invoices it appears that LTI began work in early 1999 to prepare a site conceptual model and a fate and transport model. Other subcontractors included Cambridge Environmental, who was hired by the KRSG to work on a human health risk assessment because "it made sense, given the conservative nature of the agency risk assessments, to have a better, more realistic risk assessment performed for this very large site."[154]

The KRSG first presented the scope of its proposed Supplement to the RI/FS to MDEQ in meetings held in September and October 1999 (however as discussed above it had already begun some of the studies). MDEQ declined to have any involvement in development of the Supplement to the RI/FS,

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150 See J. Giesy. December 2, 1998. Letter to M. Brown (BBL). KZ-KRSG-00422777 – KZ-KRSG-00422793; at page KZ-KRSG000422786.

151 See Lettinga & Associates. November 1998. Kalamazoo Superfund General Account, Invoice #107. KZ00229972 – KZ00230111; at page KZ00230026.

152 See Lettinga & Associates. March 1999. Kalamazoo Superfund General Account, Invoice #111. KZ00230499 – KZ00230630; at pages KZ00230552, KZ00230554.

153 See Lettinga & Associates. April 1999. Kalamazoo Superfund General Account, Invoice #112 and #113. KZ00230631 – KZ00230853; at pages KZ00230686, KZ00230689, KZ00230766 – KZ00230767, KZ00230769.

154 See Deposition of Mark Brown. July 24, 2014. Georgia-Pacific Consumer Products LP vs. NCR Corporation; at 72:6-13.

and MDEQ was not willing to review the associated work plans for the investigations. In fact, MDEQ stated that it did not believe that the KRSG needed to conduct these additional studies at all.[155]

Despite the lack of MDEQ involvement, the KRSG continued its studies into the fall of 1999 and 2000.[156] In August 2000, the MDEQ directed the KRSG to keep any results or conclusions from the Supplement to the RI/FS separate from the OU-5 RI/FS, as these supplemental studies were "outside of the MDEQ-approved scope of work."[157] Furthermore, MDEQ refused to consider the data collected as part of the Supplement to the RI/FS.[158]

In response to a dispute filed by the KRSG, US EPA became involved at OU-5 and suggested in October 2000 that the KRSG should be able to present its data to MDEQ in a document separate from the OU-5 RI/FS. However, US EPA was clear that the burden was on the KRSG to "demonstrate to the satisfaction of MDEQ, that the data in dispute was collected and analyzed in accordance with the data collection and analysis provisions in the AOC, as well as the approved RI/FS workplan and QAPP."[159]

In October 2000, immediately prior to the issuance of the OU-5 RI/FS and Supplement to the RI/FS, MDEQ agreed to review the voluntary studies that had been completed. However, MDEQ considered these studies to have been conducted outside of the AOC, and expressed concerns that the data were enveloped in a "shroud of mystery" and that "the purpose, scope, and detail of the additional data collection efforts have simply not been clear."[160]

The RI/FS and the Supplement to the RI/FS were submitted separately in October 2000. Over the next two years, MDEQ and US EPA reviewed both documents, and from the record it is clear that

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155 See BBL. October 2000. Supplement to the Kalamazoo River RI/FS – Phase I. WY803941 – WY805495; at page WY803959.

156 See BBL. October 2000. Supplement to the Kalamazoo River RI/FS – Phase I. WY803941 – WY805495; at page WY803959.

157 See BBL. October 2000. Supplement to the Kalamazoo River RI/FS – Phase I. WY803941 – WY805495; at page WY803959.

158 See M. Brown (BBL). August 28, 2000. Letter to A. Howard (MDEQ) re: Dispute Resolution Regarding RI/FS Preparation. WYDQ004224 – WYDQ004226.

159 See W. Muno (US EPA). September 15, 2000. Letter to A. Howard (MDEQ) re: Dispute Resolution Regarding RI/FS Preparation for Phase I of Kalamazoo River. WYDQ004262 – WYDQ004263.

160 See B. von Gunten (MDEQ). October 24, 2000. Letter to M. Brown (BBL). WYDQ004264 – WYDQ004265.

they did not view the Supplement to the RI/FS as being acceptable for their decision-making purposes.

For example, in January 2001 comments, MDEQ noted that "[t]he scope of the [Supplemental Information] was not approved by MDEQ; the data collected without oversight and is outside of the scope of Administrative Order of Consent (AOC). Document's contents, what little there is, can not be used for site investigation or evaluation purposes."[161]

In December 2001, MDEQ issued comments specific to the risk assessment work that Dr. Giesy had prepared as part of the Supplement to the RI/FS. MDEQ again noted that the work was submitted outside the scope of the 1990 AOC. MDEQ also explicitly recommended to US EPA that it release MDEQ's risk assessments without incorporating any of the concerns or suggestions made by Dr. Giesy.[162]

In July 2002, MDEQ gave notice to US EPA that it was disapproving the OU-5 RI/FS. Of note, MDEQ stated that:

> *In the creation and submittal of this draft RI/FS, the KRSG has demonstrated an inability or unwillingness to report facts objectively. The MDEQ does not consider the draft RI/FS a good faith effort to develop reasonable remedial options or impartially evaluate alternatives consistent with the AOC or the National Contingency Plan (NCP). The MDEQ believes the KRSG's preferred alternative, as a stand-alone remedy, does not satisfy the two threshold evaluation criteria under the NCP...Overall, much of the RI/FS reads as an argumentative advocacy piece intended to persuade the reader that the MDNR is partially to blame for the polychlorinated biphenyl contamination in the river.*[163]

MDEQ was not alone in its criticism of the OU-5 RI/FS and the Supplement to the RI/FS. In its review of the documents, US EPA was also concerned about the usefulness of the documents. Specifically:

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[161] See MDEQ. 2001. Consolidated Comments, Remedial Investigation, Feasibility Study, Supplemental Investigation, Former Impoundment Approaches. NCRKZOO0431957 – NCRKZOO0432140; at page NCRKZOO0431972.

[162] See B. von Gunten. December 10, 2001. Letter to T. Short (US EPA) transmitting Preliminary Comments on Draft Interim Ecological Risk Assessment of Former Impoundment Soils. WYDQ003713 – WYDQ003718; at page WYDQ003714.

[163] See B. von Gunten (MDEQ). July 11, 2002. Letter to S. Kolak (US EPA). WYDQ004244 – WYDQ004245.

> *The essential purposes of an RI/FS are (1) to characterize the nature and extent of hazardous contamination at a Site; and (2) to develop and evaluate effective remedial alternatives. The document should not be used to support or defend against a liability lawsuit. Nevertheless, a significant portion of the RI and, to a lesser extent, the FS, appears to be devoted to targeting the Michigan Department of Natural Resources as a potentially responsible party for the PCB contamination in the Kalamazoo River. In many cases, the RI reads like a legal brief supporting the PRPs' argument that the MDNR exacerbated the harm in the Kalamazoo River by opening up the gates and lowering the sills on three dams.*[164]

US EPA also noted that "Because MDEQ prohibited the PRPs from using the fate and transport model they developed, the PRPs created an unauthorized Supplement to the RI/FS, which is referenced throughout the original document."[165]

While the RI/FS and the Supplement to the RI/FS were being reviewed by the Agencies in 2001 and 2002, GP and the KRSG continued to perform studies related to the supplement. These included continued work by Dr. Giesy and his staff at MSU, Limno Tech, and other subcontractors, and work by those subcontractors continued into 2004. For example, according to the BBL project manager, even after MDEQ stated they would not review Dr. Giesy's risk assessment work the KRSG "...proceeded to fund John Giesy's work, a portion of which was reported in the supplement."[166]

Regardless of whether the US EPA ultimately considered parts of the Supplement to the RI/FS to inform its decision-making under the 2007 ASAOC (as Mr. Zoch claims), at the time of its preparation in 2000 it was not considered to be <u>necessary</u> by the agencies. Furthermore, there is no evidence in the documented record that the Agency has <u>ever</u> considered the Supplement to the RI/FS to have been necessary for decision-making at the Site.

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[164] See US EPA. May 11, 2001. Letter to B. von Gunten (MDEQ) re: USEPA comments. Includes as part of MDEQ July 2002 Comments to Draft RI/FS. NCRKZOO432141 – NCRKZOO432541; at page NCRKZOO432169.

[165] See US EPA. May 11, 2001. Letter to B. von Gunten (MDEQ) re: USEPA comments. Includes as part of MDEQ July 2002 Comments to Draft RI/FS. NCRKZOO432141 – NCRKZOO432541; at page NCRKZOO432170.

[166] See Deposition of Mark Brown. July 24, 2014. Georgia-Pacific Consumer Products LP vs. NCR Corporation; at 68:20 – 69:4.

In summary, the Supplement to the RI/FS was performed by GP and its fellow KRSG members at their discretion, at their own business risk and to promote the positions of GP and the KRSG.

Quantifying the Cost of the Supplement to the RI/FS and Related Studies

In order to quantify the amount of claimed cost related to the Supplement to the RI/FS and subsequent studies performed between 1999 and 2004, I first evaluated the cost recovery claim submitted by GP and discussed in the expert report of Mr. Zoch. However, neither the claim spreadsheets nor the evaluation of costs conducted by Mr. Zoch attempt to differentiate the voluntary costs related to the Supplement from other costs for the October 2000 RI/FS.

Furthermore, based on a review of depositions issued in this case, it appears that GP and its primary contractor at the time BBL are unable or unwilling to quantify the amount of cost to perform the Supplement to the RI/FS and related studies.[167,168,169]

In order to quantify these costs, I first reviewed the claimed costs for OU-5 from 1998 through 2006. Based on an invoice database created by John Butler's team[170] that I received from counsel, I reviewed invoices associated with specific months and vendors during this time period. From this review I identified several vendors who exclusively appear to have contributed to the Supplement to the RI/FS and related voluntary studies. These included:

- Anchor Environmental (September 2001-August 2004) – During this time period Anchor reviewed cleanup cost estimates and assisted with the development of a conceptual remedy.[171]

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[167] See Deposition of Roger Hilardes. July 10 and 11, 2014. Georgia-Pacific Consumer Products LP vs. NCR Corporation; at 41:3-20, 104:3-7, 124:23 – 127:11.

[168] See Deposition of Paul Montney. August 6, 2014. Georgia-Pacific Consumer Products LP vs. NCR Corporation; at 86:19 – 87:11.

[169] See Deposition of Mark Brown. July 24, 2014. Georgia-Pacific Consumer Products LP vs. NCR Corporation; at 121:8-12.

[170] See Expert Report of John C. Butler, III. December 5, 2014.

[171] See Anchor Environmental LLC. April 15, 2002. Invoice #2308. KZ00198012 – KZ00198013.

- Arcadis (October 2000-November 2001) – During this time period Arcadis provided consulting support to the Ecological Risk Assessment and Human Health Risk Assessment, as well as NRDA-related services and document repository-related work.[172]
- Environ (November 1999) – Environ provided support to the Human Health Risk Assessment.[173]
- JSA Environmental (December 1999) – JSA provided support to the Ecological Risk Assessment.[174]

In addition to the above vendors, much of the voluntary work was conducted by BBL and its subcontractors such as Dr. Giesy, MSU, and LTI. The BBL invoices were in many cases hundreds of pages long, covered all five operable units of the Site, and represented over a million dollars of invoiced costs for a single month. Additionally, while the invoices separated costs by OU and by geographic area, they did not separate costs by response activity (i.e., RI/FS, Supplement to RI/FS, other studies, interim response actions, etc.).

Based on my review, it appears that a significant portion of the invoiced costs for OU-5 from February 1999 through May 2004 were for subcontractors to BBL. I further split this time period into two groups – February 1999 through October 2000 (for the Supplement to the RI/FS), and November 2000 through May 2004 (for continuance of studies relating to the Supplement to the RI/FS).

From February 1999 through October 2000, there are approximately $5.3 million in BBL and BBL subcontractor costs claimed by GP. Of this amount, over 50% appears to have been incurred by subcontractors such as Dr. Giesy, MSU and LTI to perform the Supplement to the RI/FS. Additionally, BBL would likely have incurred significant time and expense supporting the subcontractor efforts to conduct these studies and to compile and write the Supplement itself. It is my opinion that the

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[172] See Lettinga & Associates. February 2001. Kalamazoo Superfund General Account, Invoice #136. KZ00234582 – KZ00234777; at pages KZ00234765 – KZ00234777.

[173] See Lettinga & Associates. March 2000. Kalamazoo Superfund General Account, Invoice #124. KZ00232383 – KZ00232574; at page KZ00232558.

[174] See Lettinga & Associates. March 2000. Kalamazoo Superfund General Account, Invoice #124. KZ00232383 – KZ00232574; at pages KZ00232559 – KZ00232574.

majority of the $5.3 million incurred during this time period was related to the Supplement to the RI/FS. See Schedule 6 for further detail on this subcontractor calculation.[175]

From November 2000 through May 2004, there are approximately $6.2 million in BBL and BBL subcontractor costs claimed by GP. Of this amount, over 65% appears to have been incurred by subcontractors such as Dr. Giesy, MSU and LTI. Additionally, BBL would have again incurred significant time and expense supporting the subcontractors. Finally, unlike the earlier time period there were no major deliverables required by the Agencies during this time period (recall the OU-5 RI/FS was submitted in October 2000). Therefore, it is my opinion that the vast majority (if not all) of the $6.2 million incurred during this time period was related to the continuance of the voluntary studies described in the Supplement to the RI/FS. See Schedule 6 for further detail on this subcontractor calculation.[176]

I understand that particularly during the first time period (February 1999 through October 2000), there were some BBL costs incurred to draft and finalize the OU-5 RI/FS report under the 1990 AOC. However, as GP has not provided sufficient cost documentation to quantify and separate these costs from the voluntary study costs, it is my opinion that the entire $5.3 million incurred by GP at OU-5 during this time period (in addition to the $6.2 million incurred in the subsequent time period) is not recoverable because the costs are associated with the Supplement to the RI/FS or there is insufficient cost documentation as required by the NCP to claim these costs. See Schedule 4 for a listing of these costs and invoices. Furthermore, as has been previously discussed the MDEQ and US EPA rejected both the OU-5 RI/FS and the Supplement to the RI/FS. Thus, it would be reasonable to conclude that certain of the costs associated with the development of the RI/FS by GP are also not recoverable as they resulted in a document that was rejected by the agencies. I have not quantified these costs at

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[175] Note that Schedule 6 calculates the subcontractor portion of <u>total</u> BBL invoiced costs ($10.6 million), rather than GP's claimed share ($5.3 million). For the purposes of this analysis, I am assuming that the subcontractor portion of GP's share of costs is equivalent to the subcontractor portion of the total invoiced costs presented in Schedule 6.

[176] Note that Schedule 6 calculates the subcontractor portion of <u>total</u> BBL invoiced costs ($12.3 million), rather than GP's claimed share ($6.2 million). For the purposes of this analysis, I am assuming that the subcontractor portion of GP's share of costs is equivalent to the subcontractor portion of the total invoiced costs presented in Schedule 6.

this time; however I reserve the right to modify this opinion should further information become available to evaluate the costs incurred during this time period.

In summary, the Supplement to the RI/FS was performed by GP and its fellow KRSG members at their discretion, at their own business risk and to promote the positions of GP and the KRSG. As a result these GP actions and associated costs of $11.6 million were not necessary under the NCP or were not properly documented and therefore are not recoverable from other parties. See Schedule 4 for a listing of these costs and invoices.

Opinion 4

$4.2 million[177] out of the total amount identified as recoverable costs for OU-6 in Mr. Zoch's Expert Report were not incurred consistent with the requirements of the NCP and therefore are not recoverable from other parties.

As previously discussed, an ASAOC to perform a TCRA was signed between GP and US EPA in 2006 for the excavation of 35,000 cy of soil from the Former OU-6 GP Mill Sites.[178,179] The TCRA was performed by GP between 2006 and 2007, with 53,075 cy excavated at a total estimated cost of $3.03 million.[180]

In evaluating the GP Mill Sites removal action, I examined the history of investigations and studies leading up to the decision to conduct a removal action. From that examination, it is clear that there was no urgency related to environmental threats and there was more than six months available prior

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[177] See Schedules 1 and 5 for a summary of these costs.

[178] See US EPA. October 27, 2006. Enforcement Action Memorandum: Georgia-Pacific Kalamazoo and Hawthorne Mills. KZ00271285 – KZ00271302; at page KZ00271285.

[179] See US EPA. November 16, 2006. Administrative Settlement Agreement and Order on Consent for Removal Action. KZ00150632 – KZ00150741.

[180] See US EPA. September 28, 2007. Georgia-Pacific Kalamazoo and Former Hawthorne Mills Removal Action Completion of Action – Pollution Report #1. NCRKZOO0173280 – NCRKZOO0173285; at pages NCRKZOO0173283 – NCRKZOO0173284.

to the start of the removal action. As discussed in the Plainwell Impoundment section, TCRAs are response actions where less than six months is available for planning.

The GP Mill Sites removal action began in November 2006. A brief timeline of various investigations and milestones preceding the start of the removal action is provided below:

- The majority of investigations at the GP Mill Sites were completed by 2003, more than three years prior to the start of the GP Mill Sites TCRA. As noted in the August 2006 draft Action Memorandum, "This removal action will address PCB contamination discovered during the sampling events conducted in 1999, 2000, 2002, and 2003..."[181]
- In June 2003 a work plan to excavate 30,000 cy from the GP Mill sites was submitted,[182] more than three years prior to the start of the GP Mill Sites TCRA and similar in scope to the TCRA as ultimately designed.
- In November 2004 US EPA indicated to GP that in order to delist the GP Mill Sites from the NPL, it would have to sign an ASAOC to perform a TCRA. This was two years prior to the start of the GP Mill Sites TCRA.[183]
- In January 2005 a draft TCRA Work Plan was submitted by GP, more than one year prior to the start of the GP Mill Sites TCRA.[184]
- In September 2005 remaining investigations at the Hawthorne Mill were completed, more than one year prior to the start of the GP Mill Sites TCRA.[185]

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[181] See US EPA. August 9, 2006. Draft Enforcement Action Memorandum: Georgia-Pacific Kalamazoo and Hawthorne Mills. KZ00270807 – KZ00270816; at page KZ00270808.

[182] See M. Davis (GP). June 27, 2003. Letter to E. Furey (US EPA) re: Request for Delisting, Attachment – Draft Work Plan for Residuals/Soil Removal In Support of Delisting Petition. KZ-Arcadis-000429 – KZ-Arcadis-000465; at page KZ-Arcadis-000440.

[183] See E. Furey (US EPA). November 19, 2004. Letter to M. Davis (GP) re: Administrative Order on Consent for Time-Critical Removal Action and Proposed Partial Deletion of Georgia-Pacific Mill Property from NPL Site. NCRKZOO0192369 – NCRKZOO0192371.

[184] See BBL. November 2005. Former Hawthorne Mill Investigation-Related Documents. NCRKZOO0033772 – NCRKZOO0034035; at page NCRKZOO0033823.

[185] See K Gross and P. McGuire (BBL). September 30, 2005. Memorandum re: Former Hawthorne Mill Supplemental Soil Investigation Activities Summary. NCRKZOO0034036 – NCRKZOO0034062.

- In October 2005 a Draft Remedial Action Work Plan was submitted, more than one year prior to the start of the GP Mill Sites TCRA.[186]
- In or before December 2005 a Draft ASAOC to remediate the GP Mill Sites was signed, at least 11 months prior to the start of the GP Mill Sites TCRA.[187]

As the above timeline indicates, the GP Mill Sites response action was not time-critical. Contamination issues at the GP Mill Sites were known for years, were not imposing any immediate environmental threats, and GP had contemplated excavating 30,000 cy from the Site as early as 2003.

Furthermore, in the action memorandum authorizing the TCRA, there is virtually no justification for why the action is time-critical other than "release and threatened release of hazardous substances to the environment from the Mill Properties, and the public health threats associated with such releases,"[188] all of which had been known or was ongoing for years. This same statement can be made for the contaminated soil at many areas of the Site (such as OU-2 and OU-3) which were handled as remedial actions.

Given the above facts, it is clear that more than six months existed prior to the onset of the removal action, therefore the performance of this response action falls under the NTCRA or remedial action criteria and requirements of the NCP.

For private party response actions the NCP language for cost recovery states that "responsible parties shall be liable for necessary costs of response actions to releases of hazardous substances incurred by any other person consistent with the NCP"[189] and that "[a] private party response action will be considered "consistent with the NCP" if the action, when evaluated as a whole, is in

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[186] See BBL. October 2005. Draft Remedial Action Work Plan, Kalamazoo Mill Property and Former Hawthorne Mill Property. NCRKZOO0034844 – NCRKZOO0034960.

[187] See K. Krawczyk (MDEQ). December 15, 2005. Letter to S. Kolak (US EPA) re: Georgia Pacific Mill Property Operable Unit 6; Draft Remedial Action Work Plan. NCRKZOO0034961 – NCRKZOO0034964; at page NCRKZOO0034961.

[188] See US EPA. October 27, 2006. Enforcement Action Memorandum: Georgia-Pacific Kalamazoo and Hawthorne Mills. KZ00271285 – KZ00271302; at page KZ00271285.

[189] See National Contingency Plan Section 300.700(c)(2).

substantial compliance with the applicable requirements in paragraphs (5) and (6) of this section..."[190]

For the purposes of this analysis, I will focus on the applicable sections of the NCP for Removal Actions and Public Participation and Community Relations.

Section 300.415(b)(4) of the NCP states that:

> *Whenever a planning period of at least six months exists before on-site activities must be initiated, and the lead agency determines, based on a site evaluation, that a removal action is appropriate: (i) The lead agency shall conduct an engineering evaluation/cost analysis (EE/CA) or its equivalent. The EE/CA is an analysis of removal alternatives for a site.*

GP did not conduct an EE/CA for the GP Mill Sites. No analysis of removal alternatives was performed. Once GP and the regulators decided in 2006 to move forward with a removal action, no alternatives were developed or evaluated other than excavation of soil with disposal at the OU-2 landfill.

Section 300.415(n)(4) of the NCP states that:

> *Where, based on the site evaluation, the lead agency determines that a CERCLA removal action is appropriate and that a planning period of at least six months exists prior to initiation of the on-site removal activities, the lead agency shall at a minimum... (ii) Publish a notice of availability and brief description of the EE/CA in a major local newspaper of general circulation... (iii) Provide a reasonable opportunity, not less than 30 calendar days, for submission of written and oral comments after completion of the EE/CA... Upon timely request, the lead agency will extend the public comment period by a minimum of 15 days; and (iv) Prepare a written response to significant comments...*

The failure to prepare an EE/CA for the GP Mill Sites removal action is inconsistent with the NCP requirements for an action of this type and it denied the community the opportunity to review and comment on the development and evaluation of potential alternatives and the selected response action.

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[190] See National Contingency Plan Section 300.700(c)(3)(i).

Based on a review of the record, it does not appear that the community was involved in the decision to conduct the GP Mill Sites TCRA in any meaningful way. There were no public meetings, fact sheets, or information sessions specific to the GP Mill Sites TCRA. The one opportunity the public did have to comment was during the OU-2 Proposed Plan, as the remedy selection for OU-2 mentioned that waste would be excavated from OU-6 and disposed of at the OU-2 landfill prior to closure.[191] In the responsiveness summary for OU-2, there are numerous comments by community members opposing the disposal of GP mill waste in OU-2. Yet because the OU-6 response action was conducted as a TCRA, there was no opportunity for the public to comment on the selected clean-up plan to be executed in the TCRA.[192]

Based on my review of the documents in the case, GP proposed the use of the TCRA authority at the GP Mill Sites in order to get the sites delisted from the NPL and allow for rapid redevelopment or sale of the property. According to the BBL project manager Mark Brown, in 2003:

> *There was a significant issue with Georgia-Pacific around this time about how to separate the mill which had been closed from the Kalamazoo River site. The issue became one of redevelopment and the limited ability to sell the property for redevelopment because it was associated with the Superfund site as a result of some of these proceedings that happened in the early '90s.*[193]

As early as 2004, GP was in discussions with US EPA regarding the future of the mill sites:

> *The United States Environmental Protection Agency ("U.S. EPA") understands that Georgia-Pacific Corporation ("Georgia-Pacific") seeks to sell for redevelopment purposes approximately 48 acres of real property located at 2425 King Highway, Kalamazoo, Michigan, adjacent to the Kalamazoo River (the "Mill Property")...As part of the redevelopment effort,*

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[191] See US EPA. July 2005. EPA Proposes Cleanup Plan for Landfill Paper Waste. NCRKZOO0033646 – NCRKZOO0033655; at page NCRKZOO0033646.

[192] See US EPA. September 2006. Willow Boulevard/A-Site Landfill Operable Unit 2 Record of Decision. NCRKZOO0035035 – NCRKZ0035159; at pages NCRKZOO0035090, NCRKZOO0035096 – NCRKZOO0035099.

[193] See Deposition of Mark Brown. July 24, 2014. Georgia-Pacific Consumer Products LP vs. NCR Corporation; at 185.

Georgia-Pacific has requested U.S. EPA to partially delete the Mill Property from the National Priorities List ("NPL").[194]

In addition to the aforementioned NCP-consistency issues, there were also components of the TCRA performed by GP that were not necessary costs of response. GP added several areas of the former mill site to the TCRA for clean-up; these areas were not required by US EPA, and were voluntary actions by GP.[195] Per the 2006 draft Action Memorandum, the US EPA was only requiring action at the Refuse and Oxbow Areas; for the Wastewater Pipeline and Transformer Pad Areas "[a]lthough not required by the US EPA, Georgia-Pacific is willing to perform removal activities at [these areas] concurrent with the time critical removal action at the Refuse and Oxbow Areas."[196,197]

Finally, Mr. Zoch again relies on his interpretation of NCP Section 300.700(c)(3)(ii) and "presumptive consistency" as support for why the OU-6 TCRA is presumed to be consistent with the NCP. For the same reasons presented in Opinion 2 regarding the OU-5 sediment TCRAs, the OU-6 TCRA response action was not evaluated and selected in accordance with CERCLA and the NCP and should not be presumed consistent with the NCP.

Based on the information above it is my opinion that the aforementioned actions and the $4.2 million in associated costs for the OU-6 response action incurred by GP were not incurred in substantial compliance with applicable requirements of the NCP and therefore are not recoverable from other parties. See Schedule 5 for a listing of these costs and invoices.

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194 See E. Furey (US EPA). November 19, 2004. Letter to M. Davis (GP) re: Administrative Order on Consent for Time-Critical Removal Action and Proposed Partial Deletion of Georgia-Pacific Mill Property from NPL Site. NCRKZOO0192369 – NCRKZOO0192371; at page NCRKZOO0192369.

195 See S. Kolak (US EPA). April 3, 2006. Letter to P. Montney (GP) re: EPA Comments on Draft Work Plan for a Time-Critical Removal Action at the Refuse Area at the Georgia-Pacific Kalamazoo Mill and Oxbow Area at the former Hawthorne Mill Properties. WYDQ002899 – WYDQ002905; at page WYDQ002901.

196 See US EPA. August 9, 2006. Draft Enforcement Action Memorandum: Georgia-Pacific Kalamazoo and Hawthorne Mills. KZ00270807 – KZ00270816; at page KZ00270811.

197 Based on the information available as of the date of this report, the costs associated with these aspects of the TCRA are not necessary costs of response and are not recoverable from other parties independent of NCP consistency issues.

Opinion 5

In addition to the costs identified above, $2.5 million[198] out of the total amount in costs identified as recoverable costs in Mr. Zoch's Expert Report are not response costs under the NCP, and as such are not recoverable costs under the NCP.

My staff and I performed several tasks to identify, review, and evaluate the response costs incurred by GP. Through counsel and another expert in the case (John Butler), we obtained cost documentation provided by GP, including copies of invoices, a database of invoice information created by John Butler and his team, and an accounting of claimed costs provided by GP.

To facilitate my evaluation of costs for which GP is seeking recovery, I separated costs by OU, year incurred, and by vendor. For each category of costs, my staff and I reviewed the invoices to determine each the activities performed. I supplemented this review with other information sources, including the description of activities provided on the invoices themselves, description of activities in the associated budgets or proposals, a comparison of the timeframe of the incurred cost and documented activities, and the type of work conducted by particular contractors or vendors at specific points in time.

My staff and I reviewed the GP claimed costs purportedly associated with response activities at the Site. I identified $2.5 million which are not response costs under the NCP.

The NCP[199] and CERCLA[200] define response as "remove, removal, remedy, or remedial action." Remove or removal is defined in CERCLA as:

> *[T]he cleanup or removal of released hazardous substances from the environment, such actions as may be necessary taken in the event of the threat of release of hazardous substances into the environment, such actions as may be necessary to monitor, assess, and evaluate the release or threat of release of hazardous substances, the disposal of removed material, or the taking of such other actions as may be necessary to prevent, minimize or*

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198 See Schedules 1 through 5 for a summary of these costs.

199 See NCP Section 300.5.

200 See CERCLA Section 101(25).

> *mitigate damage to the public health or welfare or to the environment, which may otherwise result from a release or threat of release.*[201]

Remedy or remedial is defined in CERCLA as:

> *[T]hose actions consistent with permanent remedy taken instead of or in addition to removal actions in the event of a release or threatened release of a hazardous substance into the environment, to prevent or minimize the release of hazardous substances so that they do not migrate to cause substantial danger to present or future public health or welfare or the environment.*[202]

These costs which are not response costs under the NCP include:

- OU-5 NRD-Related Costs ($680K) – These costs are related to natural resource damages (NRD). NRD and NRD Assessments are not response costs as they are not costs incurred for the cleanup or removal of hazardous substances. Rather, NRD-related costs concern the evaluation of compensatory costs for damage to the environment. The NCP stipulates that NRD Assessments are to be performed by state or federal trustees.[203] There is no provision under the NCP Section 300.700 for the recovery of NRD-related costs by private parties.
- OU-5 Public Relations Costs ($787K) – Seyferth & Associates and Lambert Edwards & Associates were public relations firms retained by the KRSG and GP. Based on a review of the invoices, there is insufficient detail to determine what portion of these costs may have related to response activities. However, it is clear that many of the costs were for advocacy on behalf of the KRSG, were duplicative of state and federal community relations efforts, and were not approved by the Agencies. For instance, in 2002 MDEQ noted that "In unrelated outreach efforts, representatives of the KRSG [Seyferth] distributed RI/FS summary "fact sheets" to various community members, gave summary presentations to several community organizations, and developed a website of their own. The MDEQ did not participate in or

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[201] See CERCLA Section 101(24).

[202] See CERCLA Section 101(23).

[203] See NCP Section 300.615(c)(1).

approve these independent KRSG activities."[204] Furthermore, according to GP project manager Chase Fortenberry, in response to a question asking whether the US EPA expected GP to conduct the Site community relations activities, he stated "I do not believe they expect G-P to – well, no, I don't believe they expect G-P to do it."[205] When asked if Seyferth would have provided its work product to either the KRSG or the Agencies, Mr. Fortenberry responded "I would make the assumption they provided it directly to either the KRSG or G-P."[206]

- OU-5 Advocacy-Related Costs ($134K) – These costs were for The Horinko Group to perform advocacy on behalf of the GP with the federal government and US EPA leadership. Examples of invoiced costs include tracking "senior EPA political leadership changes",[207] discussions with EPA regarding stimulus funding,[208] and calls with politicians.[209]
- OU-5 Other Non-Response Costs ($262K) – These costs are related to other activities that are not response costs under the NCP. They include:
  - Allegan County Parks ($25K) – These costs relate to a fundraising challenge conducted by GP on behalf of the parks department.[210] They are not response costs under the NCP.
  - Appraisal Group II ($1,500) – These costs relate to the appraisal of vacant land in Otsego Township, Michigan.[211] The invoice support provided by GP does not provide

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[204] See B. von Gunten (MDEQ). April 2, 2002. Letter to S. Kolak (US EPA) re: Public Comments in Response to Alternatives Presented in the Draft RI/FS. WY011809 – WY011831; at page WY011809.

[205] See Deposition of Chase Fortenberry. November 11, 2014. Georgia-Pacific Consumer Products LP vs. NCR Corporation; at 129:14-18.

[206] See Deposition of Chase Fortenberry. November 11, 2014. Georgia-Pacific Consumer Products LP vs. NCR Corporation; at 132:18-22.

[207] See The Horinko Group. February 3, 2009. Invoice No. 030-004. KZ00408979 – KZ00408980.

[208] See The Horinko Group. March 6, 2009. Invoice No. 030-008. KZ00408981 – KZ00408982.

[209] See The Horinko Group. October 7, 2009. Invoice No. 030-015. KZ00408994 – KZ00408995.

[210] See G. Ritter (GP). August 22, 2005. Email to J. Anderson re: Georgia-Pacific Challenge. KZ00362671 – KZ00362673.

[211] See Appraisal Group II. March 24, 2003. Invoice: Vacant Land, Miller Road, Otsego Township, Michigan, Fee for Appraisal Assignment $1,500. KZ00198032 – KZ00198033.

information to indicate how these services were related to the Site, and whether they are related to response activities.

- City of Otsego ($71K) – These costs relate to improvement and restoration of the City of Otsego's dam.[212,213] They are not response costs under the NCP.
- Institute of Paper Science Technology ($4,850) – These costs relate to testing services performed by Georgia Tech University.[214] The invoice support provided by GP does not provide information to indicate how these services were related to the Site, and whether they are related to response activities.
- Kalamazoo Nature Center ($392) – These costs are for bird nesting platform materials at the Kalamazoo Nature Center.[215] They are not response costs under the NCP.
- Michigan State University ($24K) – These costs were a gift to Michigan State University to conduct animal testing.[216,217] These gifts are not response costs under the NCP.
- Outdoor Discovery Center ($2,079) – These costs are for beetle pots for purple loosestrife control at the Outdoor Discovery Center.[218,219] They are not response costs under the NCP.
- Prein & Newhof ($5,479) – These costs relate to a commercial mortgage and survey.[220,221,222] The invoice support provided by GP does not provide information to

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212 See City of Otsego. April 23, 2004. Invoice 0000000267. KZ00217382 – KZ00217386; at page KZ00217386.

213 See Georgia-Pacific. January 4, 2004. Intracompany Memo re: Kalamazoo River Superfund site/Payment to City of Otsego. KZ00217387 – KZ00217392; at page KZ00217388.

214 See Institute of Paper Science Technology at GA Tech. May 13, 2010. Testing Services Invoice. KZ00217423 – KZ00217424.

215 See Georgia-Pacific. March 1, 2012. Special Handling Authorization. KZ00217438 – KZ00217444; at page KZ00217444.

216 See G. Griffith (GP). April 15, 2011. Letter to M. Zwiernik (MSU). KZ00242416 – KZ00242417.

217 See G. Griffith (GP). July 15, 2011. Letter to M. Zwiernik (MSU). KZ00242418 – KZ00242420.

218 See Outdoor Discovery Center. July 29, 2013. Invoice No. 72913. KZ00242500 – KZ00242501.

219 See Outdoor Discovery Center. 2013. Brief Summary of Work. KZ00425279 – KZ00425280.

indicate how these services were related to the Site, and whether they are related to response activities.

- University of Ottawa ($130K) – These costs relate to a research agreement between GP and the University of Ottawa. GP is listed as a sponsor providing financial support to further research at the University of Ottawa.[223] This sponsorship is not a response cost under the NCP.

- OU-6 Costs Related to the Crown Vantage Parchment Mill ($117K) – These costs relate to the Crown Vantage Parchment Mill located in Parchment, Michigan. Mr. Zoch has categorized these costs under the "OU-6 TCRA" cost category in his expert report.[224] However, these costs are not related to OU-6 or the GP Kalamazoo or Hawthorne mills. Furthermore, Mr. Zoch has not provided support that these costs are for PCB-related response actions at the Site.

- OU-6 Other Non-Response Costs ($505K) – These costs are related to other activities that are not response costs under the NCP. They include:

  - Arcadis ($6,994) – These are costs incurred by Arcadis from September 2009 through December 2009, after the GP Mill Sites were delisted from the NPL and removed from the Superfund Site. According to GP project manager Chase Fortenberry, costs incurred by GP after the site was delisted were "more bank beautification, removal of concrete structures and things like that."[225] As the Agencies made the delisting

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[220] See Prein & Newhof. October 31, 2003. Invoice No. 53153 re: CMI w/ Alta; Prcls 1 thru 10, Sect 14, 23 & 24, T2S, R11W. KZ00363615.

[221] See Prein & Newhof. July 31, 2004. Invoice No. 57884 re: CMI w/ Alta; Prcls 1 thru 10, Sect 14, 23 & 24, T2S, R11W. KZ00363616.

[222] See Prein & Newhof. April 10, 2006. Invoice No. 7661 re: Prints. KZ00418448.

[223] See Georgia-Pacific. June 21, 2010. Research Agreement Between Georgia-Pacific LLC and University of Ottawa. KZ00243747 – KZ00243748.

[224] See Expert Report of Robert M. Zoch Jr., PE. December 5, 2014; at page 27.

[225] See Deposition of Chase Fortenberry. November 11, 2014. Georgia-Pacific Consumer Products LP vs. NCR Corporation; at 128:9-11.

determination in June 2009,[226] costs incurred after that time are not necessary costs of response under the NCP.

- County of Kalamazoo ($250) – These costs relate to a permit to "remove remnant concrete structures, regrade, seed & stabilize" in 2010.[227] They are not response costs under the NCP.
- Prein & Newhof ($30K) – These costs relate to a commercial mortgage.[228] The invoice support provided by GP does not provide information to indicate how these services were related to the Site, and whether they are related to response activities.
- State of Michigan ($18K) – These costs relate to a fence installed in 2012 along GP's property. The costs were split 50% with the Kalamazoo County Park Foundation.[229] They are not response costs under the NCP.
- Terra Contracting ($411K) – These costs relate to 1) response to a vandalism/break-in prior to the start of the TCRA; 2) decommissioning of transformers and disposal of transformer oil; and 3) restoration and maintenance of the GP-owned property after it was delisted and removed from the Superfund Site. These categories of costs are not response costs under the NCP.
- Triangle Economic Research ($39K) – These costs were incurred in 2002 for a facility analysis of the GP mill site.[230] During this time period, GP was considering divesting the mill property. They are not response costs under the NCP.

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[226] See R. Karl (US EPA). June 30, 2009. Letter to C. Fortenberry (GP) re: Georgia-Pacific Kalamazoo Mill and Former Hawthorne Mill Source Investigation. KZ00245538 – KZ00245539.

[227] See Soil Erosion and Sedimentation Control Program. October 11, 2010. Earth Change Permit. KZ00217411 – KZ00217413.

[228] See Prein & Newhof. April 11, 2003. Invoice No. 49547 re: CMI w/ Alta; Prcls 1 thru 10, Sect 14, 23 & 24, T2S, R11W. KZ00363613 – KZ00363614.

[229] See Parks Foundation of Kalamazoo County. June 13, 2013. Invoice #1-2013 re: 3544 feet of 6' Chain link fence, two modified rolling fence gates. KZ00217433 – KZ00217437; at page KZ00217433.

[230] See Triangle Economic Research. February 8, 2002. Invoice TR090-200201. KZ00364780 – KZ00364781.

Based on the information above it is my opinion that the aforementioned actions and the $2.5 million in associated costs were not response costs under the NCP. These costs are therefore are not recoverable from other parties. See Schedules 3 through 5 for a listing of these costs and invoices.

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5

IN THE MATTER OF:

Allied Paper/Portage Creek/Kalamazoo
River Superfund Site
Allegan and Kalamazoo Counties, Michigan

Respondents:

Millennium Holdings, LLC
Georgia-Pacific, LLC

ADMINISTRATIVE
SETTLEMENT AGREEMENT
AND ORDER ON CONSENT
FOR REMOVAL ACTION

Docket No. V-W- '07 -C-863

Proceeding Under Sections 104,
106(a), 107 and 122
of the Comprehensive
Environmental Response,
Compensation, and Liability Act,
as amended, 42 U.S.C. §§ 9604,
9606(a), 9607 and 9622

Exhibit 1005

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I. JURISDICTION AND GENERAL PROVISIONS

1. This Administrative Settlement Agreement and Order on Consent ("Settlement Agreement") is entered into voluntarily by the United States Environmental Protection Agency ("U.S. EPA"), the State of Michigan (the "State"), and Respondents. This Settlement Agreement provides for the performance of removal actions by Respondents at or in connection with the Plainwell Impoundment Area, as that term is defined below, of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site, located in Allegan and Kalamazoo Counties, Michigan.

2. This Settlement Agreement is issued under the authority vested in the President of the United States by Sections 104, 106(a), 107 and 122 of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended ("CERCLA"), 42 U.S.C. §§ 9604, 9606(a), 9607 and 9622. This authority has been delegated to the Administrator of the U.S. EPA by Executive Order No. 12580, January 23, 1987, 52 Federal Register 2923, and further delegated to the Regional Administrators by U.S. EPA Delegation Nos. 14-14-A, 14-14-C and 14-14-D, and to the Director, Superfund Division, Region 5, by Regional Delegation Nos. 14-14-A, 14-14-C and 14-14-D.

3. The State enters into this Settlement Agreement pursuant to Section 107 of CERCLA, the authority vested in the MDEQ and MDAG by Section 20134(1) of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, ("NREPA"), MCL 324.20101 *et seq.*, and the general authority of the Michigan Attorney General.

4. U.S. EPA, the State, and Respondents recognize that this Settlement Agreement has been negotiated in good faith and that the actions undertaken by Respondents in accordance with this Settlement Agreement do not constitute an admission of any liability. Respondents do not admit, and retain the right to controvert in any subsequent proceedings other than proceedings to implement or enforce this Settlement Agreement, the validity of the findings of facts, conclusions of law, and determinations in Sections IV and V of this Settlement Agreement. Respondents agree to comply with and be bound by the terms of this Settlement Agreement and further agree that they will not contest the basis or validity of this Settlement Agreement or its terms.

II. PARTIES BOUND

5. This Settlement Agreement applies to and is binding upon U.S. EPA, the State, and upon Respondents and their successors and assigns. Any change in ownership or corporate status of a Respondent including, but not limited to, any transfer of assets or real or personal property shall not alter such Respondent's responsibilities under this Settlement Agreement.

6. Respondents are jointly and severally liable for carrying out all activities required by this Settlement Agreement. In the event of the insolvency or other failure of any one or more Respondents to implement the requirements of this Settlement Agreement, the remaining Respondents shall complete all such requirements.

7. Respondents shall ensure that their contractors, subcontractors, and representatives comply with this Settlement Agreement. Respondents shall be responsible for any noncompliance with this Settlement Agreement.

III. DEFINITIONS

8. Unless otherwise expressly provided herein, terms used in this Settlement Agreement which are defined in CERCLA or in regulations promulgated under CERCLA shall have the meaning assigned to them in CERCLA or in such regulations. Whenever terms listed below are used in this Settlement Agreement or in the appendices attached hereto and incorporated hereunder, the following definitions shall apply:

a. "Action Memorandum" shall mean that document executed by Region 5, U.S. EPA on February 14, 2007 to authorize and describe the time-critical response actions to be undertaken at the Plainwell Impoundment Area. The Action Memorandum is incorporated into and made a part of this Agreement as Appendix 1.

b. "Allied Paper Operable Unit #1" or "Allied OU" shall mean that part of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site between Cork and Alcott Streets which is approximately 62 acres in size and includes, but is not limited to, the Monarch and Bryant paper mills, the Bryant Mill Pond Area, the Historic Residual Dewatering Lagoons, the Former Residual Dewatering Lagoons, the Former Type III Landfill, and the Western Disposal Area.

c. "CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §§ 9601 *et seq.*

d. "Effective Date" shall be the effective date of this Settlement Agreement as provided in Section XXXII.

e. "Future Response Costs" shall mean all costs, including direct and indirect costs, that the United States incurs in reviewing or developing plans, reports and other items pursuant to this Settlement Agreement, verifying the Work, or otherwise implementing, overseeing, or enforcing this Settlement Agreement on or after the Effective Date.

f. "Georgia-Pacific" shall mean Georgia-Pacific, LLC, its successors and assigns. Georgia-Pacific is the current owner of two mill properties located in Kalamazoo Township, Michigan. Between 1967 and 2000, Georgia-Pacific manufactured paper at one of these facilities, commonly referred to as "the Kalamazoo Mill." Predecessors to Georgia-Pacific produced paper at the Kalamazoo Mill as early as 1899. Georgia-Pacific purchased the second mill property, commonly referred to as the "Hawthorne Mill," in 1976, but never conducted any papermaking activities at this location.

g. "Hazardous Substance" shall mean any substance defined as such under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14), or under Part 201 of NREPA, MCL

§ 324.20101, or any hazardous waste within the meaning of Section 1004(5) of RCRA, 42 U.S.C. § 6903(5).

h. "Interest" shall mean interest at the rate specified for interest on investments of the U.S. EPA Hazardous Substance Superfund established by 26 U.S.C. § 9507, compounded annually on October 1 of each year, in accordance with 42 U.S.C. § 9607(a). The applicable rate of interest shall be the rate in effect at the time the interest accrues. The rate of interest is subject to change on October 1 of each year.

i. "MDAG" shall mean the Michigan Department of Attorney General, and any successor agency.

j. "MDEQ" shall mean the Michigan Department of Environmental Quality, and any successor agency.

k. "MDNR" shall mean the Michigan Department of Natural Resources, and any successor agency.

l. MHLLC" shall mean Millennium Holdings, LLC, and its successors and assigns. Between 1955 and 1988 Allied Paper, Inc. owned or operated certain paper manufacturing facilities located in the City of Kalamazoo, Michigan. Until 1986, Allied Paper was a wholly-owned subsidiary of SCM Corporation. In 1986, SCM Corporation was acquired by HM Holdings, Inc., then a wholly-owned subsidiary of Hanson Industries, Inc. In 1996, Hanson Industries underwent a "de-merger." Millennium Chemicals, Inc. was formed, and HM Holdings became its wholly-owned subsidiary. HM Holdings then changed its name to Millennium Holdings, Inc., and later became Millennium Holdings, LLC.

m. "National Contingency Plan" or "NCP" shall mean the National Oil and Hazardous Substances Pollution Contingency Plan promulgated pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, codified at 40 C.F.R. Part 300, and any amendments thereto.

n. "Part 201 of NREPA" shall mean the Michigan Natural Resources and Environmental Protection Act, 1994 Mich. Pub. Acts 451, MCL §§ 324.20101 *et seq.*

o. "Parties" shall mean U.S. EPA, the State, and Respondents.

p. "Polychlorinated biphenyls" or "PCBs" shall mean the toxic pollutant and hazardous substance designated under Sections 307(a)(1) and 311(b)(2)(A) of the Clean Water Act, 33 U.S.C. §§ 1317(a), 1321(b)(2)(A). PCBs are also a CERCLA hazardous substance. *See* 42 U.S.C. § 9601(14).

q. "Plainwell Impoundment Area" shall mean the submerged sediments, river banks and floodplain soils of the Kalamazoo River system that were previously underwater when the Plainwell Dam was intact and fully operational. The area extends approximately 8000 feet upstream from the Plainwell Dam, and includes approximately

1.5 miles of Kalamazoo River channel, adjacent banks, and approximately 79 acres of floodplains.

r. "Plainwell Impoundment Area Disbursement Special Account" or "Disbursement Special Account" shall mean the disbursement special account established by U.S. EPA in accordance with Subparagraph 39.a of this Settlement Agreement and Section 122(b)(3) of CERCLA, 42 U.S.C. § 9622(b)(3).

s. "RCRA" shall mean the Solid Waste Disposal Act, as amended, 42 U.S.C. §§ 6901 *et seq.* (also known as the Resource Conservation and Recovery Act).

t. "Respondents" shall mean Millennium Holdings, LLC and Georgia-Pacific, LLC.

u. "Settlement Agreement" shall mean this Administrative Settlement Agreement and Order on Consent and all appendices attached hereto (listed in Section XXXI). In the event of conflict between this Settlement Agreement and any appendix, this Settlement Agreement shall control

v. "Site" shall mean the Allied Paper/Portage Creek/Kalamazoo River Superfund Site, located in Allegan and Kalamazoo Counties, Michigan, as depicted generally on the map attached as Appendix 2.

w. "SOW" shall mean the Statement of Work for Supplemental Remedial Investigations and Feasibility Studies for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, Attachment A to the Administrative Settlement Agreement and Order on Consent for Supplemental Remedial Investigations and Feasibility Studies, which is being entered into by U.S. EPA and Respondents contemporaneously with this Settlement Agreement.

x. "State" shall mean the MDEQ, MDNR, and MDAG.

y. "State Future Response Costs" shall mean all costs, including direct and indirect costs, that the State incurs in reviewing or developing plans, reports and other items pursuant to this Settlement Agreement, verifying the Work, or otherwise implementing, overseeing, or enforcing this Settlement Agreement on or after the Effective Date. State Future Response Costs shall also include all costs, including direct and indirect costs, incurred since August 28, 2006, but paid after that date.

z. "State Past Response Costs" shall mean those response costs incurred and paid by the State in connection with the Site that are identified in Appendix 3 to this Settlement Agreement as "Amount to be Forgiven." MDEQ represents that there are no outstanding response costs remaining to be invoiced and reimbursed under the 1990 Administrative Order on Consent with Respondents (Final Order No. DFO-ERD-91-001) through the end of 2001.

aa. "U.S. EPA" shall mean the United States Environmental Protection Agency and any successor departments or agencies of the United States.

bb. "Waste Material" shall mean 1) any "hazardous substance" under Section 101(14) of CERCLA, 42 U.S.C. § 9601(14); 2) any pollutant or contaminant under Section 101(33) of CERCLA, 42 U.S.C. § 9601(33); 3) any "solid waste" under Section 1004(27) of RCRA, 42 U.S.C. § 6903(27); and 4) any "hazardous substance" under Part 201 of NREPA.

cc. "Work" shall mean all activities Respondents are required to perform under this Settlement Agreement, including those activities specified in the Work Plan and any modifications to the Work Plan made in accordance with this Settlement Agreement.

dd. "Work Plan" shall mean the document entitled *Former Plainwell Impoundment Area Time-Critical Removal Action Design Report* and attached to this Settlement Agreement as Appendix 4, which specifies those response activities required by U.S. EPA and the MDEQ under this Settlement Agreement. The Work Plan was approved by U.S. EPA on February 14, 2007, and by the MDEQ and MDNR on February 13, 2007. The Work Plan requires submission of a final Health and Safety Plan and includes a final Security Plan, the latter of which has been reviewed by U.S. EPA and the MDEQ. Respondents incorporated all modifications recommended by U.S. EPA and the MDEQ to the draft Security Plan before finalizing that document.

IV. FINDINGS OF FACT

9. Based on available information, including the Administrative Record in this matter, U.S. EPA and the State find that:

a. On August 30, 1990 and pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, U.S. EPA placed the Site on the NPL by publication in the Federal Register, 55 *Fed. Reg.* 35502. The Site was listed after routine surface water and biota sampling at the mouth of the Kalamazoo River indicated that PCBs were discharging to Lake Michigan via the Kalamazoo River, and that these PCBs were widely bioavailable.

b. The Michigan Department of Natural Resources first issued a public health advisory regarding PCB contamination from the Site in 1977. The advisory remains in place today, and warns against eating carp, suckers, catfish and largemouth bass from these waters. The advisory warns nursing mothers, pregnant women, women who expect to bear children and children below the age of 15 not to eat certain species of fish from these waters.

c. Respondents are two of several companies located on the Kalamazoo River which, between the mid-1950s and early 1970s, engaged in the recycling of carbonless copy paper. Carbonless copy paper contained invisible spheres of PCB-carrying solvents. As a preparation step in the recycling process, Respondents de-inked their recyclable paper, which included, at various times, carbonless copy paper. The

process of de-inking and/or pulping of carbonless copy paper released PCBs into the resulting waste streams.

d. MHLLC operated two paper mills at the Site: the Monarch Mill and the Bryant Mill. MHLLC operated the Monarch Mill starting in 1955, and installed a clarifier shortly thereafter. MHLLC's predecessor had installed a clarifier at the Bryant Mill in 1954. MHLLC became the owner of the Bryant Mill in 1956. Prior to the installation of clarifiers, wastewater was discharged directly into Portage Creek, an area of the Site upstream from the Plainwell Impoundment Area. After installation of the clarifiers, the supernatant was discharged either to Portage Creek or to the City of Kalamazoo wastewater treatment facility.

e. MHLLC ceased de-inking operations at the Monarch Mill in 1958 and closed the mill in 1980. Deinking operations were discontinued at the Bryant Mill in 1971. MHLLC sold the Bryant Mill in 1988.

f. Georgia-Pacific purchased the Kalamazoo Mill in 1967. Predecessors to Georgia-Pacific produced paper at the Kalamazoo Mill as early as 1899. As part of their papermaking processes at the Kalamazoo Mill, Georgia-Pacific and its predecessors at the Kalamazoo Mill recycled some waste paper, including carbonless copy paper.

g. Georgia-Pacific's predecessor at the Kalamazoo Mill installed a clarifier in 1954. Prior to the installation of the clarifier, wastewater was discharged directly into the Kalamazoo River upstream of the Plainwell Impoundment Area. Overflow from the clarifier went to the Kalamazoo River, while underflow was pumped to adjacent lagoons. Beginning in 1964, the clarifier's effluent was sent to the City of Kalamazoo wastewater treatment plant for secondary treatment. Supernatant from the lagoons was returned to the clarifier. In 1977, Georgia-Pacific updated its waste treatment system, and installed a new primary clarifier.

h. Georgia-Pacific ceased de-inking operations at the Kalamazoo Mill and closed the mill in 2000.

i. PCBs discharged in the wastes from Respondents' papermaking operations have come to be located in sediments, river banks and floodplain soils of the Plainwell Impoundment Area.

j. The Plainwell Dam currently impounds approximately 77,000 cubic yards of submerged sediments. PCBs have been detected in the submerged sediments of the Plainwell Impoundment Area at concentrations ranging from non-detect to 220 parts per million ("ppm").

k. PCB concentrations in the river banks located at the Plainwell Impoundment Area range from non-detect to 120 ppm.

l. PCB concentrations in the floodplain soils of the Plainwell Impoundment Area range from non-detect to 158 ppm.

m. Between November of 2004 and January 2007, U.S. EPA, the State, Respondents, and other federal agencies participated in a facilitated mediation to resolve issues in controversy at the Site.

n. As a result of the mediation, Respondents agreed to conduct a removal action to address the imminent and substantial endangerment to human health and the environment presented by the presence of PCB-contaminated materials in the Plainwell Impoundment Area.

o. As a result of the mediation, U.S. EPA Region 5 agreed to request approval from U.S. EPA's Office of Site Remediation Enforcement to disburse $1 million from the Kalamazoo River Special Account to the Respondents as partial reimbursement for the response actions to be conducted pursuant to this Settlement Agreement. Region 5 received prior written approval for the disbursement on September 18, 2006.

p. As a result of the mediation, the MDEQ agreed to forgive the State Past Response Costs and the MDNR agreed to disburse $500,000 to the Respondents as partial reimbursement for the response actions to be conducted pursuant to this Settlement Agreement. MDNR further agreed to assume the post-removal site control obligations as set forth in Paragraphs 18 and 43.c.

q. On February 14, 2007, Region 5 executed an Action Memorandum which identified the dredging and excavation of PCB-contaminated bank soils, floodplain soils and sediments in the Plainwell Impoundment Area, and placement of the dredged or excavated material into landfills already located at the Allied OU, as the appropriate response action to be taken at the Plainwell Impoundment Area. Region 5 determined that this response action was necessary to address a significant source of PCB-contamination to the Kalamazoo River and Lake Michigan. In the Action Memorandum, attached to and made a part of this Settlement Agreement as Appendix 1, Region 5 decided that the response action should be conducted as a time-critical removal action pursuant to 40 C.F.R. § 300.415.

r. Contemporaneously with the execution of this Settlement Agreement, Respondents have entered into an administrative settlement to supplement the Remedial Investigation/Feasibility Study conducted to date for, *inter alia*, the Kalamazoo River Operable Unit of the Site. Subsequent to completion of the response actions required by this Settlement Agreement and supplemental RI/FS activities, U.S. EPA will propose a final remedy for the first reach of the Kalamazoo River Operable Unit #5 of the Site (*i.e.* Morrow Dam to Plainwell Dam). U.S. EPA's proposed plan for the first reach will identify any response actions that U.S. EPA determines are necessary to address unacceptable risks to human health and the environment presented by the presence of PCB-contaminated sediments, river banks and floodplain soils remaining within the Plainwell Impoundment Area after completion of the removal action conducted pursuant to this Settlement Agreement.

s. Subsequent to completion of the RI/FS for the Allied OU, U.S. EPA will issue a proposed plan for the final remedy for that portion of the Site. The Allied OU final remedy is likely to include, but may not be limited to, final response actions selected for those areas at which PCB-contaminated material from the Plainwell Impoundment Area will be placed during and after the removal action required by this Settlement Agreement. Before permanent disposal of any dredged or excavated material with PCB concentrations exceeding 50 ppm can occur at the Allied OU, Region 5 will need to consider the appropriateness of a TSCA approval for risk-based disposal pursuant to 40 C.F.R. § 761.61(c). Region 5 has granted such approvals for the 12th St. Landfill, Operable Unit #4 at the Site, and the A-Site Landfill, a part of Operable Unit #2 at the Site and portions of the Allied OU, Operable Unit #1. Region 5 has committed to coordination between the Superfund and TSCA programs with respect to the remainder of the Allied OU.

V. CONCLUSIONS OF LAW AND DETERMINATIONS

10. Based on the Findings of Fact set forth above, and the Administrative Record supporting this removal action, U.S. EPA and the MDEQ have determined that:

a. The Site is a "facility" as defined by Section 101(9) of CERCLA, 42 U.S.C. § 9601(9). The Plainwell Impoundment Area is a portion of the Site at which hazardous substances have come to be located, and from which hazardous substances have been released and threaten to be released.

b. The contamination found at the Plainwell Impoundment Area, as identified in the Findings of Fact above, includes a "hazardous substance" as defined by Section 101(14) of CERCLA, 42 U.S.C. § 9601(14).

c. Each Respondent is a "person" as defined by Section 101(21) of CERCLA, 42 U.S.C. § 9601(21).

d. Each Respondent is a responsible party under Section 107(a) of CERCLA, 42 U.S.C. § 9607(a), and is therefore jointly and severally liable for response costs incurred and to be incurred at or in connection with the Plainwell Impoundment Area.

e. The unsecured presence of PCB-contaminated soils and sediments at the Plainwell Impoundment Area constitutes an actual or threatened "release" of a hazardous substance from the facility into the "environment" as defined by Sections 101(8) and 101(22) of CERCLA, 42 U.S.C.§§ 9601(8) and 9601(22).

f. As set forth in the Action Memorandum, which is attached as Appendix 1 to this Settlement Agreement, the conditions present at the Plainwell Impoundment Area constitute a threat to public health, welfare, or the environment based upon the factors set forth in Section 300.415(b)(2) of the NCP. These factors include, but are not limited to, the following:

i. actual or potential exposure to nearby human populations, animals, or the food chain from hazardous substances, pollutants or contaminants. This factor is present at the Plainwell Impoundment Area due to the presence of PCBs in Kalamazoo River fish in concentrations that create unacceptable health risks to both human and ecological receptors.

ii. high levels of hazardous substances or pollutants or contaminants in soils largely at or near the surface, that may migrate. This factor is present at the Plainwell Impoundment Area due to the existence of PCBs in high concentrations near the surface of the river banks, sediments and floodplain soils, that may migrate as a result of erosion and scouring from the Kalamazoo River.

iii. weather conditions that may cause hazardous substances or pollutants or contaminants to migrate or be released. This factor is present at the Plainwell Impoundment Area due to the potential for ice movement in late winter to increase scouring of the river banks or river bottom. Additionally, heavy rains and flooding in spring and summer add to stream volume and velocity, and result in additional scouring of PCB-contaminated river banks, sediments and floodplain soils.

iv. the unavailability of other appropriate federal or state response mechanisms to respond to the release. This factor is present because no other federal, state or local agency is prepared to address the PCB contamination in the Plainwell Impoundment Area at this time.

g. The removal action required by this Settlement Agreement is necessary to protect the public health, welfare, or the environment and, if carried out in compliance with the terms of this Settlement Agreement, will be considered consistent with the NCP, as provided in Section 300.700(c)(3)(ii) of the NCP.

VI. SETTLEMENT AGREEMENT AND ORDER

Based upon the foregoing Findings of Fact, Conclusions of Law, Determinations, and the Administrative Record for this Site, it is hereby Ordered and Agreed that Respondents shall comply with all provisions of this Settlement Agreement, including, but not limited to, all appendices to this Settlement Agreement and all documents incorporated by reference into this Settlement Agreement.

VII. DESIGNATION OF CONTRACTOR, PROJECT COORDINATORS, AND ON-SCENE COORDINATOR

11. Respondents shall retain one or more contractors to perform the Work and shall notify U.S. EPA, MDEQ, and MDNR of the name(s) and qualifications of such contractor(s) within 5 business days of the Effective Date. Respondents shall also notify U.S. EPA, MDEQ, and MDNR of the name(s) and qualification(s) of any other contractor(s) or subcontractor(s) retained to perform the Work at least 5 business days prior to commencement of such Work. U.S. EPA, after consultation with MDEQ, retains the right to disapprove of any or all of the

contractors and/or subcontractors retained by Respondents. If U.S. EPA disapproves of a selected contractor, Respondents shall retain a different contractor and shall notify U.S. EPA, MDEQ, and MDNR of that contractor's name and qualifications within 3 business days of U.S. EPA's disapproval. The contractor must demonstrate compliance with ANSI/ASQC E-4-1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), by submitting a copy of the proposed contractor's Quality Management Plan ("QMP"). The QMP should be prepared consistent with "EPA Requirements for Quality Management Plans (QA/R-2)" (EPA/240/B0-1/002), or equivalent documentation as required by U.S. EPA.

12. U.S. EPA has designated Sam Borries of the Emergency Response Branch, Region 5, as its On-Scene Coordinator ("OSC"). The MDEQ has designated Paul Bucholtz of its Remediation and Redevelopment Division, Superfund Section as its Project Coordinator. The MDNR has designated Sharon Hanshue of its Fisheries Division as its Project Coordinator. Within 5 business days after the Effective Date, Respondents shall designate a Project Coordinator, who shall be responsible for administration of all actions by Respondents required by this Settlement Agreement, and shall submit to U.S. EPA, MDEQ and the MDNR the designated Project Coordinator's name, address, telephone number, and qualifications. To the greatest extent possible, the Project Coordinator shall be present on Site or readily available during the Work. U.S. EPA, after consultation with the MDEQ, retains the right to disapprove of the designated Project Coordinator. If U.S. EPA disapproves of the designated Project Coordinator, Respondents shall retain a different Project Coordinator and shall notify U.S. EPA, MDEQ, and MDNR of that person's name, address, telephone number, and qualifications within 4 business days following U.S. EPA's disapproval. Receipt by Respondents' Project Coordinator of any notice or communication from U.S. EPA, MDEQ, or MDNR relating to this Settlement Agreement shall constitute receipt by all Respondents.

13. Notices and Submissions. Unless otherwise provided in this Settlement Agreement, whenever notice is required to be given or a document is required to be sent by one Party to another, it will be directed to the individuals at the addresses specified below, unless those individuals or their successors give notice of a change to the other Parties in writing.

As to the U.S. EPA Regional Financial Management Officer:

Chief
Superfund Program Accounting and Analysis Section
United States Environmental Protection Agency
Region 5
77 W. Jackson Blvd. ML-10C
Chicago, IL 60604

As to U.S. EPA until issuance of Notice of Completion of Work pursuant to Paragraph 77:

Samuel Borries
On-Scene Coordinator
United States Environmental Protection Agency
Region 5
77 W. Jackson Blvd. Mail Code SE-5J
Chicago, IL 60604

As to U.S. EPA for three years subsequent to issuance of Notice of Completion of Work pursuant to Paragraph 77:

Samuel Borries
On-Scene Coordinator
United States Environmental Protection Agency
Region 5
77 W. Jackson Blvd. Mail Code SE-5J
Chicago, IL 60604

and

Shari Kolak
Remedial Project Manager
United States Environmental Protection Agency
Region 5
77 W. Jackson Blvd. Mail Code S-6J
Chicago, IL 60604

As to U.S. EPA after three years subsequent to issuance of Notice of Completion of Work pursuant to Paragraph 77:

Shari Kolak
Remedial Project Manager
United States Environmental Protection Agency
Region 5
77 W. Jackson Blvd. Mail Code S-6J
Chicago, IL 60604

As to the MDEQ:

Paul Bucholtz
Michigan Department of Environmental Quality
Remediation and Redevelopment Division, Superfund Section
P.O. Box 30426
Lansing, Michigan 48909-7926

If via courier:
Michigan Department of Environmental Quality
Remediation and Redevelopment Division, Superfund Section
525 West Allegan Street
Lansing, MI 48933-2125

As to the MDNR:

Sharon Hanshue
Michigan Department of Natural Resources
Fisheries Division
P.O. Box 30446
Lansing, MI 48909-7946

If via courier:
Michigan Department of Natural Resources
Fisheries Division
530 West Allegan Street
Lansing, MI 48933

As to MHLLC and Georgia-Pacific:

Stephen Garbaciak, Jr., PE
Vice-President
ARCADIS U.S. Inc.
30 W. Monroe Street, Suite 1710
Chicago, IL 60603

14. U.S. EPA, MDEQ, MDNR, and Respondents shall have the right, subject to Paragraph 12, to change their respective designated OSC or Project Coordinator. U.S. EPA, MDEQ, MDNR, or Respondents shall notify each of the other Parties as early as possible before such a change is made, but in no case less than 24 hours before such a change. The initial notification may be made orally but it shall be promptly followed by a written notice.

VIII. WORK TO BE PERFORMED

15. Respondents shall perform all actions necessary to implement the Work Plan and comply with this Settlement Agreement. The actions to be implemented generally include the following:

a. removal of portions of the Plainwell Dam in accordance with the Work Plan;

b. excavation and/or dredging of submerged sediments, river banks and floodplain soils in the Plainwell Impoundment Area in accordance with the performance standards and at the locations specified in the Action Memorandum and the Work Plan;

c. cut-back and stabilization of river banks;

d. disposal of all PCB contaminated material identified for removal in the Action Memorandum and the Work Plan into existing landfills at the Allied OU;

e. the use of excavated clean soils as cover;

f. re-vegetation of excavated floodplain areas, as specified in the Work Plan;

g. monitoring during the implementation of the Work and for three years subsequent to receipt of U.S. EPA's Notice of Completion of Work pursuant to Paragraph 77; and

h. an on-Site inspection of the status and condition of excavated and stabilized and/or revegetated areas of river banks and floodplains in the Plainwell Impoundment Area with representatives from U.S. EPA and MDNR present, to take place no more than 60 days prior to the third anniversary date of MDNR's receipt of the Notice of Completion of Work pursuant to Paragraph 77.

16. Work Plan and Implementation.

a. Respondents shall implement the Work Plan as approved by U.S. EPA, MDEQ, and MDNR in accordance with the schedule in the Work Plan. The Work Plan, the schedule, and any subsequent modifications shall be incorporated into and become fully enforceable under this Settlement Agreement.

b. Respondent shall not commence any Work except in conformance with the terms of this Settlement Agreement and the approved Work Plan schedule.

c. Respondents shall implement the Health and Safety Plan and the Security Plan during the pendency of the removal action.

17. Quality Assurance and Sampling.

a. All sampling and analyses performed pursuant to this Settlement Agreement shall conform to U.S. EPA direction, approval, and guidance regarding sampling, quality assurance/quality control ("QA/QC"), data validation, and chain of custody procedures. Respondents shall ensure that the laboratory used to perform the analyses participates in a QA/QC program that complies with the appropriate U.S. EPA guidance. Respondents shall follow, as appropriate, "Quality Assurance/Quality Control Guidance for Removal Activities: Sampling QA/QC Plan and Data Validation Procedures" (OSWER Directive No. 9360.4-01, April 1, 1990) and the MDEQ Remediation and Redevelopment Division's Operational Memorandum No. 2, Sampling and Analysis Guidance, dated October 22, 2004 or any MDEQ documents that supersede or amend Operational Memorandum No. 2 as guidance for QA/QC and sampling. In the event of any conflict between the U.S. EPA guidance and MDEQ guidance identified above, Respondents shall follow the specified U.S. EPA guidance. Respondents shall

only use laboratories that have a documented Quality System that complies with ANSI/ASQC E-4 1994, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" (American National Standard, January 5, 1995), and "EPA Requirements for Quality Management Plans (QA/R-2) (EPA/240/B-01/002, March 2001)," or equivalent documentation as determined by U.S. EPA. U.S. EPA may consider laboratories accredited under the National Environmental Laboratory Accreditation Program ("NELAP") as meeting the Quality System requirements.

b. Upon request by U.S. EPA or the MDEQ, Respondents shall have such a laboratory analyze samples submitted by U.S. EPA or the MDEQ for QA monitoring. Respondents shall provide to U.S. EPA and the MDEQ the QA/QC procedures followed by all sampling teams and laboratories performing data collection and/or analysis.

c. Upon request by U.S. EPA or the MDEQ, Respondents shall allow U.S. EPA, the MDEQ or their authorized representatives to take split and/or duplicate samples. Respondents shall notify U.S. EPA and the MDEQ not less than 3 business days in advance of any sample collection activity, unless shorter notice is agreed to by U.S. EPA and the MDEQ. U.S. EPA and the MDEQ shall have the right to take any additional samples that U.S. EPA or the MDEQ deems necessary. Upon request, U.S. EPA and the MDEQ shall allow Respondents to take split or duplicate samples of any samples taken as part of their oversight of Respondents' implementation of the Work.

d. Within 45 days of the Effective Date, Respondents shall submit to U.S. EPA for approval, after a reasonable opportunity for review and comment by MDEQ, a Quality Assurance Project Plan ("QAPP"). Respondents shall use quality assurance, quality control, and chain of custody procedures for all treatability, design, compliance and monitoring samples in accordance with "EPA Requirements for Quality Assurance Project Plans for Environmental Data Operation," (EPA QA/R5) (EPA/240/B-01/003, March 2001); "Guidance for Quality Assurance Project Plans (QA/G5)" (EPA/600/R-98/018, February 1998), and subsequent amendments to such guidelines upon notification by U.S. EPA to Respondents of such amendment. Amended guidelines shall apply only to procedures conducted after such notification.

18. Post-Removal Site Control. Upon the third anniversary date of MDNR's receipt of the Notice of Completion of Work pursuant to Paragraph 77, MDNR agrees to perform the post-removal site control activities described in Section 5.6.2 through 5.6.5 of the Work Plan. With regard to the reporting requirements of Section 5.6.5 of the Work Plan, MDNR shall submit the required report annually until such time that U.S. EPA and MDNR agree that the banks addressed in the removal action required by this Settlement Agreement are sufficiently stabilized, and the vegetation sufficiently restored, such that no further annual reporting is necessary. After U.S. EPA and MDNR so agree, MDNR shall submit a report to U.S. EPA only in those years when a significant change has occurred in the condition of the vegetation or banks within the Plainwell Impoundment, and/or when MDNR has taken a significant action to address a change in the condition of the vegetation or banks within the Plainwell Impoundment.

19. Reporting.

a. Respondents shall submit a written progress report to U.S. EPA, MDEQ, and the MDNR concerning actions undertaken pursuant to this Settlement Agreement every 15th day of the month starting with the second month after the Effective Date until termination of this Settlement Agreement, unless otherwise directed in writing by the OSC after consultation with MDEQ. These reports shall describe all significant developments during the preceding period, including the actions performed and any problems encountered, analytical data received during the reporting period, and the developments anticipated during the next reporting period, including a schedule of actions to be performed, anticipated problems, and planned resolutions of past or anticipated problems.

b. Respondents shall submit to U.S. EPA, MDEQ, and MDNR three copies of all plans, reports or other submissions required by this Settlement Agreement or the Work Plan. Upon request by U.S. EPA, MDEQ, or MDNR, Respondents shall submit such documents in electronic form.

c. If a Respondent owns real property at the Site where Work related to this Settlement Agreement will be performed, such Respondent shall, at least 30 days prior to the conveyance of any interest in such property, give written notice to the transferee that the property is subject to this Settlement Agreement, and written notice to U.S. EPA and the MDEQ of the proposed conveyance, including the name and address of the transferee. Respondents also agree to require that their successors provide the same notice to U.S. EPA, the MDEQ, and to any subsequent transferee that is required of Respondents in the immediately preceding sentence. Respondents further agree to require their successors to comply with Sections IX (Site Access) and X (Access to Information).

20. Final Report. Within 60 calendar days after completion of all Work required by Section VIII of this Settlement Agreement, with the exception of any continuing obligations required by this Settlement Agreement, including, *e.g.*, post-removal site controls, payment of Future Response Costs and State Future Response Costs, and record retention, Respondents shall submit for U.S. EPA, MDEQ, and MDNR review, a final report summarizing the actions taken to comply with this Settlement Agreement. The final report shall conform, at a minimum, with the requirements set forth in Section 300.165 of the NCP entitled "OSC Reports" and with the guidance set forth in "Superfund Removal Procedures: Removal Response Reporting – POLREPS and OSC Reports" (OSWER Directive No. 9360.3-03, June 1, 1994). The final report shall include a good faith estimate of total costs or a statement of actual costs incurred in complying with the Settlement Agreement, a listing of quantities and types of materials removed off-Site or handled on-Site, a listing of the ultimate destination(s) of those materials, a presentation of the analytical results of all sampling and analyses performed, and accompanying appendices containing all relevant documentation generated during the removal action (*e.g.*, manifests, invoices, bills, contracts, and permits). The final report shall also include the following certification signed by a person who supervised or directed the preparation of that report:

"Under penalty of law, I certify that to the best of my knowledge, after appropriate inquiries of all relevant persons involved in the preparation of the report, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

21. Off-Site Shipments.

a. Respondents shall, prior to any off-Site shipment of Waste Material from the Plainwell Impoundment Area to an out-of-State waste management facility, provide written notification of such shipment of Waste Material to the appropriate state environmental official in the receiving facility's state, to the OSC, and to MDEQ. However, this notification requirement shall not apply to any off-Site shipments when the total volume of all such shipments will not exceed 10 cubic yards.

b. Respondents shall include in the written notification the following information: 1) the name and location of the facility to which the Waste Material is to be shipped; 2) the type and quantity of the Waste Material to be shipped; 3) the expected schedule for the shipment of the Waste Material; and 4) the method of transportation. Respondents shall notify the state in which the planned receiving facility is located of major changes in the shipment plan, such as a decision to ship the Waste Material to another facility within the same state, or to a facility in another state.

c. The identity of the receiving facility and state will be determined by Respondents following the award of the contract for the removal action. Respondents shall provide the information required by Paragraphs 21.a and 21.b as soon as practicable after the award of the contract and before the Waste Material is actually shipped.

d. Before shipping any hazardous substances, pollutants, or contaminants from the Plainwell Impoundment Area to an off-Site location, Respondents shall obtain U.S. EPA's certification that the proposed receiving facility is operating in compliance with the requirements of CERCLA Section 121(d)(3), 42 U.S.C. § 9621(d)(3), and 40 C.F.R. § 300.440. Respondents shall only send hazardous substances, pollutants, or contaminants from the Plainwell Impoundment Area to an off-Site facility that complies with the requirements of the statutory provision and regulation cited in the preceding sentence. For purposes of this Agreement, the Allied Operable Unit is not considered an "off-Site" location.

IX. SITE ACCESS

22. Where any action under this Settlement Agreement is to be performed in areas owned by a Respondent, such Respondent shall, commencing on the Effective Date, provide U.S. EPA, MDEQ, and the MDNR, and their representatives, including contractors, with access at all reasonable times to such property for the purpose of conducting any activity related to this Settlement Agreement. Where any action under this Settlement Agreement is to be performed in areas owned by or in possession of the MDNR, the MDNR shall, commencing on the Effective

Date, provide U.S. EPA, MDEQ, and Respondents, and their representatives, including contractors, with access at all reasonable times to such property for the purpose of conducting any activity related to this Settlement Agreement.

23. Where any action under this Settlement Agreement is to be performed in areas owned by or in possession of someone other than Respondents or MDNR, Respondents shall use their best efforts to obtain all necessary access agreements within 30 business days after the Effective Date, or as otherwise specified in writing by the OSC. Respondents shall immediately notify U.S. EPA, MDEQ, and MDNR if, after using their best efforts, they are unable to obtain such agreements. For purposes of this Paragraph, "best efforts" includes the payment of reasonable sums of money in consideration of access, provided, however, that Respondents shall not be required to pay sums of money for access to another potentially responsible party whose potential liability for response costs and response actions at the Site is based on a theory of liability other than current owner/operator status under 42 U.S.C. § 9607(a)(1). Respondents shall describe in writing their efforts to obtain access. U.S. EPA may then assist Respondents in gaining access, to the extent necessary to effectuate the response actions described herein, using such means as U.S. EPA deems appropriate. Respondents shall reimburse U.S. EPA for all costs and attorneys' fees incurred by the United States in obtaining such access, in accordance with the procedures in Section XV (Payment of Response Costs).

24. Notwithstanding any provision of this Settlement Agreement, U.S. EPA and the MDEQ retain all of their access authorities and rights, including enforcement authorities related thereto, under CERCLA, RCRA, and any other applicable statutes or regulations.

X. ACCESS TO INFORMATION

25. Respondents shall provide to U.S. EPA and MDEQ, upon request, copies of all documents and information within their possession or control or that of their contractors or agents relating to activities at the Plainwell Impoundment Area or to the implementation of this Settlement Agreement, including, but not limited to, sampling, analysis, chain of custody records, manifests, trucking logs, receipts, reports, sample traffic routing, correspondence, or other documents or information related to the Work. Respondents shall also make available to U.S. EPA and to the MDEQ, for purposes of investigation, information gathering, or testimony, their employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

26. Respondents may assert business confidentiality claims covering part or all of the documents or information submitted to U.S. EPA or to the MDEQ under this Settlement Agreement to the extent permitted by and in accordance with Section 104(e)(7) of CERCLA, 42 U.S.C. § 9604(e)(7), and 40 C.F.R. § 2.203(b), and, with respect to documents or information submitted to the MDEQ, Section 20117(10) of Part 201, MCL 324.20117(10). Documents or information determined to be confidential by U.S. EPA or the MDEQ will be afforded the protection specified in 40 C.F.R. Part 2, Subpart B and/or MCL 324.20117(10), as applicable. If no claim of confidentiality accompanies documents or information when they are submitted to U.S. EPA or MDEQ, or if U.S. EPA or MDEQ has notified Respondents that the documents or information are not confidential under the standards of Section 104(e)(7) of CERCLA, 40 C.F.R.

Part 2, Subpart B, or MCL 324. 20117(10), as applicable, the public may be given access to such documents or information without further notice to Respondents. Documents or information generated under this Settlement Agreement shall not be subject to Part 148, Environmental Audit Privilege and Immunity, of the NREPA, MCL 324.14801 *et seq.*

27. Respondents may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law. If the Respondents assert such a privilege in lieu of providing documents, they shall provide U.S. EPA and the MDEQ with the following: 1) the title of the document, record, or information; 2) the date of the document, record, or information; 3) the name and title of the author of the document, record, or information; 4) the name and title of each addressee and recipient; 5) a description of the contents of the document, record, or information; and 6) the privilege asserted by Respondents. However, no documents, reports or other information created or generated pursuant to the requirements of this Settlement Agreement shall be withheld on the grounds that they are privileged.

28. No claim of confidentiality shall be made with respect to any data, including, but not limited to, all sampling, analytical, monitoring, hydrogeologic, scientific, chemical, or engineering data, or any other documents or information evidencing conditions at or around the Plainwell Impoundment Area.

XI. RECORD RETENTION

29. Until 6 years after Respondents' receipt of U.S. EPA's notification pursuant to Section XXVIII (Notice of Completion of Work), each Respondent shall preserve and retain all non-identical copies of records and documents (including records or documents in electronic form) now in its possession or control or which come into its possession or control that relate in any manner to the performance of the Work or the liability of any person under CERCLA with respect to the Plainwell Impoundment Area, regardless of any corporate retention policy to the contrary. Until 6 years after Respondents' receipt of U.S. EPA's notification pursuant to Section XXVIII (Notice of Completion of Work), Respondents shall also instruct their contractors and agents to preserve all documents, records, and information of whatever kind, nature or description relating to performance of the Work.

30. At the conclusion of this document retention period, Respondents shall notify U.S. EPA and the MDEQ at least 60 days prior to the destruction of any such records or documents, and, upon request by U.S. EPA and/or the MDEQ, Respondents shall deliver any such records or documents to the requestor(s). Respondents may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal law or state law. If Respondents assert such a privilege, they shall provide the requestor with the following: 1) the title of the document, record, or information; 2) the date of the document, record, or information; 3) the name and title of the author of the document, record, or information; 4) the name and title of each addressee and recipient; 5) a description of the subject of the document, record, or information; and 6) the privilege asserted by Respondents. However, no documents, reports or other information created

or generated pursuant to the requirements of this Settlement Agreement shall be withheld on the grounds that they are privileged.

31. Each Respondent hereby certifies individually that to the best of its knowledge and belief, after thorough inquiry, it has not altered, mutilated, discarded, destroyed or otherwise disposed of any records, documents or other information (other than identical copies) relating to its potential liability regarding the Site since notification of potential liability by U.S. EPA or the MDEQ or the filing of suit against it regarding the Site and that it has fully complied and will fully comply with any and all U.S. EPA requests for information pursuant to Sections 104(e) and 122(e) of CERCLA, 42 U.S.C. §§ 9604(e) and 9622(e), and Section 3007 of RCRA, 42 U.S.C. § 6927.

XII. COMPLIANCE WITH OTHER LAWS

32. Respondents shall perform all actions required pursuant to this Settlement Agreement in accordance with all applicable local, state, and federal laws and regulations except as provided in Section 121(e) of CERCLA, 42 U.S.C. § 6921(e), and 40 C.F.R. §§ 300.400(e) and 300.415(j). In accordance with 40 C.F.R. § 300.415(j), all on-Site actions required pursuant to this Settlement Agreement shall, to the extent practicable, as determined by U.S. EPA, considering the exigencies of the situation, attain applicable or relevant and appropriate requirements under federal environmental or state environmental or facility siting laws.

XIII. EMERGENCY RESPONSE AND NOTIFICATION OF RELEASES

33. In the event of any action or occurrence during performance of the Work which causes or threatens a release of Waste Material from the Site that constitutes an emergency situation or may present an immediate threat to public health or welfare or the environment, Respondents shall immediately take all appropriate action. Respondents shall take these actions in accordance with all applicable provisions of this Settlement Agreement, including, but not limited to, the Health and Safety Plan, in order to prevent, abate or minimize such release or endangerment caused or threatened by the release. Respondents shall also immediately notify the OSC or, in the event of his/her unavailability, the Regional Duty Officer, Emergency Response Branch, Region 5 at (312) 353-2318, of the incident or Site conditions. The Respondents shall also immediately notify the MDEQ Project Coordinator, or in the event of his/her unavailability, the Pollution Emergency Alerting System (PEAS) at (800) 292- 4706 (within Michigan) or 1-517-373-7660 (outside of Michigan). In the event that Respondents fail to take appropriate response action as required by this Paragraph, and U.S. EPA takes such action instead, Respondents shall reimburse U.S. EPA all costs of the response action not inconsistent with the NCP pursuant to Section XV (Payment of Response Costs).

34. In addition, in the event of any release of a Hazardous Substance from the Site, Respondents shall immediately notify the OSC at (312) 353-2318 and the National Response Center at (800) 424-8802. Respondents shall submit a written report to U.S. EPA and to the MDEQ within 7 business days after each release, setting forth the events that occurred and the measures taken or to be taken to mitigate any release or endangerment caused or threatened by the release and to prevent the reoccurrence of such a release. This reporting requirement is in

addition to, and not in lieu of, reporting under Section 103(c) of CERCLA, 42 U.S.C. § 9603(c), and Section 304 of the Emergency Planning and Community Right-To-Know Act of 1986, 42 U.S.C. § 11004 *et seq.*

XIV. AUTHORITY OF ON-SCENE COORDINATOR

35. The OSC shall be responsible for overseeing Respondents' implementation of this Settlement Agreement. The OSC shall have the authority vested in an OSC by the NCP, including the authority to halt, conduct, or direct any Work required by this Settlement Agreement, or to direct any other removal action undertaken at the Site. Absence of the OSC from the Site shall not be cause for stoppage of work unless specifically directed by the OSC.

XV. PAYMENT OF RESPONSE COSTS

36. Payments of Future Response Costs incurred by U.S. EPA.

a. Subject to the Reservations of Rights by U.S. EPA provided in Section XXI, Respondents shall pay Future Response Costs not inconsistent with the NCP as follows: U.S. EPA shall bill and Respondents shall pay Future Response Costs in an amount not to exceed $300,000 during the first year subsequent to the Effective Date of this Settlement Agreement. For each year after the first anniversary date of this Settlement Agreement, U.S. EPA shall bill and Respondents shall pay Future Response Costs in an amount not to exceed $325,000, provided, however, that in any year subsequent to the Effective Date, U.S. EPA shall bill and Respondents shall pay all Future Response Costs incurred by U.S. EPA to secure access for performance of the Work from any potentially responsible party, and any sums billed and paid to secure such access shall not be included in the $300,000 and $325,000 figures specified above. U.S. EPA does not currently anticipate that Future Response Costs shall exceed the amounts to be billed and paid under the terms of this Settlement Agreement. In the event that U.S. EPA incurs Future Response Costs that are not billed under this Paragraph, it is U.S. EPA's present intent, consistent with its usual practice and in its unreviewable discretion, first to attempt to reach agreement with non-settling parties, and/or newly identified responsible parties, for payment of the additional Future Response Costs. On a periodic basis (at least annually), U.S. EPA will send Respondents a bill requiring payment that consists of an Itemized Cost Summary. Respondents shall make all payments within 30 calendar days of receipt of each bill requiring payment, except as otherwise provided in Paragraph 38 of this Settlement Agreement, according to the following procedures.

i. If the payment amount demanded in the bill is for $10,000 or greater, payment shall be made to U.S. EPA by Electronics Funds Transfer ("EFT") in accordance with current EFT procedures to be provided to Respondents by U.S. EPA Region 5. Payment shall be accompanied by a statement identifying the name and address of the party(ies) making payment, the Site name, U.S. EPA Region 5, the "Plainwell Impoundment Time-Critical Removal Action" designation, the Site/Spill ID Number 059B, and the U.S. EPA docket number for this action.

ii. If the amount demanded in the bill is $10,000 or less, Respondents may in lieu of the procedures in Subparagraph 36.a.i make all payments required by this Paragraph by a certified or cashier's check or checks made payable to "EPA Hazardous Substance Superfund," referencing the name and address of the party(ies) making the payment, and the EPA Site/Spill ID Number 059B. Settling Respondents shall send the check(s) to:

U.S. Environmental Protection Agency, Region 5
Superfund Program Accounting & Analysis Section
P.O. Box 371531
Pittsburgh, PA 15251-7531

b. At the time of payment, Respondents shall send notice that payment has been made to the Director, Superfund Division, U.S. EPA Region 5, 77 West Jackson Blvd., Chicago, Illinois, 60604-3590 and to Eileen L. Furey, Associate Regional Counsel, 77 West Jackson Boulevard, C-14J, Chicago, Illinois, 60604-3590.

c. The total amount to be paid by Respondents pursuant to Paragraph 36.a shall be deposited in the Kalamazoo River Special Account within the U.S. EPA Hazardous Substance Superfund to be retained and used to conduct or finance response actions at or in connection with the Site, or to be transferred by U.S. EPA to the U.S. EPA Hazardous Substance Superfund.

37. In the event that the payments for Future Response Costs are not made within 30 days of Respondents' receipt of a bill, Respondents shall pay Interest on the unpaid balance. The Interest on Future Response Costs shall begin to accrue on the date of the bill and shall continue to accrue until the date of payment. Payments of Interest made under this Paragraph shall be in addition to such other remedies or sanctions available to the United States by virtue of Respondents' failure to make timely payments under this Section, including but not limited to, payment of stipulated penalties pursuant to Section XVIII.

38. Respondents may dispute all or part of a bill for Future Response Costs submitted under this Settlement Agreement, only if Respondents allege that U.S. EPA has made an accounting error, or if Respondents allege that a cost item is inconsistent with the NCP. If any dispute over costs is resolved before payment is due, the amount due will be adjusted as necessary. If the dispute is not resolved before payment is due, Respondents shall pay the full amount of the uncontested costs to U.S. EPA as specified in Paragraph 36 on or before the due date. Within the same time period, Respondents shall pay the full amount of the contested costs into an interest-bearing escrow account. Respondents shall simultaneously transmit a copy of both checks to the persons listed in Paragraph 36.b above. Respondents shall ensure that the prevailing party or parties in the dispute shall receive the amount upon which they prevailed from the escrow funds plus interest within 20 calendar days after the dispute is resolved.

39. Disbursement of Special Account Funds

a. Creation of Plainwell Impoundment Area Disbursement Special Account and Agreement to Disburse Funds to Respondents. Within 30 days after the Effective Date, U.S. EPA shall establish a new special account, the Plainwell Impoundment Disbursement Special Account, within the U.S. EPA Hazardous Substance Superfund and shall transfer $1 million from the Kalamazoo River Special Account to the Plainwell Impoundment Disbursement Special Account. Subject to the terms and conditions set forth in this Paragraph, U.S. EPA agrees to make the funds in the Plainwell Impoundment Area Disbursement Special Account, including Interest Earned on the funds in the Plainwell Impoundment Area Disbursement Special Account, available for disbursement to Respondents as partial reimbursement for performance of the Work under this Settlement Agreement. U.S. EPA shall disburse funds from the Plainwell Impoundment Area Disbursement Special Account to Respondents in accordance with the procedures and milestones for phased disbursement set forth in this Paragraph.

b. Timing, Amount and Method of Disbursing Funds from the Plainwell Impoundment Area Disbursement Special Account. Within 60 days of U.S. EPA's receipt of a Cost Summary and Certification, as defined by Subparagraph 39.c.i. or, if U.S. EPA has requested additional information under Subparagraph 39.c.i. or a revised Cost Summary and Certification under Subparagraph 39.c.ii, within 60 days of receipt of the additional information or revised Cost Summary and Certification, and subject to the conditions set forth in this Section, U.S. EPA shall disburse the funds from the Plainwell Impoundment Disbursement Special Account at the completion of the following milestones, and in the amounts set forth below:

	Disbursement of Funds
1. U.S. EPA written notice that all Work associated with mobilization has been completed	$200,000 of the funds in the Plainwell Impoundment Area Disbursement Special Account
2. U.S. EPA written notice that all Work associated with the first year of construction has been completed successfully	$300,000 of the funds in the Plainwell Impoundment Area Disbursement Special Account
3. EPA Notice of Completion of the Work	$500,000 of the funds in the Plainwell Impoundment Area Disbursement Special Account

U.S. EPA shall disburse the funds from the Plainwell Impoundment Area Disbursement Special Account to Respondents by electronic funds transfer per the following instructions:

Bank:	Wachovia Bank
ABA#	031-201-467
Beneficiary:	Drinker Biddle & Reath LLP Escrow Agent
Account #:	20-14104-743-189
Reference:	Kalamazoo Disbursement Fund

c. Requests for Disbursement of Special Account Funds. Within 30 days of issuance of U.S. EPA's written confirmation that a milestone of the Work, as defined in Subparagraph 39.b, has been satisfactorily completed, Respondents shall submit to U.S. EPA a Cost Summary and Certification, as defined in Subparagraph 39.c.i, covering the Work performed pursuant to this Settlement Agreement up to the date of completion of that milestone. Respondents shall not include in any submission costs included in a previous Cost Summary and Certification following completion of an earlier milestone of the Work if those costs have been previously reimbursed pursuant to Subparagraph 39.b.

i. Each Cost Summary and Certification shall include a complete and accurate written cost summary and certification of the necessary costs incurred and paid by Respondents for the Work covered by the particular submission, excluding costs not eligible for disbursement under Subparagraph 39.d. Each Cost Summary and Certification shall contain the following certification statement signed by the Chief Financial Officer of Georgia-Pacific:

> To the best of my knowledge, after thorough investigation and review of Respondents' documentation of costs incurred and paid for Work performed pursuant to this Settlement Agreement [**insert, as appropriate,** "up to the date of completion of milestone 1," "between the date of completion of milestone 1 and the date of completion of milestone 2," "between the date of completion of milestone 2 and the date of completion of the milestone 3,"] I certify that the information contained in or accompanying this submittal is true, accurate, and complete. I am aware that there are significant penalties for knowingly submitting false information, including the possibility of fine and imprisonment.

The Chief Financial Officer shall also provide U.S. EPA a list of the documents that he or she reviewed in support of the Cost Summary and Certification. Upon request by U.S. EPA, Respondents shall submit to U.S. EPA any additional information that U.S. EPA deems necessary for its review and approval of a Cost Summary and Certification.

ii. If U.S. EPA finds that a Cost Summary and Certification includes a mathematical accounting error, costs excluded under Subparagraph 39.d, costs that are inadequately documented, or costs submitted in a prior Cost Summary and Certification, it will notify Respondents and provide an opportunity to cure

the deficiency by submitting a revised Cost Summary and Certification. If Respondents fail to cure the deficiency within 14 days after being notified of, and given the opportunity to cure, the deficiency, U.S. EPA will recalculate Respondents' costs eligible for disbursement for that submission, and disburse the corrected amount to Respondents in accordance with the procedures in Subparagraph 39.b. Respondents may dispute U.S. EPA's recalculation under this Subparagraph pursuant to Section XVI (Dispute Resolution). In no event shall Respondents be disbursed funds from the Plainwell Impoundment Area Disbursement Special Account in excess of amounts properly documented in a Cost Summary and Certification accepted or modified by U.S. EPA.

d. Costs Excluded from Disbursement. The following costs are excluded from, and shall not be sought by Respondents for, disbursement from the Plainwell Impoundment Area Disbursement Special Account: (a) Future Response Costs or State Future Response Costs; (b) any other payments made by Respondents to the United States or to the State pursuant to this Settlement Agreement, including, but not limited to, any interest or stipulated penalties paid pursuant to Section XVIII; (c) attorneys' fees and costs, except for reasonable attorneys' fees and costs necessarily related to obtaining access as required by Section IX; (d) costs of any response activities Respondents perform that are not required under, or approved by U.S. EPA pursuant to, this Settlement Agreement; (e) costs related to Respondents' litigation, settlement, development of potential contribution claims or identification of other potentially responsible parties; (f) internal costs of Respondents, including but not limited to, salaries, travel, or in-kind services, except for those costs that represent the work of employees of Respondents directly performing the Work; (g) any costs incurred by Respondents prior to the Effective Date, except for those costs that represent work performed to develop the Work Plan; or (h) any costs incurred by Respondents pursuant to Section XVI or Paragraph 42 (Dispute Resolution).

e. Termination of Disbursements from the Special Account. U.S. EPA's obligation to disburse funds from the Plainwell Impoundment Area Disbursement Special Account under this Settlement Agreement shall terminate upon U.S. EPA's determination that Respondents: (a) have knowingly submitted a materially false or misleading Cost Summary and Certification; (b) have submitted a materially inaccurate or incomplete Cost Summary and Certification, and have failed to correct the materially inaccurate or incomplete Cost Summary and Certification within 14 days after being notified of, and given the opportunity to cure, the deficiency; or (c) failed to submit a Cost Summary and Certification as required by Subparagraph 39.c within 30 days (or such longer period as U.S. EPA agrees) after being notified that U.S. EPA intends to terminate its obligation to make disbursements pursuant to this Paragraph because of Respondents' failure to submit the Cost Summary and Certification as required by Subparagraph 39.c . U.S. EPA's obligation to disburse funds from the Plainwell Impoundment Area Disbursement Special Account shall also terminate upon U.S. EPA's assumption of performance of any portion of the Work pursuant to Paragraph 58, when such assumption of performance of the Work is not challenged by Respondents or, if challenged, is upheld under Section XVI

(Dispute Resolution). Respondents may dispute U.S. EPA's termination of special account disbursements under Section XVI (Dispute Resolution).

f. Recapture of Special Account Disbursements. Upon termination of disbursements from the Plainwell Impoundment Area Disbursement Special Account under Subparagraph 39.e, if U.S. EPA has previously disbursed funds from the Plainwell Impoundment Area Disbursement Special Account for activities specifically related to the reason for termination (*e.g.*, discovery of a materially false or misleading submission after disbursement of funds based on that submission), U.S. EPA shall submit a bill to Respondents for those amounts already disbursed from the Plainwell Impoundment Area Disbursement Special Account specifically related to the reason for termination, plus Interest on that amount covering the period from the date of disbursement of the funds by U.S. EPA to the date of repayment of the funds by Respondents. Within 14 days of receipt of U.S. EPA's bill, Respondents shall reimburse the Hazardous Substance Superfund for the total amount billed by a certified or cashier's check or checks made payable to "U.S. EPA Hazardous Substance Superfund," referencing the name and address of the party making payment, EPA Site/Spill Identification Number 059B, the "Plainwell Impoundment Area Removal Action," and the U.S. EPA docket number for this action. Respondents shall send the check(s) to:

U.S. Environmental Protection Agency, Region 5
Superfund Program Accounting & Analysis Section
P.O. Box 371531
Pittsburgh, PA 15251-7531

At the time of payment, Respondents shall send notice that payment has been made to U.S. EPA and to the Regional Financial Management Officer, in accordance with Paragraph 13 (Notices and Submissions). Upon receipt of payment, U.S. EPA may deposit all or any portion thereof in the Kalamazoo River Special Account or the Hazardous Substance Superfund. The determination of where to deposit or how to use the funds shall not be subject to challenge by Respondents pursuant to the dispute resolution provisions of this Settlement Agreement or in any other forum. Respondents may dispute U.S. EPA's determination as to recapture of funds pursuant to Section XVI (Dispute Resolution).

g. Balance of Special Account Funds. After U.S. EPA issues its written Notice of Completion of Work pursuant to this Settlement Agreement, and after U.S. EPA completes all disbursement to Respondents in accordance with this Section, if any funds remain in the Plainwell Impoundment Area Disbursement Special Account, U.S. EPA may transfer such funds to the Hazardous Substance Superfund or to the Kalamazoo River Special Account, to be retained and used to conduct or finance response actions at or in connection with the Site. Any transfer of funds to the Kalamazoo River Special Account or the Hazardous Substance Superfund shall not be subject to challenge by Respondents pursuant to the dispute resolution provisions of this Settlement Agreement or in any other forum.

40. Payment of State Future Response Costs. Respondents shall pay State Future Response Costs lawfully incurred under Part 201 of NREPA as follows: except for costs incurred by the State associated with judicial enforcement of this Settlement Agreement, the State Future Response Costs during the first year after the Effective Date of this Settlement Agreement shall not exceed $200,000 and State Future Response Costs for each subsequent year after the first anniversary date of this Settlement Agreement shall not exceed $175,000, with the exception of enforcement costs. The State shall not be entitled to collect enforcement costs under this Paragraph if U.S. EPA is enforcing all of the terms of this Settlement Agreement. On a periodic basis, the MDEQ will send Respondents an invoice requiring payment that consists of a cost summary that sets forth with reasonable specificity, the nature of the costs incurred. Except as provided by Paragraph 42, Respondents shall make all payments within 30 calendar days of receipt of each invoice requiring payment, according to the following procedures:.

a. Payment shall be made by certified check, made payable to the "State of Michigan – Environmental Response Fund" and shall be sent by first class mail to:

MDEQ Revenue Control Unit
Financial and Business Services Division
P.O. Box 30657
Lansing Michigan 48909-8157

If the payment is being submitted via courier, the payment shall be delivered to:

MDEQ Revenue Control Unit
Financial and Business Services Division,
Constitution Hall, 5th Floor, South Tower
525 West Allegan Street
Lansing, Michigan, 48933-2125

To ensure proper credit, all payments shall include the Site name Allied Paper/Portage Creek/Kalamazoo River Superfund Site and Project No.: 450316.

b. A copy of the transmittal letter and the check shall be provided simultaneously to the MDEQ Project Coordinator at the address listed in Paragraph 13; the Chief of the Compliance and Enforcement Section, RRD, at P.O. Box 30426, Lansing Michigan, 48909-7926.

c. Costs recovered pursuant to this Paragraph shall be deposited into the Environmental Response Fund in accordance with the provisions of Section 20108(3) of the NREPA.

41. In the event that the payments of State Future Response Costs are not made within 30 days of Respondents' receipt of an invoice. Respondents shall pay interest on the unpaid balance. The interest on State Future Response Costs shall accrue at the rate specified in Section 20126a(3) of Part 201 and shall begin to accrue on the date payment was due and shall continue to accrue until the Respondents make full payment of those costs, including all accrued interest, to the MDEQ. Payments of interest made under this Paragraph shall be in addition to such other

remedies or sanctions available to the MDEQ by virtue of Respondents' failure to make timely payments under this Section.

42. Dispute Resolution for State Future Response Costs

a. Respondents may dispute all or part of an invoice for State Future Response Costs submitted under this Settlement Agreement, only if Respondents allege that MDEQ has made an accounting error, is attempting to recover Future Response Costs in excess of the amounts specified in Paragraph 40 or if the Respondents allege that a cost was not lawfully incurred under Part 201. In any challenge to a MDEQ invoice for payment of the State's Future Response Costs, Respondents shall have the burden of establishing that the State did not lawfully incur those costs in accordance with Section 20126a(1)(a) of the NREPA. A dispute shall be considered to have arisen on the date the MDEQ receives written notification from the Respondents invoking dispute resolution. The dispute resolution process set forth in 42.b. below shall be the exclusive mechanism for resolving disputes concerning payment of State Future Response Costs. If any dispute over costs is resolved before payment is due, the amount due will be adjusted as necessary. If the dispute is not resolved before payment is due, Respondents shall pay the full amount of the uncontested costs to the MDEQ as specified in Paragraph 40 on or before the due date. Interest shall not accrue on any contested costs that are resolved in Respondents' favor. Payment of the unpaid contested costs, including all accrued interest, shall be made within 30 days after the dispute is resolved.

b. Respondents shall notify the MDEQ in writing within 30 calendar days of receipt of the MDEQ's invoice, unless the objection(s) has/have been resolved informally. This written notice shall include a statement of the issues in dispute, the relevant facts upon which the dispute is based, all factual data, analysis or opinion supporting Respondents' position, and all supporting documentation on which such party relies. MDEQ shall provide its Statement of Position, including supporting documentation, no later than 10 calendar days after receipt of the written notice of dispute. The time periods for exchange of written documents relating to disputes may be modified by written agreement between MDEQ and Respondents. An administrative record of any dispute under this Section shall be maintained by the MDEQ. The record shall include the Respondents' written notification of such dispute, and the MDEQ's Statement of Position. Upon review of the administrative record, the MDEQ's, Remediation and Redevelopment Division Chief, shall resolve the dispute consistent with Part 201 and the terms of this Settlement Agreement.

43. MDNR Contribution

a. In the interest of early action and settlement, the MDNR will contribute $500,000 to the response actions required by this Settlement Agreement in the manner set forth in Paragraph 43.b and will undertake the post-removal site control obligations set forth in Paragraph 43.c.

b. MDNR shall disburse its $500,000 contribution to Respondents by electronic funds transfer within thirty (30) days of receipt of U.S. EPA's written notice that all Work associated with mobilization has been completed under Paragraph 39.b.

c. Beginning three years after MDNR's receipt of the Notice of Completion of Work pursuant to Paragraph 77, MDNR agrees to perform post-removal site control as set forth in Paragraph 18. MDNR intends to satisfy its obligations under this Settlement Agreement by including in its budget request or otherwise proposing, for each fiscal period, appropriations sufficient to cover MDNR's obligations for each year, and will use all reasonable and lawful mans to secure the appropriations for each year sufficient to fulfill its obligations hereunder. In the event the budget or other means of appropriations does not provide funds in sufficient amounts to discharge these obligations, MDNR shall use its best efforts to satisfy any requirements for payments from any other sources of funds legally available for this purpose. In the event Respondents incur costs or damages by performing response work at the direction of U.S. EPA to address a condition caused by MDNR's failure to perform its post-removal site control obligations, Respondents may set off those costs or damages against Respondents' obligations (if any), under either CERCLA or an agreement with MDEQ, to pay response costs incurred by MDEQ after the Effective Date in connection with long-term monitoring activities at the Site performed pursuant to its long-term monitoring program as referenced in Section 1.1.1.1 of the SOW.

XVI. DISPUTE RESOLUTION

44. Unless otherwise expressly provided for in this Settlement Agreement, the dispute resolution procedures of this Section shall be the exclusive mechanism for resolving disputes arising under this Settlement Agreement. The Parties shall attempt to resolve any disagreements concerning this Settlement Agreement expeditiously and informally.

45. If Respondents object to any U.S. EPA action taken pursuant to this Settlement Agreement that does not relate to billings for Future Response Costs, they shall notify U.S. EPA in writing of their objection(s) within 10 calendar days of such action, unless the objection(s) has/have been resolved informally. If the objection relates to billings for Future Response Costs, Respondents' time for objections will be 45 calendar days. In either event, this written notice shall include a statement of the issues in dispute, the relevant facts upon which the dispute is based; all factual data, analysis or opinion supporting Respondents' position, and all supporting documentation on which such party relies. U.S. EPA shall provide its Statement of Position, including supporting documentation, no later than 10 calendar days after receipt of the written notice of dispute (or 30 days in the case of a dispute about Future Response Costs). In the event that U.S. EPA determines that these 10-day time periods for exchange of written documents will cause a delay in the work, they may be shortened upon, and in accordance with, notice by U.S. EPA. The time periods for exchange of written documents relating to disputes over billings for Future Response Costs may be extended at the sole discretion of U.S. EPA. An administrative record of any dispute under this Section shall be maintained by U.S. EPA. The record shall include the Respondents' written notification of such dispute, and U.S. EPA's Statement of Position. Upon review of the administrative record, the Director of the Superfund

Division, U.S. EPA Region 5, shall resolve the dispute consistent with the NCP and the terms of this Settlement Agreement.

46. Respondents' obligations under this Settlement Agreement shall not be tolled by submission of any objection for dispute resolution under this Section. Following resolution of the dispute, as provided by this Section, Respondents shall fulfill the requirement that was the subject of the dispute in accordance with the agreement reached or with U.S. EPA's decision, whichever occurs.

XVII. FORCE MAJEURE

47. Respondents agree to perform all requirements of this Settlement Agreement within the time limits established under this Settlement Agreement, unless the performance is delayed by a *force majeure*. For purposes of this Settlement Agreement, a *force majeure* is defined as any event arising from causes beyond the control of Respondents, or of any entity controlled by Respondents, including but not limited to their contractors and subcontractors, which delays or prevents performance of any obligation under this Settlement Agreement despite Respondents' best efforts to fulfill the obligation. *Force majeure* does not include financial inability to complete the Work or increased cost of performance.

48. If any event occurs or has occurred that may delay the performance of any obligation under this Settlement Agreement, whether or not caused by a *force majeure* event, Respondents shall notify U.S. EPA and MDEQ orally within 24 hours of when Respondents first knew that the event might cause a delay. Within 7 calendar days thereafter, Respondents shall provide to U.S. EPA in writing, with a copy to the MDEQ, an explanation and description of the reasons for the delay; the anticipated duration of the delay; all actions taken or to be taken to prevent or minimize the delay; a schedule for implementation of any measures to be taken to prevent or mitigate the delay or the effect of the delay; Respondents' rationale for attributing such delay to a *force majeure* event if they intend to assert such a claim; and a statement as to whether, in the opinion of Respondents, such event may cause or contribute to an endangerment to public health, welfare or the environment. Failure to comply with the above requirements shall be grounds for U.S. EPA to deny Respondents an extension of time for performance. Respondents shall have the burden of demonstrating by a preponderance of the evidence that the event is a *force majeure*; that the delay is warranted under the circumstances; and that best efforts were exercised to avoid and mitigate the effects of the delay.

49. If U.S. EPA, after consultation with the MDEQ to the extent practical, agrees that the delay or anticipated delay is attributable to a *force majeure* event, the time for performance of the obligations under this Settlement Agreement that are affected by the *force majeure* event will be extended by U.S. EPA for such time as is necessary to complete those obligations. An extension of the time for performance of the obligations affected by the *force majeure* event shall not, of itself, extend the time for performance of any other obligation. If U.S. EPA, after consultation with the MDEQ to the extent practical, does not agree that the delay or anticipated delay has been or will be caused by a *force majeure* event, U.S. EPA will notify Respondents in writing of its decision. If U.S. EPA, after consultation with the MDEQ to the extent practical, agrees that the delay is attributable to a *force majeure* event, U.S. EPA will notify Respondents

in writing of the length of the extension, if any, for performance of the obligations affected by the *force majeure* event.

XVIII. STIPULATED PENALTIES

50. Unless otherwise expressly provided for in this Settlement Agreement, Respondents shall be liable to U.S. EPA for stipulated penalties in the amounts set forth in Paragraphs 51 and 52 for failure to comply with the requirements of this Settlement Agreement specified below, unless excused under Section XVII (*Force Majeure*). "Compliance" by Respondents shall include completion of the activities under this Settlement Agreement, the Work Plan, or any other plan approved under this Settlement Agreement identified below in accordance with all applicable requirements of this Settlement Agreement within the specified time schedules established by and approved under this Settlement Agreement and the Work Plan.

51. Stipulated Penalty Amounts - Work.

a. The following stipulated penalties shall accrue per violation per day for any noncompliance identified in Paragraph 51.b; failure to pay Future Response Costs: or for any noncompliance with any "major milestone," defined as a due date for a submission or task expressly designated as a major milestone in the Work Plan:

Penalty Per Violation Per Day	Period of Noncompliance
$ 750	1st through 14th day
$ 1000	15th through 30th day
$ 1,500	31st day and beyond

b. Compliance Milestones:

Failure to pay Future Response Costs as provided in Paragraph 36
Failure to provide Financial Assurance as provided in Section XXIX
Failure to provide Insurance as provided in Section XXX
Failure to use best efforts to obtain Access as provided in Section IX
Failure to meet any scheduled deadline in the Work Plan
Failure to complete any planning document required by this Settlement Agreement and/or the Work Plan (*e.g.* QAPP, QMP, etc.)

52. Stipulated Penalty Amounts - Reports. The following stipulated penalties shall accrue per violation per day for failure to submit timely or adequate reports pursuant to Paragraphs 19 and 20:

Penalty Per Violation Per Day	Period of Noncompliance
$ 100	1st through 14th day
$ 250	15th through 30th day
$ 500	31st day and beyond

53. All penalties shall begin to accrue on the day after the complete performance is due or the day a violation occurs, and shall continue to accrue through the final day of the

correction of the noncompliance or completion of the activity. However, stipulated penalties shall not accrue: 1) with respect to a deficient submission under Section VIII (Work to be Performed), during the period, if any, beginning on the 21st day after U.S. EPA's receipt of such submission until the date that U.S. EPA notifies Respondents of any deficiency; and 2) with respect to a decision by the Director of the Superfund Division, Region 5, under Paragraph 45 of Section XVI (Dispute Resolution), during the period, if any, beginning on the 14th day after U.S. EPA submits its written statement of position until the date that the Director of the Superfund Division issues a final decision regarding such dispute. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate violations of this Settlement Agreement.

54. Following U.S. EPA's determination, after consultation with the MDEQ, that Respondents have failed to comply with a requirement of this Settlement Agreement, U.S. EPA may give Respondents written notification of the failure and describe the noncompliance. U.S. EPA may send Respondents a written demand for payment of the penalties. However, penalties shall accrue as provided in the preceding Paragraph regardless of whether U.S. EPA has notified Respondents of a violation. U.S. EPA may exercise its discretion not to seek penalties.

55. All penalties accruing under this Section shall be due and payable to U.S. EPA within 30 days of Respondents' receipt from U.S. EPA of a demand for payment of the penalties, unless Respondents invoke the dispute resolution procedures under Section XVI (Dispute Resolution). All payments to U.S. EPA under this Section shall be paid by certified or cashier's check(s) made payable to "U.S. EPA Hazardous Substances Superfund," shall be mailed to U.S. Environmental Protection Agency, Program Accounting & Analysis Section, P.O. Box 371531, Pittsburgh, PA 15251-7531, and shall indicate that the payment is for stipulated penalties, and shall reference the U.S. EPA Site/Spill ID Number 059B, the U.S. EPA Docket Number, and the name and address of the party(ies) making payment. Copies of check(s) paid pursuant to this Section, and any accompanying transmittal letter(s), shall be sent to U.S. EPA as provided in Paragraph 36.b.

56. The payment of penalties shall not alter in any way Respondents' obligation to complete performance of the Work required under this Settlement Agreement.

57. Penalties shall continue to accrue during any dispute resolution period, but need not be paid until 20 days after the dispute is resolved by agreement or by receipt of U.S. EPA's decision.

58. If Respondents fail to pay stipulated penalties when due, U.S. EPA may institute proceedings to collect the penalties, as well as Interest. Respondents shall pay Interest on the unpaid balance, which shall begin to accrue on the date of demand made pursuant to Paragraph 54. Nothing in this Settlement Agreement shall be construed as prohibiting, altering, or in any way limiting the ability of U.S. EPA to seek any other remedies or sanctions available by virtue of Respondents' violation of this Settlement Agreement or of the statutes and regulations upon which it is based, including, but not limited to, penalties pursuant to Sections 106(b) and 122(*l*) of CERCLA, 42 U.S.C. §§ 9606(b) and 9622(*l*), and punitive damages pursuant to Section 107(c)(3) of CERCLA, 42 U.S.C. § 9607(c)(3). Provided, however, that U.S. EPA shall not seek civil penalties pursuant to Section 106(b) or 122(*l*) of CERCLA or punitive damages pursuant to

Section 107(c)(3) of CERCLA for any violation for which a stipulated penalty is provided herein, except in the case of a willful violation of this Settlement Agreement. Should Respondents violate this Settlement Agreement or any portion hereof, U.S. EPA may carry out the required actions unilaterally, pursuant to Section 104 of CERCLA, 42 U.S.C. § 9604, and/or may seek judicial enforcement of this Settlement Agreement pursuant to Section 106 of CERCLA, 42 U.S.C. § 9606. Notwithstanding any other provision of this Section, U.S. EPA may, in its unreviewable discretion, waive in writing any portion of stipulated penalties that have accrued pursuant to this Settlement Agreement.

XIX. COVENANT NOT TO SUE BY U.S. EPA

59. In consideration of the actions that will be performed and the payments that will be made by the Respondents under the terms of this Settlement Agreement, and except as otherwise specifically provided in this Settlement Agreement, U.S. EPA covenants not to sue or to take administrative action against Respondents pursuant to Sections 106 and 107(a) of CERCLA, 42 U.S.C. §§ 9606 and 9607(a), for the Work, for Future Response Costs billed and paid, and for Future Response Costs billed but determined not to be payable in dispute resolution under Section XVI of this Settlement Agreement. This covenant not to sue shall take effect upon the Effective Date and is conditioned upon the complete and satisfactory performance by Respondents of all obligations under this Settlement Agreement, including, but not limited to, payment of Future Response Costs pursuant to Paragraph 36. This covenant not to sue extends only to Respondents and does not extend to any other person.

XX. COVENANT NOT TO SUE BY THE STATE

60. In consideration of the actions that will be performed and the payments that will be made by the Respondents under the terms of this Settlement Agreement, and except as otherwise specifically provided in this Settlement Agreement, the State covenants not to sue or to take administrative action against the Respondents pursuant to Sections 107(a) and 113 of CERCLA, 42 U.S.C. §§ 9607(a) and 9613; Section 7002 of RCRA, 42 U.S.C. § 6972; and Part 201 of NREPA, MCL 324.20101 *et seq.*, for the Work, for State Past Response Costs, and for State Future Response Costs. This covenant not to sue shall take effect upon the Effective Date and is conditioned upon the complete and satisfactory performance by Respondents of all obligations under this Settlement Agreement, including, but not limited to, payment of State Future Response Costs pursuant to Paragraph 40. This covenant not to sue extends only to Respondents and does not extend to any other person.

XXI. RESERVATIONS OF RIGHTS BY U.S. EPA

61. Except as specifically provided in this Settlement Agreement, nothing herein shall limit the power and authority of U.S. EPA or the United States to take, direct, or order all actions necessary to protect public health, welfare, or the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances, pollutants or contaminants, or hazardous or solid waste on, at, or from the Plainwell Impoundment Area or the Site. Further, nothing herein shall prevent U.S. EPA from seeking legal or equitable relief to enforce the terms of this Settlement Agreement. U.S. EPA also reserves the right to take any other legal or equitable

action as it deems appropriate and necessary, or to require the Respondents in the future to perform additional activities pursuant to CERCLA or any other applicable law.

62. The covenant not to sue set forth in Section XIX above does not pertain to any matters other than those expressly identified therein. U.S. EPA reserves, and this Settlement Agreement is without prejudice to, all rights against Respondents with respect to all other matters, including, but not limited to:

a. claims based on a failure by Respondents to meet a requirement of this Settlement Agreement;

b. liability for costs not included within the definition of Future Response Costs;

c. liability for Future Response Costs, other than the amounts billed and paid, or billed but determined not to be payable in dispute resolution under Section XVI of this Settlement Agreement;

d. liability for performance of response action other than the Work;

e. criminal liability;

f. liability for damages for injury to, destruction of, or loss of natural resources, and for the costs of any natural resource damage assessments;

g. liability arising from the past, present, or future disposal, release or threat of release of Waste Materials outside of the Site; and

h. liability for costs incurred or to be incurred by the Agency for Toxic Substances and Disease Registry related to the Site.

XXII. RESERVATIONS OF RIGHTS BY THE STATE

63. Except as specifically provided in this Settlement Agreement, nothing herein shall limit the power and authority of the State to take, direct, or order all actions necessary to protect public health, welfare, or the environment or to prevent, abate, or minimize an actual or threatened release of hazardous substances, pollutants or contaminants, or hazardous or solid waste on, at, or from the Plainwell Impoundment Area or the Site. Further, nothing herein shall prevent the State from seeking legal or equitable relief to enforce the terms of this Settlement Agreement. The State also reserves the right to take any other legal or equitable action as it deems appropriate and necessary, or to require the Respondents in the future to perform additional activities pursuant to CERCLA or any other applicable federal or state law.

64. The covenant not to sue set forth in Section XX (Covenant Not to Sue by the State) above does not pertain to any matters other than those expressly identified therein. The State reserves, and this Settlement Agreement is without prejudice to, all rights against Respondents with respect to all other matters, including, but not limited to:

a. claims based on a failure by Respondents to meet a requirement of this Settlement Agreement;

b. liability for costs not included within the definition of State Past Response Costs;

c. liability for costs not included within the definition of State Future Response Costs;

d. liability for performance of response action, or response activity as defined under Part 201, other than the Work;

e. criminal liability;

f. liability for damages for injury to, destruction of, or loss of natural resources, and for the costs of any natural resource damage assessments; and

g. liability arising from the past, present, or future disposal, release or threat of release of Waste Materials outside of the Site.

XXIII. COVENANT NOT TO SUE BY RESPONDENTS

65. Respondents covenant not to sue and agree not to assert any claims or causes of action against the United States or the State, or their contractors or employees, with respect to the Work, Future Response Costs billed and paid, or otherwise resolved through Dispute Resolution, under the terms of this Settlement Agreement, State Past Response Costs, State Future Response Costs, or this Settlement Agreement, including, but not limited to:

a. any direct or indirect claim for reimbursement from the Hazardous Substance Superfund established by 26 U.S.C. § 9507, based on Sections 106(b)(2), 107, 111, 112, or 113 of CERCLA, 42 U.S.C. §§ 9606(b)(2), 9607, 9611, 9612, or 9613, or any other provision of law;

b. any direct or indirect claim for reimbursement from the Cleanup and Redevelopment Fund pursuant to Section 20119(5) of NREPA, MCL § 324.20119(5), or any other provision of law;

c. any claim arising out of response actions at or in connection with the Plainwell Impoundment Area or the Site, including any claim under the United States Constitution, the State of Michigan Constitution, the Tucker Act, 28 U.S.C. § 1491, the Equal Access to Justice Act, 28 U.S.C. § 2412, as amended, or at common law;

d. any claim against the United States pursuant to Sections 106(b)(2), 107 and 113 of CERCLA, 42 U.S.C. §§ 9606(b)(2), 9607 and 9613, relating to the Plainwell Impoundment Area or the Site; or

e. any claim against the State pursuant to Sections 107 and 113 of CERCLA, 42 U.S.C. §§ 9607 and 9613; Section 20126a(1)(b) or 20126a(1)(c), MCL 324.20126a(1)(b) or (c); or 20129(3) of Part 201, MCL 324. 20129(3) relating to the Plainwell Impoundment Area or the Site.

These covenants not to sue shall not apply in the event the United States and/or the State brings a cause of action or issues an order pursuant to, with respect to the United States, the reservations set forth in Paragraphs 62(b) - (d), and (f) - (h), and with respect to the State, the reservations set forth in Paragraphs 63(b) - (d), and (f) - (g), but only to the extent that Respondents' claims arise from the same response action, response costs, or damages that the United States and/or the State is seeking pursuant to the applicable reservation. These covenants not to sue shall not apply to Respondents' rights to set off under Paragraph 43(c).

66. Nothing in this Agreement shall be deemed to constitute approval or preauthorization of a claim within the meaning of Section 111 of CERCLA, 42 U.S.C. § 9611, or 40 C.F.R. § 300.700(d).

XXIV. OTHER CLAIMS

67. By issuance of this Settlement Agreement, the United States, the State, and U.S. EPA assume no liability for injuries or damages to persons or property resulting from any acts or omissions of Respondents. The United States, the State or U.S. EPA shall not be deemed a party to any contract entered into by Respondents or their directors, officers, employees, agents, successors, representatives, assigns, contractors, or consultants in carrying out actions pursuant to this Settlement Agreement.

68. Except as expressly provided in Section XIX (Covenant Not to Sue by U.S. EPA) and Section XX (Covenant Not to Sue by the State), nothing in this Settlement Agreement constitutes a satisfaction of or release from any claim or cause of action against Respondents or any person not a party to this Settlement Agreement, for any liability such person may have under CERCLA, other statutes, or common law, including but not limited to any claims of the United States for costs, damages and interest under Sections 106 and 107 of CERCLA, 42 U.S.C. §§ 9606 and 9607, and claims by the State for costs, damages and interest under Sections 107 of CERCLA, 42 U.S.C. § 9607, and Part 201 of NREPA.

69. No action or decision by U.S. EPA or the State pursuant to this Settlement Agreement shall give rise to any right to judicial review, except as set forth in Section 113(h) of CERCLA, 42 U.S.C. § 9613(h). Additionally, no action or decision by the State pursuant to this Settlement Agreement shall give rise to any right to judicial review, except as set forth in Section 20137(4) of Part 201, MCL 324.20137(4).

XXV. CONTRIBUTION

70. a. The Parties agree that this Settlement Agreement constitutes an administrative settlement for purposes of Section 113(f)(2) of CERCLA, 42 U.S.C. § 9613(f)(2), and that Respondents are entitled, as of the Effective Date, to protection from contribution actions or claims as provided by Sections 113(f)(2) and 122(h)(4) of CERCLA, 42 U.S.C.

§§ 9613(f)(2) and 9622(h)(4), for "matters addressed" in this Settlement Agreement. The "matters addressed" in this Settlement Agreement are the Work; Future Response Costs billed and paid, or otherwise resolved through dispute resolution; State Past Response Costs; and State Future Response Costs, invoiced and paid, or otherwise resolved through dispute resolution.

b. The Parties agree that this Settlement Agreement constitutes an administrative settlement for purposes of Section 113(f)(3)(B) of CERCLA, 42. U.S.C. § 9613(f)(3)(B), pursuant to which the Respondents have, as of the Effective Date, resolved their liability to the United States and to the MDEQ for the Work; Future Response Costs billed and paid or otherwise resolved through dispute resolution; State Past Response Costs; and State Future Response Costs.

c. Nothing in this Settlement Agreement precludes the United States, the State or Respondents from asserting any claims, causes of action, or demands for indemnification, contribution, or cost recovery against any persons not parties to this Settlement Agreement. Nothing herein diminishes the right of the United States or the State, pursuant to Section 113(f)(2)and (3), 42 U.S.C. §§ 9613(f)(2) and (3), to pursue any such persons to obtain additional response costs or response action, and to enter into settlements that give rise to contribution protection pursuant to Section 113(f)(2) of CERCLA, 42 U.S.C. § 9613(f)(2) and, with respect to the State, from asserting any claims under Part 201 of NREPA or other applicable state law.

XXVI. INDEMNIFICATION

71. Respondents shall indemnify, save and hold harmless the United States, the State, their officials, agents, contractors, subcontractors, employees and representatives from any and all claims or causes of action arising from, or on account of, negligent or other wrongful acts or omissions of Respondents, their officers, directors, employees, agents, contractors, or subcontractors, in carrying out actions pursuant to this Settlement Agreement. In addition, Respondents agree to pay (1) the United States all costs incurred by the United States, including but not limited to attorneys fees and other expenses of litigation and settlement, arising from or on account of claims made against the United States based on negligent or other wrongful acts or omissions of Respondents, their officers, directors, employees, agents, contractors, subcontractors and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Settlement Agreement; and (2) the State all costs incurred by the State, including but not limited to attorneys fees and other expenses of litigation and settlement, arising from or on account of claims made against the State based on negligent or other wrongful acts or omissions of Respondents, their officers, directors, employees, agents, contractors, subcontractors and any persons acting on their behalf or under their control, in carrying out activities pursuant to this Settlement Agreement. Neither the United States nor the State shall be held out as a party to any contract entered into by or on behalf of Respondents in carrying out activities pursuant to this Settlement Agreement. Neither Respondents nor any such contractor shall be considered an agent of the United States or of the State. The Federal Tort Claims Act (28 U.S.C. §§ 2671, 2680) provides coverage for injury or loss of property, or injury or death caused by the negligent or wrongful act or omission of an employee of U.S. EPA while acting within the scope of his or her employment, under circumstances where U.S. EPA, if a private

person, would be liable to the claimant in accordance with the law of the place where the act or omission occurred.

72. The United States and the State shall, respectively, give Respondents notice of any claim for which the United States or the State plans to seek indemnification pursuant to this Section and shall consult with Respondents prior to settling such claim.

73. Respondents waive all claims against the United States or against the State for damages or reimbursement or for set-off of any payments made or to be made to the United States or to the State, arising from or on account of any contract, agreement, or arrangement between any one or more of Respondents and any person for performance of Work at or relating to the Plainwell Impoundment Area, including, but not limited to, claims on account of construction delays. In addition, Respondents shall indemnify and hold harmless the United States and the State with respect to any and all claims for damages or reimbursement arising from or on account of any contract, agreement, or arrangement between any one or more of Respondents and any person for performance of Work at or relating to the Plainwell Impoundment Area, including, but not limited to, claims on account of construction delays.

XXVII. MODIFICATIONS

74. The OSC, upon agreement by MDNR and, for the first three years after issuance of Notice of Completion, after consultation with Respondents, may make modifications to the post-removal site control requirements for the Plainwell Impoundment, as specified in Section 5.6 of the Work Plan. Any modification by the OSC to the post-removal site control requirements for the Plainwell Impoundment shall be in writing or by oral direction. Any oral modification to the post-removal site control requirements will be memorialized in writing by U.S. EPA promptly, but shall have as its effective date the date of the OSC's oral direction. With regard to any other plan or schedule required by this Settlement Agreement, including but not limited to the Work Plan or any appendix thereto, the OSC, after consultation with MDEQ, may make modifications in writing or by oral direction. Any oral modification required by the OSC to any other plan or schedule will be memorialized in writing by U.S. EPA promptly, but shall have as its effective date the date of the OSC's oral direction. Any requirement of this Settlement Agreement, including post-removal site control requirements for the Plainwell Impoundment, may be modified in writing by mutual agreement of the Parties.

75. With regard to the post-removal site control requirements for the Plainwell Impoundment, if Respondents seek to modify the requirements of the Work Plan, Respondent's Project Coordinator shall submit a written request to U.S. EPA and to MDNR for approval, outlining the proposed modification and its basis. Respondents shall not proceed with the requested deviation until receiving oral or written approval from the OSC and from MDNR. If Respondents seek permission to deviate from any other requirement of the Work Plan, or any other approved plan or schedule, Respondents' Project Coordinator shall submit a written request to U.S. EPA, for approval, with a copy to the MDEQ and MDNR, outlining the proposed modification and its basis. Respondents may not proceed with the requested deviation until receiving oral or written approval from the OSC, after consultation with MDEQ, pursuant to Paragraph 74.

76. No informal advice, guidance, suggestion, or comment by the OSC or other U.S. EPA representatives, the State's Project Coordinators or other State representatives, regarding reports, plans, specifications, schedules, or any other writing submitted by Respondents shall relieve Respondents of their obligation to obtain any formal approval required by this Settlement Agreement, or to comply with all requirements of this Settlement Agreement, unless it is formally modified.

XXVIII. NOTICE OF COMPLETION OF WORK

77. When U.S. EPA, after consultation with the MDEQ and MDNR, and after reviewing the final report, determines that all Work has been fully performed in accordance with this Settlement Agreement, with the exception of any continuing obligations required by this Settlement Agreement, including, *e.g.*, post-removal site controls, payment of Future Response Costs and State Future Response Costs, and record retention, U.S. EPA will provide written notice to Respondents, MDEQ and MDNR. If U.S. EPA, after consultation with the State, determines that any such Work has not been completed in accordance with this Settlement Agreement, U.S. EPA will notify Respondents, provide a list of the deficiencies, and require that Respondents modify the Work Plan if appropriate in order to correct such deficiencies. Respondents shall implement the modified and approved Work Plan and shall submit a modified Final Report in accordance with the U.S. EPA notice. Failure by Respondents to implement the approved modified Work Plan shall be a violation of this Settlement Agreement.

XXIX. FINANCIAL ASSURANCE

78. Within 45 days of the Effective Date, Respondents shall establish and maintain financial security in the amount of $21 million in one or more of the following forms, which must be satisfactory in form and substance to U.S. EPA. In the event Respondents establish and maintain such financial security in one of the forms identified in Subparagraphs 78(a) – 78(d) of this Paragraph, Respondents may establish and maintain such financial security jointly :

a. a surety bond guaranteeing performance of the Work;

b. one or more irrevocable letters of credit equaling the total estimated cost of the Work;

c. a trust fund;

d. a policy of insurance that (i) provides U.S. EPA with acceptable rights as a beneficiary thereof; and (ii) is issued by an insurance carrier (a) that has the authority to issue insurance policies in the applicable jurisdiction(s), and (b) whose insurance operations are regulated and examined by a state agency;

e. a guarantee to perform the Work by one or more parent corporations or subsidiaries, or by one or more unrelated corporations that have a substantial business relationship with at least one of Respondents; or

f. a demonstration that one or more of the Respondents satisfy the requirements of 40 C.F.R. Part 264.143(f).

79. If Respondents seek to demonstrate the ability to complete the Work through a guarantee by a third party pursuant to Paragraph 78.e of this Section, Respondents shall demonstrate that the guarantor satisfies the requirements of 40 C.F.R. Part 264.143(f). If Respondents seek to demonstrate their ability to complete the Work by means of the financial test or the corporate guarantee pursuant to Paragraph 78.e or 78.f of this Section, they shall resubmit sworn statements conveying the information required by 40 C.F.R. Part 264.143(f) annually, on the anniversary of the Effective Date. In the event that U.S. EPA determines at any time that the financial assurances provided pursuant to this Section are inadequate, Respondents shall, within 45 days of receipt of notice of U.S. EPA's determination, obtain and present to U.S. EPA for approval one of the other forms of financial assurance listed in Paragraph 78 of this Section. Respondents' inability to demonstrate financial ability to complete the Work shall not excuse performance of any activities required under this Settlement Agreement.

80. If, after the Effective Date, Respondents can show that the estimated cost to complete the remaining Work has diminished below the amount set forth in Paragraph 78 of this Section, Respondents may, on any anniversary date of the Effective Date, or at any other time agreed to by the Parties, reduce the amount of the financial security provided under this Section to the estimated cost of the remaining Work to be performed. Respondents shall submit a proposal for such reduction to U.S. EPA, in accordance with the requirements of this Section, and may reduce the amount of the security upon approval by U.S. EPA. In the event of a dispute, Respondents may reduce the amount of the security in accordance with the written decision resolving the dispute.

81. Respondents may change the form of financial assurance provided under this Section at any time, upon notice to and approval by U.S. EPA, provided that the new form of assurance meets the requirements of this Section. In the event of a dispute, Respondents may change the form of the financial assurance only in accordance with the written decision resolving the dispute.

XXX. INSURANCE

82. At least 7 days prior to commencing any on-Site work under this Settlement Agreement, Respondents or its contractors shall secure, and shall maintain for the duration of this Settlement Agreement, comprehensive general liability insurance and automobile insurance with limits of $2 million dollars, combined single limit. Within the same time period, Respondents shall provide U.S. EPA with certificates of such insurance and a copy of each insurance policy. In addition, for the duration of the Settlement Agreement, Respondents shall satisfy, or shall ensure that their contractors or subcontractors satisfy, all applicable laws and regulations regarding the provision of worker's compensation insurance for all persons performing the Work on behalf of Respondents in furtherance of this Settlement Agreement. If Respondents demonstrate by evidence satisfactory to U.S. EPA that any contractor or subcontractor maintains insurance equivalent to that described above, or insurance covering some or all of the same risks but in an equal or lesser amount, then Respondents need provide

only that portion of the insurance described above which is not maintained by such contractor or subcontractor.

XXXI. SEVERABILITY/INTEGRATION/APPENDICES

83. If a court issues an order that invalidates any provision of this Settlement Agreement or finds that Respondents have sufficient cause not to comply with one or more provisions of this Settlement Agreement, Respondents shall remain bound to comply with all provisions of this Settlement Agreement not invalidated or determined to be subject to a sufficient cause defense by the court's order.

84. This Settlement Agreement and its appendices constitute the final, complete and exclusive agreement and understanding among the Parties with respect to the settlement embodied in this Settlement Agreement. The parties acknowledge that there are no representations, agreements or understandings relating to the settlement other than those expressly contained in this Settlement Agreement. The following appendices are incorporated into this Settlement Agreement:

Appendix 1: Action Memorandum issued by U.S. EPA on February 14, 2007

Appendix 2: Map generally depicting the Allied Paper/Portage Creek/Kalamazoo River Superfund Site

Appendix 3: State Response Costs

Appendix 4: Work Plan approved by U.S. EPA on February 14, 2007 and the MDEQ and MDNR on February 13, 2007

XXXII. EFFECTIVE DATE

85. This Settlement Agreement shall be effective upon signature by the Director, Superfund Division, U.S. EPA Region 5.

THE UNDERSIGNED PARTY enters into this Agreement with regard to the Plainwell Impoundment Area of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site in Kalamazoo and Allegan Counties, Michigan:

FOR THE STATE OF MICHIGAN:

Michael A. Cox
Attorney General

Date: 2-15-07 By: _____
Polly Synk
Assistant Attorney General
Environment, Natural Resources, and
Agriculture Division

FOR THE MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY:

Date: 2/15/07 By: _____
Jim Sygo, Deputy Director
MDEQ

FOR THE MICHIGAN DEPARTMENT OF NATURAL RESOURCES:

Date: 2/15/07 By: _____
Arminda S. Koch, Deputy Director
MDNR

THE UNDERSIGNED PARTY enters into this Agreement with regard to the Plainwell Impoundment Area of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site in Kalamazoo and Allegan Counties, Michigan:

FOR MILLENNIUM HOLDINGS, LLC

Date: February 15, 2007

By: Deborah W. Kryak
Deborah W. Kryak
Director, Retained Liabilities and Remediation

THE UNDERSIGNED PARTY enters into this Agreement with regard to the Plainwell Impoundment Area of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site in Kalamazoo and Allegan Counties, Michigan:

FOR GEORGIA-PACIFIC ~~CORPORATION~~ LLC TMO

Date: FEBRUARY 15, 2007 JMD By: Bill R. Caffey

Bill R. Caffey
EVP Operations & Compliance

THE UNDERSIGNED PARTY enters into this Agreement with regard to the Plainwell Impoundment Area of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site in Kalamazoo and Allegan Counties, Michigan:

It is so ORDERED and Agreed this 21 day of February, 2007.

BY: Richard C Karl

Richard C. Karl, Director
Superfund Division
United States Environmental Protection Agency
Region 5

100% Recycled 30% PCW

Δ π EXHIBIT 2407
Deponent Bulnoltz
Date 10-14 Rptr. LR
WWW.DEPOBOOK.COM

SITE SPECIFIC AMENDMENT
TO THE
ENFORCEMENT AGREEMENT FOR STATE ENFORCEMENT LEAD SITES
IN MICHIGAN
FOR THE
ALLIED PAPER INC./PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE

I. INTRODUCTION

This Amendment establishes the roles and responsibilities of the U.S. Environmental Protection Agency - Region V (EPA) and the Michigan Department of Natural Resources (MDNR) at the Allied Paper Inc./Portage Creek/Kalamazoo River Superfund site. The MDNR, following concurrence by the EPA, is assuming a state enforcement lead at this site for the purposes of conducting the Remedial Investigation/Feasibility Study (RI/FS) at this site.

Unless otherwise stated in this Amendment, the terms and conditions of the original Superfund Memorandum of Agreement, dated December 26, 1989 will remain effective.

II. ROLES AND RESPONSIBILITIES

The MDNR State Project Manager (SPM) will provide the EPA Support Agency Coordinator (SAC) with one copy of all correspondence between the MDNR and the Potentially Responsible Parties (PRPs) for this site.

The SPM will provide the SAC with two copies of the major work products identified in Table I - Deliverables During the Allied Paper Inc./Portage Creek/Kalamazoo River RI/FS. The deliverables will be sent to EPA within five (5) days of receipt by the Department.

The EPA SAC agrees to provide the designated support agency review within the timeframe designated for that deliverable in Table I. These timeframes may be altered upon mutual agreement between the SPM and the SAC.

All agency activities for this site will be coordinated through the MDNR SPM. The EPA SAC shall contact the SPM before contacting the PRPs or any MDNR contractors for this site.

The MDNR SPM and the EPA SAC are designated in Table II - Agency Contacts. In the event that these contacts are not available, secondary contacts are also designated in this table.

III. CRITERIA FOR EPA INTERVENTION

Although this Amendment formalizes the roles of the MDNR and EPA with respect to MDNR as the lead enforcement agency at the Allied Paper Inc./ Portage Creek/Kalamazoo River site, this lead designation may be switched at the request of the MDNR. Following discussion of such a request, and upon concurrence from EPA, the MDNR will either request that this site be

designated an EPA enforcement lead site, or the MDNR will prepare a site specific Cooperative Agreement for a state lead fund financed RI/FS or remedial design/remedial action (RD/RA). MDNR recognizes that should this shift in lead or funding occur, the remedial action at the site may be delayed.

IV. EXECUTION AND MODIFICATION

This amendment shall be reviewed on an annual basis by both the State Environmental Response Division Chief and the Region V, Director - Waste Management Division, or their designated representatives. This amendment shall be revised as necessary by mutual agreement of the two agencies.

Executed and Agreed to on January 23, 1991.

For the State of Michigan, Department of Natural Resources:

James G. Truchan, Chief
Environmental Response Division

For the U.S. Environmental Protection Agency - Region V:

David A. Ullrich, Acting Director
Waste Management Division

W042825

WY021819

TABLE I.

DELIVERABLES DURING THE
ALLIED PAPER INC./PORTAGE CREEK/KALAMAZOO RIVER RI/FS

Presented below is a list of the documents that will be provided, at a minimum, to the support agency (EPA). Also included in this table is the type of support agency review, and the timeframes for that review.

Documents Provided by MDNR to EPA	Type of Support Agency Review	Timeframe (Calendar Days)
1. Enforcement Document (Contract w/PRPs)	Information/Files	---
2. Initial Draft RI/FS Work plan(s)	Review/Comment	30 days
3. Final RI/FS Work Plan(s)	Review/Concur	14 days
4. Community Relations Plan	Review/Concur	14 days
5. Health and Safety Plan	Review/Acceptance	30 days
6. Pre-QAPP Meeting	Mutual Agreement	14 days Advance Notice
7. Quality Assurance Project Plan (QAPP)	Review/Concur (Subsequent drafts and minor revisions 15-days)	1st draft - 30 days
8. CLP Data Package	Data Review Comments	Within 30 Days of package receipt
9. Draft RI	Review/Comment	30 days
10. Final RI	Review/Concur	14 days
11. Alternatives Array/ ARAR's Meeting	Review/Comment Within 3 weeks	30 days
12. Preliminary Draft FS	Review/Comment	30 days
13. Agency Draft FS	Review/Comment	30 days
14. Agency Review Meetings (EPA Branch meeting, State Division mtg.)	Meetings (Support agency meeting first, alternate agency represented)	Within 45 days of Ag. Draft FS
15. Public Comment Draft FS	Review/Concur	14 days
16. Draft Proposed Plan (lead agency drafts plan, support agency has option to coauthor)	Review/Comment	21 days

W042826

Documents Provided by MDNR to EPA	Type of Support Agency Review	Timeframe (Calendar Days)
17. Final Proposed Plan	Review/Concur	5 Working Days
18. Draft ROD	Review/Comment	20 Days
19. Final ROD	Review/Concur	14 Days

TABLE II

AGENCY CONTACTS

MDNR SPM

Scott Cornelius (517) 373-7367
Department of Natural Resources
Environmental Response Division
Superfund Section
P.O. Box 30028
Lansing, MI 48909

MDNR Secondary Contact

Sally Beebe (517) 373-4110
Department of Natural Resources
Environmental Response Division
Superfund Section
P.O. Box 30028
Lansing, MI 48909

EPA SAC

Terese Van Donsel (312) 353-6564
MI/WI Section (5HS-11)
U.S. EPA, Region V
230 S. Dearborn Street
Chicago, IL 60604

EPA Secondary Contact

Mary Pat Tyson, Chief, Unit #2 (312) 886-3006
MI/WI Section (5HS-11)
U.S. EPA, Region V
230 S. Dearborn Street
Chicago, IL 60604

Form Approved, OMB No. 2010-0004, Approval expires 8-31-89

U.S. ENVIRONMENTAL PROTECTION AGENCY
EPA ASSISTANCE AGREEMENT/AMENDMENT
PART I - ASSISTANCE NOTIFICATION INFORMATION

1. ASSISTANCE ID NO.: V995088-01
2. LOG NUMBER:
3. DATE OF AWARD: DEC 27 1990
4. MAILING DATE: JAN 03 1991

5. AGREEMENT TYPE
- Cooperative Agreement: X
- Grant Agreement:
- Assistance Amendment:

6. PAYMENT METHOD
- [ ] Advance
- [ ] Reimbursement
- [X] Letter of Credit 68-13-0519

Send Payment Request To:

7. TYPE OF ACTION

RECIPIENT ORGANIZATION

8. RECIPIENT
Michigan Department of Natural Resources
P.O. Box 30028
Lansing, Michigan 48909

9. PAYEE
Same as Block 8

EIN NO.: 38-6000134

CONGRESSIONAL DISTRICT: 6th

10. RECIPIENT TYPE: State

11. PROJECT MANAGER AND TELEPHONE NO.
Scott D. Cornelius
(517) 373-7367
(Same address as Block 8)

12. CONSULTANT (WWT Construction Grants Only)
N/A

EPA CONTACT

13. ISSUING OFFICE (City/State)
Chicago, Illinois

14. EPA PROJECT/STATE OFFICER AND TELEPHONE NO.
John Oaks (5HSM) (312) 886-0394
State Relations Unit, SPMB
U.S. Environmental Protection Agency
230 South Dearborn Street
Chicago, Illinois 60604

15. EPA CONGRESSIONAL LIAISON & TEL. NO.: Pat Gaskins (202) 382-5184

16. STATE APPL ID (Clearinghouse):

17. FIELD OF SCIENCE: N/A

18. PROJECT STEP (WWT CG Only): N/A

19. STATUTORY AUTHORITY
P.L. 96-510

20. REGULATORY AUTHORITY
40 CFR Parts 29, 30, 32, 33 and 35

21. STEP 2 + 3 & STEP 3 (WWT Construction Only)

a. Treatment Level		
b. Project Type	N	
c. Treatment Process		A
d. Sludge Design		

22. PROJECT TITLE AND DESCRIPTION
State-Lead Cooperative Agreement to fund production of a Risk Assessment at the Allied Paper site in Kalamazoo, Michigan

23. PROJECT LOCATION (Areas Impacted by Project)

City/Place	County	State	Congressional District
Kalamazoo, Michigan	Allegan/Kalamazoo	MI	3 & 4

24. ASSISTANCE PROGRAM (CFDA Program No. & Title): 66.802 Superfund

25. PROJECT PERIOD: 12/15/90

26. BUDGET PERIOD: 03/15/92

27. COMMUNITY POPULATION (WWT CG Only): N/A

28. TOTAL BUDGET PERIOD COST: $75,000

29. TOTAL PROJECT PERIOD COST: $75,000

FUNDS	FORMER AWARD	THIS ACTION	AMENDED TOTAL
30. EPA Amount This Action		$75,000	
31. EPA In-Kind Amount			
32. Unexpended Prior Year Balance			
33. Other Federal Funds			
34. Recipient Contribution			
35. State Contribution			
36. Local Contribution			
37. Other Contribution			
38. Allowable Project Cost		$75,000	

39. FISCAL

Program Element	FY	Appropriation	Doc. Control No.	Account Number	Object Class	Obligation/Deoblig. Amount
TGBY3A	91	68-2008145	SK0004	ITGB05FB9B	41.85	$75,000

W042829

WY02182

PART II—APPROVED BUDGET

ASSISTANCE IDENTIFICATION NO. V995088-01

TABLE A – OBJECT CLASS CATEGORY (Non-construction)	TOTAL APPROVED ALLOWABLE BUDGET PERIOD COST
1. PERSONNEL	$ 9,719
2. FRINGE BENEFITS	2,916
3. TRAVEL	4,500
4. EQUIPMENT	-0-
5. SUPPLIES	187
6. CONTRACTUAL	55,000
7. CONSTRUCTION	-0-
8. OTHER	156
9. TOTAL DIRECT CHARGES	72,478
10. INDIRECT COSTS: RATE % BASE	2,522
11. TOTAL (Share: Recipient 0 %. Federal 100 %.)	$75,000
12. TOTAL APPROVED ASSISTANCE AMOUNT	$75,000
TABLE B – PROGRAM ELEMENT CLASSIFICATION (Non-construction)	
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	
11.	
12. TOTAL (Share: Recipient ____ %. Federal ____ %.)	
13. TOTAL APPROVED ASSISTANCE AMOUNT	$
TABLE C – PROGRAM ELEMENT CLASSIFICATION (Construction)	
1. ADMINISTRATION EXPENSE	
2. PRELIMINARY EXPENSE	
3. LAND STRUCTURES, RIGHT-OF-WAY	
4. ARCHITECTURAL ENGINEERING BASIC FEES	
5. OTHER ARCHITECTURAL ENGINEERING FEES	
6. PROJECT INSPECTION FEES	
7. LAND DEVELOPMENT	
8. RELOCATION EXPENSES	
9. RELOCATION PAYMENTS TO INDIVIDUALS AND BUSINESSES	
10. DEMOLITION AND REMOVAL	
11. CONSTRUCTION AND PROJECT IMPROVEMENT	
12. EQUIPMENT	
13. MISCELLANEOUS	
14. TOTAL (Lines 1 thru 13)	
15. ESTIMATED INCOME (If applicable)	
16. NET PROJECT AMOUNT (Line 14 minus 15)	
17. LESS: INELIGIBLE EXCLUSIONS	
18. ADD: CONTINGENCIES	
19. TOTAL (Share: Recipient ____ %. Federal ____ %.)	
20. TOTAL APPROVED ASSISTANCE AMOUNT	$

W042830

A. GENERAL CONDITION

The recipient covenants and agrees that it will expeditiously initiate and timely complete the project work for which assistance has been awarded under this agreement, in accordance with all applicable provisions of 40 CFR Chapter I, Subchapter B. The recipient warrants, represents, and agrees that it, and all its contractors, employees and representatives, will comply with all applicable provisions of 40 CFR Chapter I, Subchapter B, INCLUDING BUT NOT LIMITED TO the provisions of 40 CFR 35 subpart 0.

B. SPECIAL CONDITIONS

1. RECYCLED PAPER

Pursuant to EPA Order 1000.25, dated January 24, 1990, the recipient agrees to use recycled paper for all reports which are prepared as a part of this agreement and delivered to the Agency. This requirement does not apply to reports which are prepared on forms supplied by EPA. This requirement applies even when the cost of recycled paper is higher than that of virgin paper.

2. SMALL BUSINESS IN RURAL AREAS

By accepting this award, the recipient agrees to comply with Section 129 of Public Law 100-590, the Small Business Administration Reauthorization and Amendment Act of 1988. Therefore, if the recipient awards a contract under this assistance agreement, it will utilize the following affirmative steps relative to Small Business in Rural Areas (SBRAs):

a. Placing SBRAs on solicitation lists;
b. Ensuring that SBRAs are solicited whenever they are potential sources;
c. Dividing total requirements when economically feasible, into small tasks or quantities to permit maximum participation by SBRAs;
d. Establishing delivery schedules, where the requirements of work will permit, which would encourage participation by SBRAs;
e. Using the services of the Small Business Administration and the Minority Business Development Agency of the U.S. Department of Commerce, as appropriate; and
f. Requiring the contractor, if it awards subcontracts, to take the affirmative steps in subparagraphs a. through e. of this condition.

3. DRUG-FREE WORKPLACE

In accordance with the Drug-Free Workplace Act of 1988 (Federal Register, 1/31/89, P4946) and EPA's implementing regulation of 40 CFR Part 32, Subpart F, Appendix C, the recipient certifies that it will provide a drug-free workplace by:

a. publishing a statement notifying employees that the unlawful manufacture, distribution, dispensing, possession, or use of controlled substances is prohibited in the recipient's workplace and specifying the actions that will be taken against employees for violation of such prohibition;

b. establishing a drug-free awareness program to inform employees about—
   (1) the dangers of drug abuse in the workplace;
   (2) the recipient's policy of maintaining a drug-free workplace;
   (3) any available drug counseling, rehabilitation, and employee assistance programs; and
   (4) the penalities that may be imposed upon employees for drug abuse violations occurring in the workplace;

c. making it a requirement that each employee to be engaged in the performance of the project be given a copy of the statement required by paragraph a.;

d. notifying the employee in the statement required by paragraph a. that, as a condition of employment under the award, the employee will—
   (1) abide by the terms of the statement; and
   (2) notify the employer in writing of his or her conviction for a violation of a criminal drug statute occurring in the workplace no later than five calendar days after such conviction;

e. notifying the Award Official in writing within ten calendar days after receiving notice under subparagraph d (2) from an employee or otherwise receiving actual notice of such conviction;

f. taking one of the following actions, within 30 calendar days of receiving notice under subparagraph d (2), with respect to any employee who is so convicted—
   (1) taking appropriate personnel action against such an employee, up to and including termination, consistent with the requirements of the Rehabilitation Act of 1973, as amended; or
   (2) requiring such employee to participate satisfactorily in a drug abuse assistance or rehabilitation program approved for such purposes by a Federal, State, or local health, law enforcement, or other appropriate agency;

g. making a good faith effort to continue to maintain a drug-free workplace through implementation of paragraphs a, b, c, d, e and f.

The recipient shall insert in the space provided below the site(s) for performance of work done in connection with the specific award. Place of Performance (street address, city, county, State, and zip code).

4. MINORITY BUSINESS ENTERPRISE/WOMEN'S BUSINESS ENTERPRISE

The recipient agrees to submit to the award official a completed Standard Form 334 within 15 days after the end of each Federal fiscal quarter during which the recipient or its contractors award any subagreements to minority or women's businesses. Negative reports are also required.

5. ANTI-LOBBYING

By accepting this award, the recipient certifies that it will comply with the new Anti-Lobbying Act, Public Law 101-121, Section 319, and the OMB Interim Final Guidance, the "Governmentwide Guidance for New Restrictions on Lobbying", dated December 18, 1989.

Therefore, the recipient, by accepting this award, certifies to the best of his or her knowledge and belief, that:

a. No Federal appropriated funds have been paid or will be paid, by or on behalf of the undersigned, to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with the awarding of any Federal contract, the making of any Federal grant, the making of any Federal loan, the entering into of any cooperative agreement, and the extension, continuation, renewal, amendment, or modification of any Federal contract, grant, loan, or cooperative agreement.

b. If any funds other than Federal appropriated funds have been paid or will be paid to any person for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with this Federal contract, grant, loan, or cooperative agreement, the undersigned shall complete and submit Standard Form-LLL, Disclosure Form to Report Lobbying, in accordance with its instructions.

c. The undersigned shall require that the language of this certification be included in the award documents for all subawards at all tiers (including subcontracts, subgrants, and contracts under grants, loans, and cooperative agreements) and that all subrecipients shall certify and disclose accordingly.

This certification is a material representation of fact upon which reliance was placed when this transaction was made or entered into. Submission of this certification is a prerequisite for making or entering into this transaction imposed by Section 1352, Title 31 U.S. Code. Any person who fails to file the required certification shall be subject to a penalty of not less than $10,000 and not more than $100,000 for each such failure.

DISCLOSURE OF LOBBYING ACTIVITIES

Approved by OMB
0348-0046

Complete this form to disclose lobbying activities pursuant to 31 U.S.C. 1352
(See reverse for public burden disclosure.)

1. Type of Federal Action:
☐ a. contract
b. grant
c. cooperative agreement
d. loan
e. loan guarantee
f. loan insurance

2. Status of Federal Action:
☐ a. bid/offer/application
b. initial award
c. post-award

3. Report Type:
☐ a. initial filing
b. material change
For Material Change Only:
year _____ quarter _____
date of last report _____

4. Name and Address of Reporting Entity:
☐ Prime ☐ Subawardee
Tier _____, *if known:*

Congressional District, *if known:*

5. If Reporting Entity in No. 4 is Subawardee, Enter Name and Address of Prime:

Congressional District, *if known:*

6. Federal Department/Agency:

7. Federal Program Name/Description:

CFDA Number, *if applicable:* _____

8. Federal Action Number, *if known:*

9. Award Amount, *if known:*
$

10. a. Name and Address of Lobbying Entity
(if individual, last name, first name, MI):

b. Individuals Performing Services *(including address if different from No. 10a)*
(last name, first name, MI):

(attach Continuation Sheet(s) SF-LLL-A, if necessary)

11. Amount of Payment *(check all that apply):*
$ _____ ☐ actual ☐ planned

12. Form of Payment *(check all that apply):*
☐ a. cash
☐ b. in-kind: specify: nature _____
value _____

13. Type of Payment *(check all that apply):*
☐ a. retainer
☐ b. one-time fee
☐ c. commission
☐ d. contingent fee
☐ e. deferred
☐ f. other; specify: _____

14. Brief Description of Services Performed or to be Performed and Date(s) of Service, including officer(s), employee(s), or Member(s) contacted, for Payment Indicated in Item 11:

(attach Continuation Sheet(s) SF-LLL-A, if necessary)

15. Continuation Sheet(s) SF-LLL-A attached: ☐ Yes ☐ No

16. Information requested through this form is authorized by title 31 U.S.C. section 1352. This disclosure of lobbying activities is a material representation of fact upon which reliance was placed by the tier above when this transaction was made or entered into. This disclosure is required pursuant to 31 U.S.C. 1352. This information will be reported to the Congress semi-annually and will be available for public inspection. Any person who fails to file the required disclosure shall be subject to a civil penalty of not less than $10,000 and not more than $100,000 for each such failure.

Signature: _____
Print Name: _____
Title: _____
Telephone No.: _____ Date: _____

W042834

INSTRUCTIONS FOR COMPLETION OF SF-LLL, DISCLOSURE OF LOBBYING ACTIVITIES

This disclosure form shall be completed by the reporting entity, whether subawardee or prime Federal recipient, at the initiation or receipt of a covered Federal action, or a material change to a previous filing, pursuant to title 31 U.S.C. section 1352. The filing of a form is required for each payment or agreement to make payment to any lobbying entity for influencing or attempting to influence an officer or employee of any agency, a Member of Congress, an officer or employee of Congress, or an employee of a Member of Congress in connection with a covered Federal action. Use the SF-LLL-A Continuation Sheet for additional information if the space on the form is inadequate. Complete all items that apply for both the initial filing and material change report. Refer to the implementing guidance published by the Office of Management and Budget for additional information.

1. Identify the type of covered Federal action for which lobbying activity is and/or has been secured to influence the outcome of a covered Federal action.

2. Identify the status of the covered Federal action.

3. Identify the appropriate classification of this report. If this is a followup report caused by a material change to the information previously reported, enter the year and quarter in which the change occurred. Enter the date of the last previously submitted report by this reporting entity for this covered Federal action.

4. Enter the full name, address, city, state and zip code of the reporting entity. Include Congressional District, if known. Check the appropriate classification of the reporting entity that designates if it is, or expects to be, a prime or subaward recipient. Identify the tier of the subawardee, e.g., the first subawardee of the prime is the 1st tier. Subawards include but are not limited to subcontracts, subgrants and contract awards under grants.

5. If the organization filing the report in item 4 checks "Subawardee", then enter the full name, address, city, state and zip code of the prime Federal recipient. Include Congressional District, if known.

6. Enter the name of the Federal agency making the award or loan commitment. Include at least one organizational level below agency name, if known. For example, Department of Transportation, United States Coast Guard.

7. Enter the Federal program name or description for the covered Federal action (item 1). If known, enter the full Catalog of Federal Domestic Assistance (CFDA) number for grants, cooperative agreements, loans, and loan commitments.

8. Enter the most appropriate Federal identifying number available for the Federal action identified in item 1 (e.g., Request for Proposal (RFP) number; Invitation for Bid (IFB) number; grant announcement number; the contract, grant, or loan award number; the application/proposal control number assigned by the Federal agency). Include prefixes, e.g., "RFP-DE-90-001."

9. For a covered Federal action where there has been an award or loan commitment by the Federal agency, enter the Federal amount of the award/loan commitment for the prime entity identified in item 4 or 5.

10. (a) Enter the full name, address, city, state and zip code of the lobbying entity engaged by the reporting entity identified in item 4 to influence the covered Federal action.

    (b) Enter the full names of the individual(s) performing services, and include full address if different from 10 (a). Enter Last Name, First Name, and Middle Initial (MI).

11. Enter the amount of compensation paid or reasonably expected to be paid by the reporting entity (item 4) to the lobbying entity (item 10). Indicate whether the payment has been made (actual) or will be made (planned). Check all boxes that apply. If this is a material change report, enter the cumulative amount of payment made or planned to be made.

12. Check the appropriate box(es). Check all boxes that apply. If payment is made through an in-kind contribution, specify the nature and value of the in-kind payment.

13. Check the appropriate box(es). Check all boxes that apply. If other, specify nature.

14. Provide a specific and detailed description of the services that the lobbyist has performed, or will be expected to perform, and the date(s) of any services rendered. Include all preparatory and related activity, not just time spent in actual contact with Federal officials. Identify the Federal official(s) or employee(s) contacted or the officer(s), employee(s), or Member(s) of Congress that were contacted.

15. Check whether or not a SF-LLL-A Continuation Sheet(s) is attached.

16. The certifying official shall sign and date the form, print his/her name, title, and telephone number.

Public reporting burden for this collection of information is estimated to average 30 mintues per response, including time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding the burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to the Office of Management and Budget, Paperwork Reduction Project (0348-0046), Washington, D.C. 20503.

W042835

ASSISTANCE IDENTIFICATION NO. V995088-01

h. SPECIAL CONDITIONS *(Continued)*

PART IV

NOTE: The Agreement must be completed in duplicate and the Original returned to the Grants Administration Division for Headquarters awards and to the appropriate Grants Administrations Office for State and local awards within 3 calendar weeks after receipt or within any extension of time as may be granted by EPA.

Receipt of a written refusal or failure to return the properly executed document within the prescribed time, may result in the withdrawal of the offer by the Agency. Any change to the Agreement by the recipient subsequent to the document being signed by the EPA Award Official which the Award Official determines to materially alter the Agreement shall void the Agreement.

OFFER AND ACCEPTANCE

The United States of America, acting by and through the U.S. Environmental Protection Agency (EPA), hereby offers assistance/amendment to the Michigan Department of Natural Resources (RECIPIENT ORGANIZATION) for 100% of all approved costs incurred up to and not exceeding $ 75,000 (ASSISTANCE AMOUNT) for the support of approved budget period effort described in application *(including all application modifications)* MDNR Application for Allied Paper site dated December 13, 1990 (DATE AND TITLE) included herein by reference.

ISSUING OFFICE *(Grants Administration Office)*	AWARD APPROVAL OFFICE
ORGANIZATION/ADDRESS	ORGANIZATION/ADDRESS
Contracts and Grants Branch (5MCG) U.S. Environmental Protection Agency 230 South Dearborn Street Chicago, Illinois 60604	Waste Management Division (5HSM) U.S. Environmental Protection Agency 230 South Dearborn Street Chicago, Illinois 60604

THE UNITED STATES OF AMERICA BY THE U.S. ENVIRONMENTAL PROTECTION AGENCY

SIGNATURE OF AWARD OFFICIAL	TYPED NAME AND TITLE	DATE
Robert Springer for	Valdas V. Adamkus, Regional Administrator	DEC 27 1990

This Agreement is subject to applicable U.S. Environmental Protection Agency statutory provisions and assistance regulations. In accepting this award or amendment and any payments made pursuant thereto, (1) the undersigned represents that he is duly authorized to act on behalf of the recipient organization, and (2, the recipient agrees (a) that the award is subject to the applicable provisions of 40 CFR Chapter I, Subchapter B and of the provisions of this agreement (Parts I thru IV), and (b) that acceptance of any payments constitutes an agreement by the payee that the amounts, if any found by EPA to have been overpaid will be refunded or credited in full to EPA.

BY AND ON BEHALF OF THE DESIGNATED RECIPIENT ORGANIZATION

SIGNATURE	TYPED NAME AND TITLE	DATE
D Rector	Delbert Rector, Deputy Director	1/18/91

W042836

OMB Approval No 0348-0043

APPLICATION FOR FEDERAL ASSISTANCE

2. DATE SUBMITTED	Applicant Identifier
3. DATE RECEIVED BY STATE	State Application Identifier
4. DATE RECEIVED BY FEDERAL AGENCY	Federal Identifier

1. TYPE OF SUBMISSION:
Application: ☐ Construction ☒ Non-Construction
Preapplication: ☐ Construction ☐ Non-Construction

5. APPLICANT INFORMATION

Legal Name: Michigan Department of Natural Resources

Organizational Unit: Environmental Response Division

Address (give city, county, state, and zip code): P.O. Box 30028, Ingham County, Lansing, MI 48909

Name and telephone number of the person to be contacted on matters involving this application (give area code): Scott D. Cornelius (technical) 517-373-7367; Donna Holey (fiscal) 517-373-1750

6. EMPLOYER IDENTIFICATION NUMBER (EIN): 3 8 — 6 0 0 0 1 3 4

7. TYPE OF APPLICANT: (enter appropriate letter in box) [A]
A. State
B. County
C. Municipal
D. Township
E. Interstate
F. Intermunicipal
G. Special District
H. Independent School Dist.
I. State Controlled Institution of Higher Learning
J. Private University
K. Indian Tribe
L. Individual
M. Profit Organization
N. Other (Specify) _____

8. TYPE OF APPLICATION:
☒ New ☐ Continuation ☐ Revision

If Revision, enter appropriate letter(s) in box(es): ☐ ☐
A. Increase Award B. Decrease Award C. Increase Duration
D. Decrease Duration Other (specify):

9. NAME OF FEDERAL AGENCY: U.S. EPA, Region V, Chicago, IL - 60604

10. CATALOG OF FEDERAL DOMESTIC ASSISTANCE NUMBER: 6 6 . 8 0 2
TITLE: Superfund

11. DESCRIPTIVE TITLE OF APPLICANT'S PROJECT: Endangerment/Risk Assessment for Allied Paper/Portage Creek/ Kalamazoo River site (State lead enforcement)

12. AREAS AFFECTED BY PROJECT (cities, counties, states, etc.): Allegan/Kalamazoo Counties

13. PROPOSED PROJECT:
Start Date: 12/15/90
Ending Date: 3/15/92

14. CONGRESSIONAL DISTRICTS OF:
a. Applicant: Sixth District
b. Project: Third & Fourth Districts

15. ESTIMATED FUNDING:

a. Federal	$	75,000 .00
b. Applicant	$	.00
c. State	$	.00
d. Local	$	.00
e. Other	$	.00
f. Program Income	$	.00
g. TOTAL	$	75,000 .00

16. IS APPLICATION SUBJECT TO REVIEW BY STATE EXECUTIVE ORDER 12372 PROCESS?
a. YES THIS PREAPPLICATION/APPLICATION WAS MADE AVAILABLE TO THE STATE EXECUTIVE ORDER 12372 PROCESS FOR REVIEW ON:
DATE 12/11/90
b. NO. ☐ PROGRAM IS NOT COVERED BY E.O. 12372
☐ OR PROGRAM HAS NOT BEEN SELECTED BY STATE FOR REVIEW

17. IS THE APPLICANT DELINQUENT ON ANY FEDERAL DEBT?
☐ Yes If "Yes," attach an explanation. ☒ No

18. TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL DATA IN THIS APPLICATION/PREAPPLICATION ARE TRUE AND CORRECT. THE DOCUMENT HAS BEEN DULY AUTHORIZED BY THE GOVERNING BODY OF THE APPLICANT AND THE APPLICANT WILL COMPLY WITH THE ATTACHED ASSURANCES IF THE ASSISTANCE IS AWARDED

a. Typed Name of Authorized Representative: Delbert Rector	b. Title: Deputy Director	c. Telephone number: 517-373-7917
d. Signature of Authorized Representative		e. Date Signed

Previous Editions Not Usable

Standard Form 424 (REV. 1-88)
Prescribed by OMB Circular A-102

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W042837

WY02183

OMB Approval No. [illegible]

BUDGET INFORMATION – Non-Construction Programs

SECTION A – BUDGET SUMMARY

Grant Program Function or Activity (a)	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1. Superfund	66-802	$	$	$ 75,000	$	$ 75,000
2.						
3.						
4.						
5. TOTALS		$	$	$ 75,000	$	$ 75,000

SECTION B – BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY (1)	(2)	(3)	(4)	Total (5)
a. Personnel	$ 9,719	$	$	$	$
b. Fringe Benefits	2,916				
c. Travel	4,500				
d. Equipment	-0-				
e. Supplies	187				
f. Contractual	55,000				
g. Construction	-0-				
h. Other	156				
i. Total Direct Charges (sum of 6a - 6h)	72,478				
j. Indirect Charges	2,522				
k. TOTALS (sum of 6i and 6j)	$ 75,000	$	$	$	$
Program Income	$	$	$	$	$

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W042838

SECTION C - NON-FEDERAL RESOURCES

(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) TOTALS
8.	$	$	$	$
9.				
10.				
11.				
12. TOTALS (sum of lines 8 and 11)	$	$	$	$

SECTION D - FORECASTED CASH NEEDS

	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	$	$	$	$	$
14. Non-Federal					
15. TOTAL (sum of lines 13 and 14)	$	$	$	$	$

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT

(a) Grant Program	(b) First	(c) Second	(d) Third	(e) Fourth
16.	$	$	$	$
17.				
18.				
19.				
20. TOTALS (sum of lines 16-19)	$	$	$	$

SECTION F - OTHER BUDGET INFORMATION

(Attach additional Sheets if Necessary)

21. Direct Charges: See attached budget detail

22. Indirect Charges: 19.967% of personnel & fringes

Remarks: See attached narrative

SF 424A (4-88) Page 2
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W042839

WY021833

OMB Approval No. 0348-0040

ASSURANCES — NON-CONSTRUCTION PROGRAMS

Note: Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the awarding agency. Further, certain Federal awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant I certify that the applicant:

1. Has the legal authority to apply for Federal assistance, and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project costs) to ensure proper planning, management and completion of the project described in this application.

2. Will give the awarding agency, the Comptroller General of the United States, and if appropriate, the State, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to the award; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.

3. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.

4. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency.

5. Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. §§ 4728-4763) relating to prescribed standards for merit systems for programs funded under one of the nineteen statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C.F.R. 900, Subpart F).

6. Will comply with all Federal statutes relating to nondiscrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972, as amended (20 U.S.C. §§ 1681-1683, and 1685-1686), which prohibits discrimination on the basis of sex; (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. § 794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975, as amended (42 U.S.C.§§ 6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255), as amended, relating to nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating to nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§ 523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. 290 dd-3 and 290 ee-3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. § 3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and (j) the requirements of any other nondiscrimination statute(s) which may apply to the application.

7. Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal or federally assisted programs. These requirements apply to all interests in real property acquired for project purposes regardless of Federal participation in purchases.

8. Will comply with the provisions of the Hatch Act (5 U.S.C. §§ 1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in part with Federal funds.

9. Will comply, as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. §§ 276a to 276a-7), the Copeland Act (40 U.S.C. § 276c and 18 U.S.C. §§ 874), and the Contract Work Hours and Safety Standards Act (40 U.S.C. §§ 327-333), regarding labor standards for federally assisted construction subagreements.

10. Will comply, if applicable, with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area to participate in the program andto purchase flood insurance if the total cost of insurable construction and acquisition is $10,000 or more.

11. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in floodplains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. §§ 1451 et seq.); (f) conformity of Federal actions to State (Clear Air) Implementation Plans under Section 176(c) of the Clear Air Act of 1955, as amended (42 U.S.C. § 7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended, (P.L. 93-523); and (h) protection of endangered species under the Endangered Species Act of 1973, as amended, (P.L. 93-205).

12. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§ 1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.

13. Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. 470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. 469a-1 et seq.).

14. Will comply with P.L. 93-348 regarding the protection of human subjects involved in research, development, and related activities supported by this award of assistance.

15. Will comply with the Laboratory Animal Welfare Act of 1966 (P.L. 89-544, as amended, 7 U.S.C. 2131 et seq.) pertaining to the care, handling, and treatment of warm blooded animals held for research, teaching, or other activities supported by this award of assistance.

16. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§ 4801 et seq.) which prohibits the use of lead based paint in construction or rehabilitation of residence structures.

17. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act of 1984.

18. Will comply with all applicable requirements of all other Federal laws, executive orders, regulations and policies governing this program.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL	TITLE Deputy Director
APPLICANT ORGANIZATION Michigan Department of Natural Resources	DATE SUBMITTED

W042841

WY021835

Note: The Program Narrative begins on page 9.

COOPERATIVE AGREEMENT ASSURANCES

The State makes the following additional assurances attached as items 1 through 26 of this application and with the intention that each assurance be incorporated into any subsequent cooperative agreement amendment.

1. Procurement Standards

   This Agreement is subject to the procurement standards of Title 40 of the Code of Federal Regulations Part 35, Subpart 0.

2. Letter of Credit

   In accepting this Cooperative Agreement, the recipient agrees to the following conditions for the letter of credit method of financing:

   a.) Cash drawdowns will occur only when needed for disbursements.

   b.) Timely reporting of cash disbursements and balances will be provided, as required by the EPA Letter of Credit Users Manual.

   c.) The same standards of timing and reporting will be imposed on secondary recipients, if any.

   d.) When a drawdown under the letter of credit occurs, the recipient will show on the voucher (Form TFCS-5805) the Cooperative Agreement number, the appropriate EPA account number, and the drawdown amount applicable to each site/activity account (see attached "Instructions for Using the Superfund Account Number Under Cooperative Agreements"). The eighth digit of the account number (see Item 39, page 1 of the Cooperative Agreement) is the code to the appropriate activity assignment:

      B - Pre-Enforcement (negotiations)
      J - Pre-Remedial Activities
      L - Remedial Investigation/Feasibility Study
      M - Feasibility Study
      N - Remedial Design
      P - Oversight of Responsible Party
      R - Remedial Action
      S - Operation and Maintenance.
      7 - General Support and Maintenance

   e.) When funds for a specific activity have been exhausted but the work under the activity has not been completed, the recipient may not draw down from another activity or site account without written permission from the EPA Award Official.

   f.) Funds remaining in an account after completion of an activity may be either returned to EPA or adjusted to another activity or site, at EPA's discretion.

W042842

COOPERATIVE AGREEMENT ASSURANCES, continued

2. Letter of Credit, continued

g.) When an activity is completed, the recipient will submit a Financial Status Report (Standard Form 269) within 90 days to the EPA Award Official.

h.) Superfund recipients also must submit the SF 269 within 90 days after the close of each budget period. If the budget period is longer than one year the report must be submitted annually, based on the anniversary date of the award.

Failure on the part of the recipient to comply with the above conditions may cause the unobligated portions of the letter of credit to be revoked and the financing method changed to a reimbursable basis.

3. Prompt Payment Act Provisions

In accordance with section 2(d) of the Prompt Payment Act (PL 97-177), Federal funds may not be used by the recipient for the payment of interest penalties to contractors when bills are paid late, nor may interest penalties be used to satisfy cost-sharing requirements. Obligations to pay such interest penalties will not be obligations of the United States.

4. Lobbying

No portion of this award may be used for lobbying or propaganda purposes as prohibited by 18 USC section 1913 or by section 607 (a) of Public Law 96-74.

5. MBE/WBE

The recipient agrees to submit to the EPA Award Official a completed EPA Form 6005-1 within fifteen (15) days after the end of each Federal fiscal quarter. Reporting must continue for each Federal fiscal quarter thereafter until award of the last subagreement for the activities or tasks identified in the Cooperative Agreement.

6. Fund Balancing

CERCLA section 104(c)(4) and 121 requires that CERCLA-funded actions provide a cost-effective response, and, in certain circumstances specified in 121(d)(4)(F), balancing the need for protection of public health, welfare, and the environment against the availability of amounts from the fund to respond at other sites. If the State requests additional fund-financed response at the site, EPA will evaluate the request against available fund monies to determine whether it is appropriate. This Cooperative Agreement does not commit EPA to future funding for response actions at the site.

W042843

WY021837

COOPERATIVE AGREEMENT ASSURANCES, continued

7. NCP

All activities conducted under this Cooperative Agreement shall be consistent with the National Contingency Plan (NCP), 40 CFR Part 300. Remedial alternatives developed as part of any remedial investigation and feasibility study funded under this Agreement will be identified, evaluated, and ultimately categorized as source control or management of migration measures based upon the factors established in the NCP.

8. Project Reviews

The EPA Remedial Project Manager or his/her designee will conduct periodic reviews and visits to evaluate project activities to assure compliance with applicable EPA requirements and regulations. The State Project Manager agrees to ensure that schedules and reporting requirements are met or that any changes are agreed to by EPA. All State-proposed modifications to schedules or activities will be reported to the EPA Cooperative Agreement Project Officer for review and concurrence. The EPA Cooperative Agreement Project Officer agrees to notify the State Project Coordinator of schedule changes resulting from EPA enforcement activities.

9. Site Access and Permits

The State assures that to the extent of its authority it will assume the responsibility for undertaking formal or informal actions necessary to satisfy all Federal, State, and local requirements, including permits and approvals, necessary for implementing activities addressed in this Cooperative Agreement. The State assures that to the extent of its authority it will assume responsibility for undertaking formal or informal actions necessary to provide access to the site as well as all rights-of-way and easements necessary to complete the response actions. The State will to the extent of its authority seek to provide for access to the site for EPA employees and contractors at all reasonable times. EPA agrees to the extent of its authority to assist the State in securing access when necessary. The State may not approve any compensation to property owners from Federal funds provided under this Cooperative Agreement without EPA approval.

10. Community Relations

The State and EPA agree that community relations activities at the site will be conducted in accordance with the community relations plan to be prepared according to the Statement of Work contained in the State's application. In implementing its plan, the State agrees to comply with all relevant EPA policy and guidance on community relations programs and procedures.

W042844

COOPERATIVE AGREEMENT ASSURANCES, continued

11. Site Safety Plan

A final safety plan shall be prepared for field activities performed at this site and shall be submitted to the EPA Cooperative Agreement Project Officer for review prior to implementation. The plan shall be consistent with the requirements of the National Contingency Plan, applicable Federal safety standards and guidance identified by EPA, and applicable State safety standards and guidance. Each subagreement awarded under this Agreement must contain a condition that requires contractors and subcontractors to comply with the approved safety plan and all relevant Federal health and safety standards. No field work at a site shall occur until a safety plan for that site has been reviewed by EPA, for consistency with EPA requirements, and the State and is finalized.

12. Access to Site Files and Confidentiality

At U.S. EPA's request, and in accordance with State law, the State shall make available any information in its possession concerning the site. If said information was submitted by the State under a claim of confidentiality, said information shall be treated in accordance with 40 CFR Part 2. Absent such a claim, U.S. EPA may make said information available to the public without further notice. At the State's request and in accordance with Federal law, U.S. EPA agrees to share information and reports developed as part of its responsibilities under this Contract. The State agrees not to release any information which the U.S. EPA requests be withheld. In making such a request, the U.S. EPA shall identify the basis on which such information is exempt from disclosure under the Federal Freedom of Information Act. Moreover, the U.S. EPA agrees to provide the State with reasonable and necessary support (e.g. witnesses or affidavits) that the State may need to defend against a challenge to the withholding of such information.

13. Reporting

The State agrees to submit progress reports to the EPA Cooperative Agreement Project Officer within forty-five (45) days of the end of each Federal fiscal quarter. These reports shall include information specific in 40 CFR part 35 Subpart O, Section 35.6650 and Section 35.6655.

14. Submission of Technical and Procurement Documents

The State agrees to submit all plans, reports, specifications, and/or recommendations to the EPA Cooperative Agreement Project Officer for review and concurrence, prior to issuance or implementation, to ensure technical adequacy and consistency with the scope of work of this Agreement. Final subagreement project assignments and work plans and subagreement project assignment modifications shall be submitted to the EPA Cooperative Agreement Project Officer prior to issuance for review to ensure compliance with the terms of this Agreement.

W042845

WY021839

COOPERATIVE AGREEMENT ASSURANCES, continued

15. CERCLA Health-Related Activities

The State agrees that no human subject testing or health effects analyses may be funded under this Agreement. Any CERCLA health-related activities must be coordinated with the United States Department of Health and Human Services, pursuant to sections 104(b) and 104(i) of CERCLA.

16. Exclusion of Third Party Benefits

This Agreement is intended to benefit only the State and EPA. It extends no benefit or rights to any party not a signatory to this Agreement. In addition, EPA does not assume any liability to third parties with respect to losses due to bodily injury or property damages that exceed the limitations contained in the provisions of 28 U.S.C. sections 1346(b), 2671-2680. To the extent permitted by State law, the State does not assume liability to any third parties with respect to losses due to bodily injury or property damage.

17. Responsible Party Activities

If, during the period of performance for this Agreement, responsible parties agree to perform, or to pay for the performance of, any work elements included in the statement of work (SOW) for this Agreement, EPA and the State agree to negotiate jointly any necessary modifications to this Agreement. If appropriate, this Agreement may be amended to adjust the State's letter of credit and the project SOW accordingly.

Should the state enter into any agreement with any PRPs for the performance of an RI/FS, the State shall reserve for itself the performance of any endangerment/risk assessment associated with that work.

18. Contractor Conflict of Interest

EPA has determined that participation in a response action at a site by a contractor that is a potentially responsible party (PRP) or works for a PRP at the site could create an organizational conflict of interest (i.e., the contractor would be placed in a position where its interests would conflict with its ability to perform the work properly or would otherwise adversely affect State or Federal enforcement action). Therefore, the State shall require each bidder or offeror on any subagreement funded under this Cooperative Agreement to provide, with its bid or proposal:

a.) Information on its status and the status of parent companies, subsidiaries, affiliates, subcontractors, and current clients as PRPs at the site.

W042846

COOPERATIVE AGREEMENT ASSURANCES, continued

18. Contractor Conflict of Interest, continued

b.) Certification that, to the best of its knowledge and belief, it has disclosed such information or no such information exists.

c.) A statement that it immediately shall disclose any such information discovered after submission of its bid or proposal, or after award.

The State shall evaluate such information and shall exclude any bidder or offeror whose conflict of interest is significant and cannot be avoided or otherwise resolved.

19. Subagreement Conflict of Interest and Technical Support for Enforcement Activities

The State shall include the following, or equivalent, clauses in each subagreement for services or construction awarded under this Cooperative Agreement:

a.) The contractor shall not provide data generated or otherwise obtained in the performance of its responsibilities under this contract to any party other than State and Federal agencies and their authorized agents.

b.) The contractor shall not accept employment from any party other than State or Federal agencies for work directly related to the site(s) covered under this contract for a period of three years from termination of the contract, or until any litigation related to the site(s) is completed, whichever is longer, unless it has received a written release from this restriction from the contracting State agency, including an EPA concurrence.

c.) The contractor, upon request, shall provide witnesses and documentation of activities performed and costs incurred under this contract to State and Federal agencies during the period of performance and for three years from termination of the contract, or until any litigation related to the site(s) is completed, whichever is longer. The contractor shall be entitled to reasonable compensation for any such activities performed.

20. Emergency Response Actions During a Remedial Project

Any emergency response activities conducted pursuant to the National Contingency Plan, 40 CFR section 300.65, shall not be restricted by the terms of this Agreement. EPA and the State may jointly suspend or modify the remedial activities in the SOW in this Agreement during and subsequent to necessary emergency response actions.

W042847

WY021841

COOPERATIVE AGREEMENT ASSURANCES, continued

21. Negation of Agency Relationship

Nothing contained in this Agreement shall be construed to create, either expressly or by implication, the relationship of agency between EPA and the State. Any standards, procedures, or protocols prescribed in this Agreement to be followed by the State during the performance of its obligations under this Agreement are to assure the quality of the final product of the actions contemplated by this Agreement, and do not constitute a right to control the actions of the State. EPA (including its employees and contractors) is not authorized to represent or act on behalf of the State in any matter relating to this Agreement, and the State (including its employees and contractors) is not authorized to represent or act on behalf of EPA in any matter related to this Agreement. Neither EPA nor the State shall be liable for the contracts, acts, errors, or omissions of the agents, employees, or contractors of the other party entered into, committed, or performed with respect to or in the performance of, this Agreement.

22. Notice of Intent to Settle or Initiate Proceedings

EPA and the state agree that, with respect to the claims that each may be entitled to assert against any third person (herein called the "responsible party," whether one or more) for reimbursement of any services, materials, monies, or other thing of value expended by EPA or the State for response activity at the site(s) described herein, neither EPA nor the State will enter into a settlement with, or initiate a judicial or administrative proceeding against, a responsible party for the recovery of such sums except after having given notice in writing to the other party to this Agreement not less than thirty (30) days in advance of the date of the proposed settlement or commencement of the proposed judicial or administrative proceedings. Neither party to this Agreement shall attempt to negotiate for nor collect reimbursement of any response costs on behalf of the other party, and authority to do so is hereby expressly negated and denied.

23. Cooperation and Coordination in Cost Recovery Efforts

EPA and the State agree that they will cooperate and coordinate in efforts to recover their respective costs of response actions taken at the site described herein, including the negotiation of settlement and the filing and management of any judicial actions against potential third parties. This shall include coordination in the use of evidence and witnesses available to each in the preparation and presentation of any cost recovery action, excepting any documents or information which may be confidential under the provisions of any applicable State or Federal law or regulation.

W042848

COOPERATIVE AGREEMENT ASSURANCES, continued

24. Judicial Action in U.S. District Court

EPA and the State agree that judicial action taken by either party against a potentially responsible party pursuant to CERCLA for recovery of any sums expended in response actions at the site described herein shall be filed in the United States District Court for the judicial district in which the site described in this Agreement is located, or in such other judicial district of the United States District Court as may be authorized by section 113 of CERCLA, and agreed to in writing by the parties of this Agreement.

25. Litigation Under CERCLA Sections 106 and 107

The award of this Agreement does not constitute a waiver of EPA's rights to bring an action against any person or persons for liability under sections 106 or 107 of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), or any other statutory provisions or common law.

26. In accepting this Cooperative Agreement, the recipient agrees to the following conditions:

a. The State's pending lawsuit, Kelly v. Allied Paper, et. al. No. L87-89-CA5 filed December 7, 1987, shall not in any way relieve the State of its obligation to comply with the CERCLA administrative process for selection of a response action(s) for this site. These obligations include, without limitation, compliance with the provisions of this agreement and the provisions of 40 C.F.R. 300.515 (d) and (e) for selection of remedial action(s) at the site. In addition, the State will not publish a proposed plan that U.S. EPA has not approved. As a term of this cooperative agreement, the State agrees to continue to use its best efforts to stay the pending lawsuit, referred to above, as it affects the remedial action and its selection, and to continue to use the administrative process provided by the statute.

26. In accepting this Cooperative Agreement, the recipient agrees to the following conditions, continued

b. The State agrees not to rely on a RI/FS, or otherwise implement, any CERCLA response actions based on a RI/FS that has not received the concurrence of the EPA.

Failure on the part of the recipient to comply with the above conditions may require the state to forfeit all further federal funds and to repay all federal funds used to complete the RI/FS, or portions thereof, which did not receive EPA's concurrence.

W042849

WY021843

PROGRAM NARRATIVE
ALLIED PAPER INC./PORTAGE CREEK/KALAMAZOO RIVER site
KALAMAZOO AND ALLEGAN COUNTIES

OVERVIEW

This request for a new state lead enforcement cooperative agreement is to fund an Endangerment/Risk Assessment for the Allied Paper Inc./Portage Creek/Kalamazoo River site. The overall purpose of the Endangerment/Risk Assessment process is to identify and characterize immediate and potential risks to public health and the environment associated with release and exposure of contaminants. The assessment will integrate information on the toxicity of identified contaminants with estimates of exposure to quantify risk, which in turn will provide justification necessary for remedial actions.

BACKGROUND

On August 30, 1990, the Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site was officially included on the National Priority List (NPL) pursuant to the Comprehensive Environmental Response, Liability and Compensation Act (CERCLA). This site includes Portage Creek, from Cork Street just above the Bryant Mill Pond, in the City of Kalamazoo Michigan, to its confluence with the Kalamazoo River and the Kalamazoo River from this confluence downstream to the Allegan City Dam. In total this site includes about a 3-mile stretch of Portage Creek and a 35-mile stretch of the Kalamazoo River.

The sediments, soils, water column and biota within this site are contaminated with polychlorinated biphenyls (PCBs), a hazardous substance and probable human carcinogen. This site contains about 200,000 pounds of PCB in the sediments. The PCBs continue to migrate off-site due to the river flow, and substantially contribute to the on-going contamination to the water column, biota and Lake Michigan. As a direct result of this contamination the Michigan Department of Public Health (MDPH) has issued a fish consumption advisory (1990) for this site. This warning has been reissued annually since 1977.

The State has identified three parties who are potentially responsible for the contamination of this site. These potentially responsible parties (PRPs) include HM Holdings Inc./Allied Paper Company, Georgia Pacific Corporation and Simpson (Plainwell) Paper Company. The MDNR has conducted negotiations with all three PRPs. The negotiations have produced an agreement for the PRPs to conduct and fund the entire Remedial Investigation/Feasibility Study on this site.

W042850

STATEMENT OF WORK
ENDANGERMENT/RISK ASSESSMENT

GENERAL DESCRIPTION

The assessment process is multi-faceted and governed to a large extent by site-dependent conditions. The assessment process can be divided into five components, as follow:

*Selection of contaminants

*Exposure assessment

*Toxicity assessment

*Risk characterization

*Endangerment/Risk Assessment Technical Memorandum

Included in the assessment will be an evaluation and transformation of site-specific demographic, physical, chemical and biologic factors into qualitative and/or quantitative interpretations of actual or potential harm associated with the site. Among the parameters to be considered in the assessment process for this site are:

*intrinsic toxicity of identified contaminants and the relevant media (e.g., water, air, soil) in which they occur;

*medium-specific fate of the contaminants within the environment including assessments of relative release and degradation processes (i.e., physical, chemical, biological properties);

*analysis of the potential pathways and extent of exposure;

*determination of human and environmental populations at risk;

*the probability and extent to which a threat exists; and

*evaluation of estimated risk by comparison with appropriate standards.

The assessment will be prepared in accordance with EPA guidance; Risk Assessment Guidance for Superfund (Volumes I and II); December 1989.

W042851

WY021845

STATEMENT OF WORK, cont.
ENDANGERMENT/RISK ASSESSMENT

ASSESSMENT TASKS

1. Selection of Contaminants.....estimated cost $10,000

The aim of contaminant selection is to identify a limited number of substances from the total possible contaminants to arrive at a representative group of high risk substances for subsequent characterization. This will be accomplished by screening initial sample information and selecting substances based on factors which may influence potential risk, such as concentration at the site, potential critical exposure pathways and the intrinsic toxicity of the compound. To date, preliminary RI findings suggest that PCB's will be the major contaminant of concern. However, all of the contaminants found at the site will be evaluated to result in the selection of "indicator chemicals" which encompass the relevant physiochemical and toxicological properties of the contaminants present. These "indicator chemicals" will be subjected to the analyses outlined in the following tasks.

2. Exposure Assessment.....estimated cost $20,000

The aim of this component of the EA process is to estimate exposure levels using a process which identifies and integrates actual and potential exposure pathways with potentially exposed human and environmental populations. This will be accomplished by determining the mechanism of substance release into the environment, including estimating the potential release rate of the chemical from its source. Second, the environmental fate of the substance will be evaluated. In this step, environmental transport (e.g., groundwater migration), transformation (e.g., biodegradation) and transfer (e.g., volatilization) processes are considered. Finally, potential exposed populations will be identified and the uptake and absorption of the substances will be calculated to determine expected exposure levels.

3. Toxicity Assessment.....estimated cost $20,000

Existing literature will be reviewed and the toxic effects of the substances will be evaluated to determine the nature and extent of the hazards associated with exposure. A qualitative description of the toxic effects, as well as quantitative data such as no-effect levels and established acceptable levels, will be generated to provide toxicity profiles for each substance.

W042852

STATEMENT OF WORK, cont.
ENDANGERMENT/RISK ASSESSMENT

ASSESSMENT TASKS, cont.

4. Risk Characterization.....estimated cost $20,000

Characterization of risk requires integrating information developed during the exposure and toxicity assessments to yield characterization of actual or potential risks. Exposure levels from the various pathways will be compared with "acceptable levels" defined by regulatory legislation and guidelines to determine if the substances pose a risk. The risk characterization will address several types of actual and potential risks, including carcinogenic risks and non-carcinogenic risks. Discussions will be held between MDNR and U.S. EPA to determine the acceptable methodologies used during this characterization.

5. Endangerment/Risk Assessment Technical Memorandum.estimated cost $ 5,000

A technical memorandum will be prepared which will determine and document the probability and magnitude of actual or potential harm to public health, welfare or the environment as determined by the description of current situation and the proposed response. This assessment will be based on results of the investigation and subsequent evaluations of the data and will consider hazardous substances and/or waste present in all relevant pathways, environmental fate and transport mechanisms, intrinsic toxicological properties or human health standards and criteria, exposure pathways and probability of sensitive populations being exposed, population at risk, and characterization of risk or harm.

TASK SCHEDULE

ACTIVITY	OUTPUT	TARGET INITIATION After Award (Month-Day)	TARGET COMPLETION After Award (Month-Day)	EST. COST

Note: The target dates for initiation and completion as well as the schedule will be determined by the interrelationship of the PRPs and MDNR as well as the Work Plan submittal.

W042853

WY021847

ALLIED/PORTAGE CREEK/KALAMAZOO RIVER SUPERFUND SITE
ENDANGERMENT/RISK ASSESSMENT

BUDGET DETAIL

Personnel:

FTE	Class and Level	Salary (estimated)	Cost	Category Totals
.25	Environmental Quality Analyst VII	$38,875	$9,719	$ 9,719

Fringes:
Based on a rate of 30% of salaries and wages ($9,719) — $ 2,916

Travel:
-Project management - 3 trip to Chicago X 3 people per trip @ $500 lodging and food/transportation/person/night X 1 night/trip. — $ 4,500 — $ 4,500

Contractual:
Endangerment/Risk Assessment (EA/RA) — $ 55,000

Supplies:
Various supplies as needed to complete the EA/RA — $ 187

Equipment: — $ 0

Indirect Costs:
Based on a rate of 19.967% of salaries and fringes — $ 2,522

Other Costs:
Audit rate (.03% of total less personnel, fringes, and indirect costs) and other miscellaneous services such as copying. — $ 156

TOTAL — $75,000

W042854

APPLICATION FOR FEDERAL ASSISTANCE (Short Form)
PART II - BUDGET DATA

NEW CA
ALLIED/PORTAGE/KALAMA
ENFORCEMENT (B)

OBJECT CLASS CATEGORIES	CURRENT APPROVED BUDGET	CHANGE REQUESTED	NEW OR REVISED BUDGET
1. PERSONNEL	-0-	$9,719.00	$9,719.00
2. FRINGES	-0-	$2,916.00	$2,916.00
3. TRAVEL	-0-	$4,500.00	$4,500.00
4. EQUIPMENT	-0-	$0.00	$0.00
5. SUPPLIES	-0-	$187.00	$187.00
6. CONTRACTUAL	-0-	$55,000.00	$55,000.00
7. CONSTRUCTION	-0-	$0.00	$0.00
8. OTHER	-0-	$156.00	$156.00
9. TOTAL DIRECT	-0-	$72,478.00	$72,478.00
10. INDIRECT	-0-	$2,522.00	$2,522.00
11. TOTAL	-0-	$75,000.00	$75,000.00
12. FEDERAL SHARE	-0-	$75,000.00	$75,000.00
13. NON-FEDERAL SHARE	-0-	$0.00	$0.00
14. PROGRAM INCOME			

15. DETAIL ON INDIRECT COSTS:

TYPE OF RATE (mark one box) [-] PROVISIONAL [ ] PREDETERMINED

[X] FINAL [ ] FIXED

RATE 19.967 % BASE $12,635.00 TOTAL AMOUNT $2,522.83

PART III
PROGRAM NARRATIVE STATEMENT
(Attach additional sheets, if necessary)

SEE ATTACHED NARRATIVE.

W042855

WY021849

100% Recycled 30% PCW

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
230 SOUTH DEARBORN ST.
CHICAGO, ILLINOIS 60604

REPLY TO THE ATTENTION OF:

5RA-14

26 DEC 1989

RECEIVED
FEB 08 1990
ERD-SUPERFUND

Δπ EXHIBIT 2406
Deponent Buchholtz
Date 11-10-14 Rptr. CR
WWW.DEPOBOOK.COM

David F. Hales, Director
Michigan Department of Natural Resources
Stevens T. Mason Building
P.O. Box 30028
Lansing, Michigan 48909

Dear Mr. Hales:

I am pleased to enter into the Superfund Memorandum of Agreement (SMOA) with the Michigan Department of Natural Resources. Enclosed is your copy of the signed Agreement. I recognize that this SMOA represents many hours of work by our respective Superfund managers and I appreciate their efforts. As your Agency undertakes the leadership for enforcement and remedial response at a greater number of sites on the National Priorities List, I want to assure you that we in Region V are committed to fulfilling the terms of this Agreement in a spirit of cooperation and mutual support.

I wish you continued success in your endeavors.

Sincerely yours,

Valdas V. Adamkus
Regional Administrator

Enclosure

2406

W042807

Superfund Memorandum of Agreement

The Michigan Department of Natural Resources and the United States Environmental Protection Agency, Region V hereby enter into the following Superfund Memorandum of Agreement.

I. INTRODUCTION - PURPOSE

A. Introduction

This Superfund Memorandum of Agreement ("SMOA") is entered into by the United States Environmental Protection Agency, Region V (EPA), and the State of Michigan by its Michigan Department of Natural Resources ("MDNR") (collectively "the Parties") pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund), as amended, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). To the extent this SMOA conflicts with 40 CFR part 35 or the NCP, Part 35 and the NCP are controlling. This agreement does not limit the ultimate enforcement authority of EPA or the United States Government.

B. Purpose

This SMOA delineates the respective roles and responsibilities of each Party as they relate to the conduct of a Superfund program to clean up hazardous waste sites in the State of Michigan. Specifically, the purposes of this SMOA are to:

1. Establish the MDNR/EPA relationship with respect to Superfund programmatic activities in order to construct and maintain a cooperative working relationship that best serves EPA and State interests.

2. Define the process to designate the "lead agency", the State Project Manager (SPM), and the EPA Remedial Project Manager (RPM) and the State Project Coordinator (SPC) and the Regional Project Officer (PO) for each NPL site in Michigan.

3. Establish procedures for close cooperation and communication between EPA and the MDNR in planning for response activities for optimal use of the Parties' resources, minimizing conflicts and duplication of effort in conducting site-specific response activities.

4. Set the general framework for the MDNR/EPA relationship, so that site-specific MDNR/EPA communication is enhanced.

II. AGREEMENT

NOW, THEREFORE, IT IS AGREED THAT:

A. Site-Specific Designation of Lead/Support Agency:

As of the effective date of this SMOA the MDNR is the designated lead agency for remedial activities at selected NPL sites in the State of Michigan. Sites listed on the NPL that have been designated as Federal or State lead are indicated in Attachment A. The MDNR and EPA will agree annually on the lead agency role for any new sites that are scheduled for remedial activity.

Lead agency designation may be reviewed at any point in the response process. There may be a need to switch the lead agency role during the life of a site cleanup because of changing conditions such as funding needs or enforcement determinations. The switch in lead agency designation will be by mutual consent of the MDNR and the EPA. The most logical and reasonable points for a change in the lead agency are prior to RI/FS and after ROD concurrence but before the beginning of Remedial Design (RD) to maintain project continuity.

B. SPM/RPM Designations

The MDNR will designate a SPM and the EPA will designate an RPM whenever a site is scheduled for remedial activity.

The SPM/RPM designations for current Michigan NPL sites are set forth in Attachment A to this SMOA. This attachment will be updated quarterly.

C. Points of Contact

1. Overall Program Communication, Coordination, and Planning - The State's Superfund Section Chief and EPA's, Michigan/Wisconsin Section Chief and Michigan Project Officer are responsible for overall program communication and coordination. They should meet quarterly to track progress of the program, to discuss any problems that may have arisen, and to plan for the future.

2. Mid-year Review and Significant Issues - The Associate Division Director, Office of Superfund and MDNR's Environmental Response Division Chief will involve them-

selves on significant issues that arise and will be the principal officials involved in the third quarterly meeting at which a mid-year joint program review is conducted.

3. Cooperative Agreement/SSC Coordination

The State Project Coordinator (SPC) is the primary liaison with the EPA Project Officer (PO).

a. The SPC:

1) Coordinates yearly and quarterly SCAP development to ensure adequate and accurate planning coordination with EPA.

2) Coordinates application for and tracks administration of all Cooperative Agreements (CA) between the State and the EPA.

3) Reviews for completeness and transmits to the PO quarterly technical and financial progress reports for each CA 45 days after the end of each quarter of the Federal Fiscal year.

4) Coordinates State activities regarding resolution of program or CA audits.

5) Coordinates with EPA relative to tracking of all work products under CAs.

6) Coordinates with PO to schedule planning and evaluation meetings; prepares response to follow-up reports.

b. EPA Project Officer (PO):

1) Coordinates EPA review of all draft and final applications for and amendments of cooperative agreements (CAs) and monitors all State CAs.

2) Coordinates with SPC, RPM and others within EPA to ensure adequate and accurate planning coordination with the State related to State-lead projects under CAs.

3) Receives and coordinates review of all work products under CAs to ensure compliance with the CAs and documentation of that compliance.

4) Receives and coordinates review of all quarterly technical and financial progress reports as required by the CAs.

5) Coordinates EPA Superfund program activities regarding resolution of CA audits.

6) Schedules and conducts mid-year and end of year evaluation meetings with the State; prepares follow-up reports documenting agreements reached and discussing any issues.

7) Coordinates negotiation of Superfund State Contracts (SSCs) for any remedial action projects designated as "Federal-lead" projects.

4. SPM/RPM Interaction and Responsibilities

Interaction

The main route of communication and resolution of site-specific technical issues will be through the lead and support agency designated SPMs and RPMs.

Responsibilities

a. The State SPM will:

1) Act as the State point of contact for all site-specific issues.

2) Manage remedial response activities at State lead sites, including the development and administration of cooperative agreements, development and administration of contracts or contract subagreements, oversight of on-site activities, project documentation, and development and/or review of technical documents and recommendations for remedial response activities.

3) Review, comment and recommend approval or revision of technical aspects of submittals from EPA according to the event schedule in Attachment B.

4) Submit work products on State lead sites to the EPA in accordance with the review schedules in Attachment B and the cooperative agreements.

5) Coordinate with appropriate State and Federal staff to assure adequate progress is made pursuant to the CA-approved schedule and Regional targets.

6) Provide for community relations activities wherever the State has the lead for community relations at a site.

b. The EPA RPM will:

1) Act as the EPA point of contact for all site-specific technical and enforcement issues.

2) Serve as the Regional Site Project Officer (RSPO) for Superfund State Contracts (SSCs) on Federal-lead sites. This will include provision of quarterly reports and other documents to the State project manager as provided for in the SSCs.

3) In coordination with EPA Project Officer, review, comment and consult on technical aspects of submittals from MDNR according to the event schedule in Attachment B. Recommend approval or revisions of CA deliverables.

4) Coordinate with appropriate State and Federal staff to ensure adequate and timely resolution of SCAP budgeting and fiscal issues.

5) Coordinate with appropriate State and Federal staff to assure adequate progress is made pursuant to SSC and CA-approved schedules and Regional targets.

6) Submit work products on Federal lead Sites to the State in accordance with applicable SSCs and the review schedules in Attachment B.

D. Planning/Coordination Processes

1. Bi-annual Planning/Evaluation Processes

Participants in the bi-annual planning/evaluation processes will be at least the State and EPA Superfund program first and second line supervisors.

Planning and evaluation sessions: Sessions will be held in the 2nd and 4th quarters between EPA and MDNR to plan and coordinate State-Federal activities for the coming fiscal year. Evaluation sessions will be held in the 1st and 3rd quarters to evaluate program management by MDNR and EPA. Meetings shall include discussions and/or negotiations of the following items:

- EPA and State goals and objectives for the coming fiscal year
- MDNR/EPA resources (staffing, dollars, workload)
- MDNR/EPA SCAP projections and SPHS targets

- CAs/SSCs
- Schedules and milestones for deliverables
- MDNR-lead enforcement sites
- Implementation hurdles:
  - site-specific
  - administrative
  - procedural
- Agreed upon corrective actions for EPA or State shortfalls/problems
- SMOA update
- Changes in lead agency designations

Results of these sessions shall include:

- Commitments/targets (both State and Federal)
- Schedules for new CAs and SSCs or major amendments
- Amendments to this SMOA
- Lead/Support agency designations
- A summary report of the review of progress prepared by the EPA PO

2. Ongoing Program Coordination

Communication - MDNR and EPA Superfund program representatives will meet in either Chicago or Lansing at a minimum of once every three months (ideally in October, January, April, and July) to establish and maintain open communication between staff and to develop a rapport between the parties to ensure ongoing continuous program coordination. Topics should include a mutually agreed upon agenda.

In addition EPA and State Program representatives intend to engage in telephone conference calls as needed. These calls will provide opportunity to discuss ongoing and upcoming activities, to discover and resolve problems between the two parties, and to maintain open communication.

Program Status Data Management/Exchange - The State and EPA recognize and agree upon the need for a simple, effective system for compiling and maintaining Superfund program status data.

The parties agree to consider exchanging Superfund program status through the use of the CERCLIS data base system or another project/program data base system.

The Parties will work together to identify problems and to recommend solutions to the data exchange system as necessary.

3. Non-Site-Specific Documents

The EPA Project Officer and the Remedial & Enforcement Branch Chief are responsible for providing the State Project Coordinator (or the Superfund Section Chief) with copies of all non-site-specific EPA guidance, policy, regulations, and laws that are made available to the Project Officer and are relevant to Superfund activities.

The State agrees to submit to the EPA PO copies of all non-site-specific State guidance, policy, regulations and laws that are relevant to Superfund activities.

E. Inter-Agency Site-Specific Coordination

1. Review and Oversight

Attachment B contains a list of response process submittals which may be generated during the course of a Superfund investigation/ response action and designates the base level of EPA/MDNR oversight for each of the submittals. The definitions of review/oversight activities for this attachment are as follows:

a. Review and approve -

Site work or the next response process phase does not proceed until the support agency reviews and provides written approval.

b. Review and comment -

Site work or the next phase may proceed but the lead agency shall incorporate support agency comments (if any), as appropriate, into the site work.

c. Submit for information/maintenance of support agency files -

Lead agency submits a document to the support agency for information and maintenance of the support agency file.

It should be noted the level of review/oversight activity established in this article and Attachment represents the base level of support agency review/oversight. This base level therefore could be modified under various CAs or SSCs that may exist under this umbrella agreement as site specific situations dictate.

2. Reasonable Notice of Important Activities

The lead agency shall provide reasonable notification to the support agency of public meetings, major site actions, negotiation meetings, PRP notice letters, proposed actions under Section 104 and 106, and of press releases.

3. Project/Agency Decision Coordination

a. Remedy Selection

It is agreed that EPA and MDNR will coordinate their decision making process to best consider each other's concerns. This will include at a minimum arranging for EPA Branch meetings and MDNR Division review meetings within 45 days of receipt of the Agency Draft FS. The support agency meeting will occur first in order to have any concerns that may arise voiced at the lead agency meeting. A representative of the alternate agency will be invited to attend these meetings.

b. Enforcement

It is agreed that the agencies will attempt to coordinate enforcement efforts for individual sites.

1) RI/FS - EPA will notify MDNR of impending negotiations for PRP lead RI/FS and provide an opportunity for MDNR to participate. Such notification shall occur at least 1 week prior to issuance of PRP notice letters.

2) RD/RA - EPA and the State will meet to discuss site specific enforcement strategy during the public comment period for the FS and Proposed Plan or prior to any meetings with PRPs to initiate negotiations, whichever comes first.

Discussions will include preliminary decisions on whether a 2 or 3 party agreement is appropriate for the site. Such meetings shall include appropriate technical staff, supervisors and legal counsel.

F. Resolution of Disputes

In the event of disputes between EPA and the MDNR concerning the implementation of any procedures specified in this SMOA or any site-specific response actions, the SPM and RPM or other specific

persons involved will attempt to resolved such disputes within 10 days. If disputes cannot be resolved at this level within this time frame, the problem will be referred to the supervisors of these persons for further EPA/MDNR consultation. If requested by their immediate supervisors, the persons involved will prepare issue papers outlining their respective positions. These issue papers will be presented to their immediate supervisors for review and resolution. Immediate supervisors will have 10 days to resolve the dispute. Issues not resolved at lower levels will be presented in writing, to the Section Chiefs. This supervisory referral and resolution process will continue, if necessary, to the level of MDNR Director and Regional Administrator, EPA, Region V. If agreement still cannot be reached, Region V and MDNR can jointly refer the dispute to the Assistant Administrator for Solid Waste and Emergency Response, who will attempt to resolve the dispute. The EPA will endeavor to reach mutual resolution before any decision is made by EPA to attempt to assert a management option for this site. The MDNR understands that EPA may take that option and, by this agreement, the MDNR does not waive any rights or responsibilities it has in regard to the specific site.

G. Reporting

Quarterly progress, significant developments, and procurement reports for State-lead sites under cooperative agreements should be submitted in accordance with the new regulatory requirements of 40 CFR 35.6650, 35.6655, and 35.6665, respectively. Reports are due 45 days after the end of each quarter of the Federal fiscal year.

H. Exclusion of Third Party Benefits

This Agreement is intended to benefit only the State and EPA. It extends no benefits or rights to any party, including potentially responsible parties, not signatory to this Agreement.

I. Negation of Agency Relationship

Nothing contained in this Agreement shall be construed to create, either expressly or by implication, the relationship of agency between EPA and the State.

The parties hereto have executed this Superfund Memorandum of Agreement in two(2) copies, each of which shall be deemed an original.

For the State of Michigan

Director, Department of Natural Resources

Date 11/20/89

For the Environmental Protection Agency

Regional Administrator

Date 12/26/89

ATTACHMENT A

Michigan Superfund Sites

SITENAME	Lead Agency Designation	U.S. EPA Remedial Project Manager	Michigan State Project Manager
Adam's Plating	F	Cestaric	Beebe
Albion-Sheridan LF	SE	Novy	Kleeper
Allied Paper	F	Sanders	Unassigned
American Anodco	F(RP)	Lee	Hoffmaster
Anderson Development	F(RP)	Valentino	Boyce
Auto Ion Chemicals	F(RP)	Cestaric	Hoffmaster
Ave."E" Ground Water Con.	SE	Martin	Darnell
Barrels	SE	Gustafson	Mosier
Bendix Corp./Allied Auto.	F	Sanders	Beebe
Berlin & Farro	F(RP)	Whipoo	Olilla
Bofors Nobel	SE	Gustafson	Przybysz
Burrows Sanitation	F	Sanders	Hauck
Butterworth #2 LF	F(RP)	Hart	Hoffmaster
Cannelton Industries	F	Allans	Phillips
Carter Industrials	F	Peterson	Monroe
Cemetery Dump	S	Yang	Simons
Charlevoix Municipal Well	F	Micke	Simons
Chem Central	F(RP)	Rollins	Adelman
Clare Water Supply	F(RP)	Peterson	Boyce
Cliff/Dow Dump	F(RP)	Rollins	Taszreak
Duell & Gardner LF	S	Yang	Herceg
E.I. Du Pont(Montague Pl)		Yang	Unassigned
Electrovoice	F(RP)	Reiner	Taszreak
Folkertsma Refuse	F	Peterson	Hauck
Forest Waste Products	F(RP)	Rollins	Monroe
G&H LF	F	Adler	Monroe
Grand Traverse Overall S.	F	Lavis	Adelman
Gratiot County LF	F(RP)	Novy	Iversen
H. Brown	F	Prendiville	Hauck
Hedblum Industries	F	Poy	Herceg
Hi-Mill Manufacturing	F(RP)	Wilk	Larsen
Hooker (Montague Plant)	SE	Tyson	Heyt
Ionia City LF	F(RP)	Gifford	Hoffmaster
J&L LF	F	Martin	Larsen
K&L Ave. LF	F	Cozza	Taszreak
Kaydon Corp.	SE	Cestaric	Heyt
Kent City Mobile Home PK		Lavis	Unassigned
Kentwood LF	F(RP)	Wilk	Hoffmaster
Kysor Industrial Corp.	S	Sanders	Roycraft
Lacks Industries		Cozza	Unassigned
Liquid Disposal	F(RP)	Adler	Gruben
Mason County LF	F	Williams	Herceg
McGraw Edison Corp.	S	Prendiville	Hayes
Metal Working Shop	F	Williams	Monroe
Metamora LF	S	Allans	Phillips
Michigan Disposal Service	F(RP)	Micke	Phillips

SITENAME	Lead Agency Designation	U.S. EPA Remedial Project Manager	Michigan State Project Manager
Motor Wheel	F(RP)	Whipon	Adelman
Muskegon Chemical	SE	Wilk	Przybysz
N. Bronson Ind. Area	S	Valentino	Boyce
Northernaire Plating	S	Sanders	Simons
Novaco Industries	F	Reiner	Gruben
Organic Chemicals	F	Williams	Obrien
Ossineke Ground W. Cont.	F	Nachowicz	Luzkow
Ott/Story/Cordova Chem.	F	Hart	Taszreak
Packaging Corp of America	F(RP)	Eleder	Adelman
Parsons Chemical Works	F	Nachowicz	Larsen
Peerless Plating	F	Poy	Myers
Petoskey Mun. Well Field	F(RP)	Sanders	Soakoff
Rasmussen's Dump	S	Peterson	Gruben
Rockwell International	F(RP)	Williams	Beebe
Rose Township Dump	F(RP)	Adler	Luzkow
Roto-Finish	F(RP)	Micke	Beebe
SCA Independent LF	SE	Eleder	Przybysz
Shiawassee River	S	Guerriero	Gauthier
S. Macomb Disp.(LF#9&#9a)	F	Lavis	Heinzman
S.W. Ottawa County LF	SE	Whipon	Przybysz
Spartan LF	F	Nachowicz	Myers
Spartan Chemical	SE	Williams	Przybysz
Spiegelberg LF	S	Peterson	Gruben
Springfield Township Dump	F	Martin	Campbell
State Disposal LF	SE	Reiner	Przybysz
Sturgis Municipal Wells	S	Allans	Luskow
Tar Lake	F(RP)	Poy	Luskow
Thermo-Chem	F(RP)	Lee	Herceg
Torch Lake	F	Lee	Gruben
U.S. Aviex	F	Whipon	Hoffmaster
Velsicol Chemical (Mich.)	F(RP)	Prendiville	Unassigned
Verona Well Field	F	Guerriero	Leemon/ Obrien
Wash King Laundry	S	Hart	Milejczak
Waste Mgmt. of Mich (H/L)	SE	Eleder	Przybysz
Whitehall Municipal Wells	F	Yang	Boyce
Willow Run (Sludge Lagoon)	F(RP)	Rollins	Linton

ATTACHMENT B

STATE OR FEDERAL-LEAD SITES

	Submittal Documents Item Reviewed	Type of Review/ Oversight Activity	Turnaround Time Frame In Calendar Days
1.	Pre Work Plan Meeting	Mutual Agreement	14 Days Advance Notice
2.	Draft RI/FS Work Plans	Review/Comment	30 Days
3.	Final RI/FS Work Plans	Review/Approval	14 Days
4.	Community Relations Plan	Review/Approval	14 Days
5.	Site Safety Plan	Review/Acceptance	30 Days
6.	Pre-QAPP Meeting	Mutual Agreement	14 Days Advance Notice
7.	Quality Assurance Project Plan (QAPP)	Review/Approval (Subsequent drafts and minor revisions 15-Days)	1st draft- 30 Days
8.	CLP Data Package	Data Review Comments	Within 30 Days of pkg. receipt
9.	Draft RI	Review/Comment	30 Days
10.	Final RI	Review/Approval	14 Days
11.	Alternatives Array/ ARAR's Meeting	Review/Comment Within 3 weeks	30 Days
12.	Preliminary Draft FS	Review/Comment	30 Days
13.	Agency Draft FS	Review/Comment	30 Days
14.	Agency Review Meetings (EPA Branch meeting, State Division mtg.)	Meetings (Support agency meeting first, alternate agency represented)	Within 45 Days of Ag. Draft FS
15.	Public Comment Draft FS	Review/Approval	14 Days
16.	Draft Proposed Plan (lead agency drafts plan, support agency has option to coauthor)	Review/Comment	21 Days
17.	Final Proposed Plan	Review/Approval	5 Working Days
18.	Draft ROD	Review/Comment	14 Days
19.	Final ROD	Review/Approval	7 Days

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Site-Specific Amendment
To The Enforcement Agreement for State-Enforcement-Lead Sites in Michigan
for the
Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site

Δ π EXHIBIT 2408
Deponent Buchholtz
Date 10-14 Rptr. RR
WWW.DEPOBOOK.COM

I. Introduction and Background

The Allied Paper Inc./Portage Creek/Kalamazoo River Superfund site (the site) was listed on the National Priorities List in 1990. Shortly thereafter, by agreement of the Michigan Department of Natural Resources (MDNR) and the United States Environmental Protection Agency (U.S. EPA), the site was designated as a non-fund financed, state-enforcement-lead site for purposes of conducting the remedial investigation/feasibility study (RI/FS).[1] This designation signified that the state of Michigan would either negotiate an agreement, enforceable under Michigan state law, with the potentially responsible parties (PRPs) pursuant to which the PRPs would agree to conduct the RI/FS; or use Michigan state law authorities to compel the PRPs to either conduct, or pay for the Michigan Department of Environmental Quality (MDEQ) to conduct, such work. The designation further signified, in accordance with the Superfund Memorandum of Agreement (SMOA) between the MDEQ and the U.S. EPA, dated December 26, 1989, that the RI/FS would occur under the primary direction of the MDEQ pursuant to Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. The January 23, 1991, site-specific agreement provided that the U.S. EPA would assume the support-agency role at the site, and would review all major documents as set forth in Table I of that agreement.

On December 28, 1990, the MDEQ and certain PRPs executed an Administrative Order by Consent (AOC) pursuant to which these PRPs agreed to conduct an RI/FS for the site. Since the execution of the AOC, RI/FS activities at the site have proceeded pursuant to the terms of that agreement.

The MDEQ and the U.S. EPA now believe that it is in the best interest of the public for certain areas of the site to be redesignated as federal-enforcement lead. This designation signifies that, for those areas of the site specified as the U.S. EPA enforcement lead in this amendment, the U.S. EPA will assume the primary responsibility for either negotiating any agreements, enforceable under federal law, with the PRPs for response activities at these areas; or using federal enforcement authorities to compel the PRPs to either conduct the necessary response activities, or pay the U.S. EPA to conduct such activities. The federal-enforcement lead designation further signifies, in accordance with the SMOA, that the U.S. EPA will have primary decision-making responsibility for response activities at those areas

[1] In 1995, statutory authority and responsibilities of certain divisions of the MDNR were transferred to the Michigan Department of Environmental Quality (MDEQ). Henceforth, in this site-specific amendment (amendment), only the term MDEQ will be used.

specified as the U.S. EPA lead in this amendment. For those areas of the site redesignated as federal enforcement lead, the MDEQ will assume a support-agency role, with all of the duties and responsibilities set forth in the SMOA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. § 300 *et seq.*

Accordingly, this amendment establishes the roles and responsibilities of the U.S. EPA and the MDEQ at the site. This amendment represents the sole agreement between the U.S. EPA and the MDEQ concerning their roles and responsibilities at the site, and supercedes any previous site-specific amendment between the U.S. EPA and the MDEQ, including the site-specific amendment dated January 23, 1991. This amendment supplements the terms and conditions of the SMOA. In the event of any conflict between the terms of the SMOA and this amendment, the terms of this amendment are controlling.

II. Roles and Responsibilities

A. Enforcement Lead Status by Area of Contamination at the Site

The MDEQ has divided the site into a number of areas of contamination. Further, the "Supplemental Kalamazoo River Sediment and Floodplain Soils Sampling Plan" (April 2000), negotiated and agreed to by the MDEQ and the PRPs for the RI/FS of the Kalamazoo River (the river), divides the river into two phases: Phase 1 includes the river from Morrow Pond Dam to Lake Allegan Dam; Phase II includes the river from Lake Allegan Dam to Lake Michigan. The following list identifies each area of the site at which response activities either have been performed, or at which the MDEQ and the U.S. EPA currently believe response activities may be required, and states the agreement of the U.S. EPA and the MDEQ with regard to each such area:

1. Allied Paper Landfill: The MDEQ is currently overseeing the RI for the Allied Paper Landfill. Unless otherwise agreed to by letter agreement of the MDEQ and the U.S. EPA, the MDEQ will retain the enforcement lead for the Allied Paper Landfill until such time that the MDEQ approves a PRP-drafted RI report; or the MDEQ determines, under the terms of the AOC, that the PRP-drafted RI report for this landfill is disapproved and an approvable modification is developed by the MDEQ.

2. Willow Boulevard/A-Site: The MDEQ currently has the enforcement lead for this area of the site. On October 8, 2001, the MDEQ disapproved the RI and focused feasibility study (FFS) prepared by the PRPs for the Willow Boulevard/A-Site. Unless otherwise agreed to by letter agreement of the MDEQ and the U.S. EPA, the MDEQ will modify the document, consistent with the AOC. The MDEQ is in the process of correcting deficiencies and finalizing the RI/FFS.

   After the MDEQ has finalized those documents, which the MDEQ currently anticipates to occur by the end of January 2002, they will be submitted to the U.S. EPA. The U.S. EPA will then assume the enforcement lead and the MDEQ will become the support agency for this area of contamination.

3. King Highway Landfill: In 1997, the MDEQ issued a Record of Decision (ROD) for this landfill, with which the U.S. EPA concurred in 1998. The MDEQ negotiated a separate AOC with one of the PRPs to conduct the remedial action required by the ROD (including installation of a monitoring network), and construction is almost complete. The MDEQ will retain the enforcement lead, and the U.S. EPA will continue to be the support agency, for this area of the site. The MDEQ will ensure that all required operation and maintenance is performed in a manner consistent with the requirements of the NCP at 40 C.F.R. § 300.435(f). Because hazardous substances at this landfill were left on-site, the U.S. EPA will conduct a review of the effectiveness of the remedy five years after the initiation of the remedial action, and every five years thereafter. *See, e.g.*, 42 U.S.C. § 9621(c). The U.S. EPA will assume responsibility for performing any five-year reviews, with the MDEQ in a supporting role for this task.

4. 12th Street Landfill: The MDEQ recently issued a ROD for this landfill, and the U.S. EPA concurred with the remedy selected by the MDEQ on September 28, 2001. As of the effective date of this amendment, the U.S. EPA will assume the enforcement lead for the 12th Street Landfill, to negotiate an agreement with the PRP(s) to perform the remedial action required in the ROD. The MDEQ will assume the role of the support agency at this area.

5. Kalamazoo River (Phase I): This area of contamination comprises the river between Morrow Pond Dam and Lake Allegan Dam. To date, certain PRPs have performed significant RI activities on this portion of the river, and in October 2000, the draft RI/FS report was submitted by these PRPs pertaining to this area. As of the effective date of this amendment, the U.S. EPA will assume the enforcement lead, and the MDEQ will assume the support-agency role, for Phase I of the river.

6. Kalamazoo River (Phase II): This area of contamination comprises the river from Lake Allegan Dam to the mouth of the river at Lake Michigan. To date, certain PRPs have performed some RI activities regarding this part of the river, but no RI report has been prepared. As of the effective date of this amendment, the U.S. EPA will assume the enforcement lead, and the MDEQ will assume the support-agency role, for Phase II of the Kalamazoo River.

7. Georgia Pacific Five Former Lagoons: Residuals located in these lagoons were disposed of in the King Highway Landfill as part of the remedial action for that landfill. No further action is anticipated at this area. In the event that additional response activities are later required, the MDEQ will assume the enforcement lead, and the U.S. EPA will assume the support-agency role, for such response activity.

8. King Mill Lagoons: Some contaminated materials at this area of the site were placed in the King Highway Landfill as part of the remedial action for the landfill. An RI has not been conducted for this area of concern. As of the effective date of this amendment, the U.S. EPA will assume the enforcement lead, and the MDEQ will assume the support-agency role, for the King Mill Lagoons.

9. Hawthorne Paper Mill: Polychlorinated biphenyls have recently been detected at this area of the site, and the MDEQ believes that some response activity may be necessary to ensure that the area is not an ongoing source to the river. As of the effective date of this amendment, the U.S. EPA will assume the enforcement lead, and the MDEQ will assume the support-agency role, for the Hawthorne Paper Mill.

With regard to any area of the site for which the MDEQ has not been specifically designated the lead-enforcement agency in this Section II. A, but at which response activities are or become necessary, the MDEQ and the U.S. EPA agree that the U.S. EPA will assume the enforcement lead and that the MDEQ will assume the support-agency role.

B. Administrative Record

The MDEQ will provide the U.S. EPA with a copy of the complete administrative record for each area of the site for which the U.S. EPA will assume the enforcement lead under the terms of this amendment, including available databases and computer files. The MDEQ further agrees that, with regard to each area of the site for which the MDEQ will retain the enforcement lead pursuant to the terms of this amendment, it will maintain an administrative record that complies with the recordkeeping requirements of the NCP, 40 C.F.R. § 300.800 *et seq.*

C. Other Matters

1. Correspondence

The MDEQ and the U.S. EPA agree that, unless already provided, the MDEQ project manager(s) and the U.S. EPA remedial project manager(s) will provide each other with copies of all correspondence between such project manager and any PRP (or its contractor).

2. Deliverable Documents

The MDEQ and the U.S. EPA agree to ensure that, whenever a letter, report, or other document, in either draft or final form, is delivered to the enforcement-lead agency under the terms of an agreement between that agency and the PRPs, a copy is simultaneously provided to the support agency.

3. Review times

Attachment B to the SMOA provides a list of response process submittals, review/oversight activities, and the turnaround time frames to be followed by the lead and support-agency project managers at a state or federal-lead Superfund site. The time frames specified in the SMOA may be altered by mutual agreement of the U.S. EPA's support-agency coordinator and the MDEQ's state project manager.

4. Modification

This amendment may be revised as provided in Section II. A, above, or otherwise by mutual agreement of the two agencies.

Executed and agreed to on this _____ day of ~~January~~ February 2002.

For the State of Michigan, Michigan Department of Environmental Quality:

1/9/02

Russell J. Harding
Director

Date

For United States Environmental Protection Agency, Region 5:

2/15/2002

Acting for Thomas V. Skinner
Regional Administrator

Date

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Deponent Buchholz
Date 10-14 Rptr. CR
WWW.DEPOBOOK.COM

Amendment to the 2002 Site-Specific Amendment to the Enforcement Agreement for State-Enforcement-Lead Sites in Michigan for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

I. Introduction and Background

The Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site (Site) was listed on the National Priorities List in 1990. Shortly thereafter, by agreement of the Michigan Department of Natural Resources (MDNR) and the United States Environmental Protection Agency (U.S. EPA), the Site was designated as a non-fund financed, state-enforcement-lead site for purposes of conducting the remedial investigation/feasibility study (RI/FS).[1] This designation signified that the state of Michigan would negotiate an agreement, enforceable under Michigan state law, with the potentially responsible parties (PRPs) pursuant to which the PRPs would agree to conduct, or pay for the Michigan Department of Environmental Quality (MDEQ) to conduct, such work. The designation further signified, in accordance with the Superfund Memorandum of Agreement (SMOA) between the MDEQ and the U.S. EPA, dated December 26, 1989, that the RI/FS would occur under the primary direction of the MDEQ pursuant to Part 201, Environmental Remediation, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended. The January 23, 1991, site-specific agreement provided that the U.S. EPA would assume the support-agency role at the Site, and would review all major documents as set forth in Table I of that agreement.

On December 28, 1990, the MDEQ and certain PRPs executed an Administrative Order by Consent (AOC) pursuant to which these PRPs agreed to conduct an RI/FS for the Site. Since the execution of the AOC, RI/FS activities at the Site have proceeded pursuant to the terms of that agreement.

In 2002, certain areas of the Site were re-designated as federal-enforcement lead, due to the agencies' belief that re-designation of certain areas of the Site was in the best interest of the public. The Site-Specific Amendment to the Enforcement Agreement for State-Enforcement Lead Sites in Michigan, under the Superfund Memorandum of Agreement, signed by the MDEQ on January 9, 2002, and by the U.S. EPA on February 15, 2002 (2002 Amendment) sets forth the roles and responsibilities of the agencies for those areas of the Site that were re-designated. Pursuant to the 2002 Amendment, the U.S. EPA assumed the primary responsibility for negotiating any agreements enforceable under federal law with the PRPs for response activities, or for using federal enforcement authorities to compel the PRPs to either conduct the necessary response activities, or pay the U.S. EPA to conduct such activities. The U.S. EPA also assumed the role of primary decision-maker for response activities at those areas specified as U.S. EPA-lead in the 2002 Amendment. The 2002 Amendment further established the MDEQ as the support-agency at those areas specified as U.S. EPA-lead, with all of the duties and responsibilities set forth in the SMOA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP); 40 C.F.R. § 300 *et seq.*

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[1] In 1995, statutory authority and responsibilities of certain divisions of the MDNR were transferred to the Michigan Department of Environmental Quality (MDEQ). Henceforth, in this amendment to the 2002 Site-Specific Amendment, only the term MDEQ will be used.

2007 Site-Specific Amendment

Section II.A.1. of the 2002 Amendment sets forth the roles and responsibilities of the U.S. EPA and the MDEQ with regard to the Allied Paper Landfill. This Amendment revises Section II.A.1. of the 2002 Amendment, and it represents the sole agreement between the U.S. EPA and the MDEQ concerning their roles and responsibilities at the Allied Paper Landfill. Furthermore, this amendment supersedes any previous Site-Specific Amendment pertaining to the Allied Paper Landfill between the U.S. EPA and the MDEQ, including the previous Site-Specific Amendments dated January 23, 1991, and February 15, 2002. This Amendment supplements the terms and conditions of the SMOA. In the event of any conflict between the terms of the SMOA and this Amendment, the terms of this Amendment are controlling.

1. **Allied Paper Landfill:**

The MDEQ currently has the enforcement lead over the RI for the Allied Paper Landfill. On October 25, 2006, the MDEQ disapproved the Revised Remedial Investigation (RI) Report prepared by Millennium Holdings, LLC (MHLLC) for the Allied Paper Landfill and notified MHLLC that the MDEQ had assumed responsibility to modify the RI report under paragraph 30(D) of the AOC signed by the MDEQ, HM Holdings, Inc. (predecessor to MHLLC), Georgia-Pacific Corporation, and Simpson Plainwell Paper Company in December 1990. The MDEQ provided a copy of a draft state-modified RI Report for the Allied Paper Landfill to the U.S. EPA on or before February 28, 2007, for the U.S. EPA's review. After the U.S. EPA provides its comments on the draft state-modified RI Report to the MDEQ, the MDEQ shall submit to the U.S. EPA a state-approved RI Report for the Allied Paper Landfill that incorporates or otherwise addresses the U.S. EPA's comments within 60 days of receiving the U.S. EPA's comments. The state-approved RI Report will not be considered a U.S. EPA-approved document until the U.S. EPA reviews the state-approved RI Report and determines that all U.S. EPA comments on the state-modified RI Report have been incorporated and that no additional response activities are necessary to complete the RI. In the event that the U.S. EPA determines that the state-approved RI Report requires modification or that additional response activities are necessary to complete the RI, the U.S. EPA and the MDEQ will have 90 days from the U.S. EPA's receipt of the state-approved RI Report to address or otherwise incorporate any modifications or additional response activities required by the U.S. EPA. After 90 days from receipt of the state-approved RI Report, if the U.S. EPA determines that the state-approved RI Report still requires modification or that additional response activities are necessary to complete the RI, the U.S. EPA will notify the MDEQ and assume the enforcement lead to modify the document and/or complete any necessary response activities. In the instance that the U.S. EPA assumes the enforcement lead and modifies the state-approved RI Report, the MDEQ will be provided, consistent with the timeframes in the MDEQ/U.S. EPA SMOA, an opportunity to comment on the U.S. EPA-issued RI Report. The U.S. EPA will approve the final RI Report for the Allied Paper Landfill. If the MDEQ fails to submit a state-approved RI Report to the U.S. EPA within 60 days of the MDEQ's receipt of the U.S. EPA's comments on the state-modified RI Report, the enforcement lead for completing the RI for the Allied Paper Landfill will be assumed by the U.S. EPA.

KZ00298392

2007 Site-Specific Amendment

Executed and agreed to on this _____ day of April, 2007.

For the State of Michigan, Michigan Department of Environmental Quality:

4-25-07

Steven E. Chester
Director

Date

For the United States Environmental Protection Agency, Region 5:

Walter W. Kovalick for

4/26/07

Mary A. Gade
Regional Administrator

Date

S: NR/cases/2000054370A/Allied/Facilitated Negotiations/amendment to enf agreement

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RUSSELL J. HARDING, Director

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Kal River

OUO/#1

July 24, 2001

AUG - 8 2001
ERD-SUPERFUND

Mr. David A. Ullrich
Acting Regional Administrator
United States Environmental Protection Agency
77 West Jackson Boulevard (R-19J)
Chicago, Illinois 60604-3590

Dear Mr. Ullrich:

The Michigan Department of Environmental Quality (MDEQ) believes that the United States Environmental Protection Agency (U.S. EPA) should assume the lead for selecting the remedy for the river portion of the Kalamazoo River Superfund site, as well as the other operable units where Records of Decision have not yet been drafted. The basis for our position follows:

1. The liable parties need to resolve their liability with your agency, in addition to ours, before proceeding with remedy implementation. This requires your agency to be intimately involved with remedy selection and that the remedy be implemented pursuant to a legally binding agreement with your agency.

2. Notwithstanding the fact that the site is currently being handled as a state enforcement lead, your agency is essentially controlling the critical aspects of the remedy selection process. Your staff recently advised us that substantial additional data collection is necessary to support the U.S. EPA remedial decision-making process. This is in spite of the fact your agency worked closely with us over the last several years in developing and implementing the remedial investigations recently concluded under state orders. In addition, your agency has raised new issues relative to the adequacy of the ecological and human health risk assessments, which were prepared by the state with substantial input from U.S. EPA staff. These issues prevent us from finalizing cleanup criteria, and U.S. EPA staff have indicated that resolution of these issues is tied to the completion of your new data-collection initiative.

3. Your agency has advised us that the remedy must also be reviewed by entities outside Region 5 --the National Remedy Review Board, and by a headquarters committee charged with reviewing the National Research Council's risk management strategy for polychlorinated biphenyl contaminated sediments before the U.S. EPA can select a remedial alternative.

4. The U.S. EPA has also recently advised our agency and the liable parties that federal permits must be obtained for all remedial work conducted by the liable parties unless the work is carried out pursuant to a legally binding agreement with the U.S. EPA. The permit exemption in Section 121(e) of the Comprehensive Environmental Response, Compensation, and Liability Act, 1980 PL 96-510, does not apply if the liable parties are performing work pursuant to a legal agreement with the state. The agreement must be between the liable parties and the U.S. EPA.

Please let me know when we can have staff develop a plan and schedule for implementing the transition to federal lead. We recommend that the plan for transitioning the U.S. river portion of the site be given top priority.

If you have any questions, please contact Mr. Alan J. Howard, Chief, Environmental Response Division, at 517-335-1104, or you may contact me.

Sincerely,

Russell J. Harding
Director
517-373-7917

cc: Mr. Todd Goeks, National Oceanic Atmospheric Administration
Ms. Lisa Williams, United States Fish and Wildlife Service
Mr. Arthur R. Nash Jr., Deputy Director, MDEQ
Mr. Alan J. Howard, MDEQ

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AUG 02 2001

REPLY TO THE ATTENTION OF:
R-19J

Mr. Russell J. Harding
Michigan Department of Environmental Quality
P.O. Box 30473
Lansing, MI 48909-7973

Dear Mr. ~~Harding~~ Russ:

Thank you for your letter of July 24, 2001 regarding the Kalamazoo River Superfund Site in Kalamazoo, Michigan. This is to advise you that we support the Michigan Department of Environmental Quality's (MDEQ's) request that our Agency assume the lead role on this site. We are committed to working closely with your Department as we move toward the decision-making stage for this project. We are encouraged to hear that your Department will provide technical assistance and remain an active partner through the investigation and cleanup.

Our project managers have already begun to discuss the shift to a federal lead and, over the coming weeks, we will jointly develop a plan and schedule for transitioning the river and other landfill operable units associated with the Site. My goal is to keep the Kalamazoo River a valuable and viable resource for the state of Michigan, so please do not hesitate to contact me, or Mr. Bill Muno, Director of the Superfund Division, if there are any other questions or issues you would like to discuss.

Sincerely yours,

Dave

David A. Ullrich,
Acting Regional Administrator

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1 CORNELIUS
2 **A. Yes.**
3 Q. That they're the driver of what the remedy will be?
4 **A. Yes.**
5 Q. Okay.
6 **A. It's not only what the remedy will be, but if there's**
7 **going to be a remedy.**
8 Q. Okay. The KRSG wanted to prepare the risk assessments
9 for the site, is that correct?
10 **A. Yes.**
11 Q. Assuming responsibility for the risk assessments would
12 enable -- would have enabled the KRSG to define the
13 risk at the site, is that correct?
14 **A. Yes.**
15 Q. Okay. Did MDEQ feel that it was appropriate for the
16 KRSG to develop the risk assessments?
17 **A. I think that EPA and DEQ, or DNR at the time, were**
18 **willing to have the PRPs prepare the risk assessment,**
19 **at least in the beginning, but as we started to work**
20 **with them, it became apparent that that would be a, a**
21 **bad decision.**
22 Q. Why would it have been a bad decision to permit the
23 KRSG to prepare the risk assessments?
24 **A. It would give them a -- it would give them more**
25 **control over the, the assessment process and lead**

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1 **CORNELIUS**
2 **probably to future delays in the -- in working out**
3 **issues.**
4 Q. Is it fair to say that permitting the KRSG to prepare
5 the risk assessment would have given them an
6 opportunity to define contamination out of the site?
7 **A. Yeah.**
8 Q. Were MDEQ or MDNR and EPA concerned that that could
9 happen if the KRSG were permitted to control the risk
10 assessment?
11 **A. Yes.**
12 Q. Was that based on the experience of working with BB&L
13 and the KRSG?
14 **A. Yes.**
15 **MR. SHEBELSKIE:** Object to the form of the
16 question.
17 **BY MR. ROTH:**
18 Q. Okay. MDEQ's contractor, CDM, prepared the risk,
19 site-wide risk assessments, is that correct?
20 **A. Correct.**
21 Q. And that was done in conjunction with EPA?
22 **A. Yes.**
23 Q. It followed EPA guidance?
24 **A. Yes.**
25 Q. It used approaches recommended by EPA for preparing

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1 CORNELIUS
2 risk assessments?
3 **A. Yes.**
4 Q. It was vetted thoroughly within MDEQ?
5 **A. Yes.**
6 Q. It was vetted with EPA?
7 **A. Yes.**
8 Q. And it was vetted with the US Fish and Wildlife
9 Service?
10 **A. Yes.**
11 Q. And the KRSG was given an opportunity to provide
12 comments on the risk assessment, though they were not
13 permitted to prepare it themselves?
14 **A. Yes.**
15 Q. Okay. Now, do you recall the KRSG retaining a
16 professor named John Geissi to provide comments on the
17 risk assessment?
18 **A. Yes.**
19 Q. And do you recall him providing an extensive critique
20 of the risk assessment?
21 **A. Yes.**
22 Q. Do you recall, notwithstanding the fact that the KRSG
23 was not permitted to prepare the risk assessment, that
24 they essentially sought to redo it through these
25 comments?

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1 CORNELIUS
2 **A. Yes.**
3 Q. Did Professor Geissi's comments indicate that PCBs did
4 not require remediation in the way that MDEQ and EPA
5 found to be necessary?
6 **A. Yes.**
7 Q. Do you recall Professor Geissi essentially taking the
8 view that PCBs could be left in the site?
9 **A. Yes.**
10 Q. And that they could be subject to a process called
11 natural attenuation?
12 **A. Yes.**
13 Q. Okay. And did he dispute the data relied upon by
14 MDEQ?
15 **A. Excuse me?**
16 Q. Did he dispute the data that had been relied upon?
17 **A. Yes.**
18 Q. Did he question the potential harm to ecological
19 receptors?
20 **A. Yes.**
21 Q. In particular, he questioned whether there would be a
22 harm to mink?
23 **A. Right, correct.**
24 Q. And did he question the competence limits used for
25 establishing PCB concentrations?

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1 CORNELIUS
2 comments on a single document, is that correct?
3 **A. Yes.**
4 Q. Okay. Often, the comments provided to the PRPs and
5 BBL would be longer than the documents that had been
6 submitted, is that correct?
7 **A. Unfortunately, yes.**
8 Q. Okay. The documents submitted by BB&L and the KRSG
9 often required multiple rounds of comment, is that
10 correct?
11 **A. Yes.**
12 Q. Is it fair to say that the amount of review and
13 commenting that was provided was unprecedented in the
14 state of Michigan for an environmental site?
15 **MR. SHEBELSKIE:** Object to the form of the
16 question and lack of foundation.
17 **A. Yes.**
18 **BY MR. ROTH:**
19 Q. That's based on your experience working with MDEQ?
20 **A. Yes, based on my experience.**
21 Q. Okay. Did MDNR ever have to take away responsibility
22 for drafting portions of documents from PRPs, from the
23 PRPs?
24 **A. Yes.**
25 Q. Let me show you a document now to discuss this,

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1 CORNELIUS
2 briefly.
3 **MARKED FOR IDENTIFICATION:**
4 DEPOSITION EXHIBIT 4461
5 1:39 p.m.
6 **BY MR. ROTH:**
7 Q. Okay, I've handed you a document bearing Bates number
8 KB10104831. This is a document dated July 21, 1992.
9 I should say it's Exhibit 4461, sorry. It's from --
10 to Mark Brown from you, and in the document you
11 observe that during our -- and this refers to, I
12 should say, drafting of a description of the current
13 situation.
14 **A. Yes.**
15 Q. The middle of the document says:
16 During our review of the second draft, it
17 became apparent that the potentially responsible
18 parties were incapable of drafting the chapter
19 entitled description of polychlorinated biphenyls to
20 the satisfaction of the MDNR and the US Environmental
21 Protection Agency.
22 Do you recall why it was that the PRPs, in
23 the view of these agencies, were incapable of drafting
24 this chapter?
25 **A. Well, this was a, this was a chapter that we had**

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1 **CORNELIUS**
2 **reviewed once before, and we had given them**
3 **significant comments on this document that detailed**
4 **what they needed to cite and how they needed to**
5 **describe PCBs. And the second draft that we were**
6 **reviewing didn't have those changes in it, so the**
7 **agencies decided that it was, that -- that they were**
8 **incapable of doing it. So we decided that we would**
9 **help them out there.**
10 Q. Okay. Do you recall whether or not this chapter in
11 the way that it had been drafted read more like an
12 advocacy piece on behalf of the PRPs and less like a
13 scientific document?
14 **A. Yes.**
15 **MR. SHEBELSKIE:** Object to the form of the
16 question.
17 **A. Yes, it did.**
18 **BY MR. ROTH:**
19 Q. Okay. Was that a common problem in the documents that
20 you reviewed?
21 **A. Yes.**
22 **MR. SHEBELSKIE:** Same objection.
23 **BY MR. ROTH:**
24 Q. The next paragraph states:
25 It is our understanding that the inclusion

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1 CORNELIUS
2 of Appendix A, KRSG's response to PCB toxicity
3 characterization by MDNR, was done under the direction
4 of the PRPs. However, no discussion between the MDNR
5 and the PRPs occurred prior to this action being
6 taken.
7 Why was it significant that the inclusion
8 of Appendix A had occurred without discussion between
9 the MDNR and the PRPs?
10 **A. Well, it was a -- we were at the, you know, we had**
11 **just reviewed it, so instead of -- I mean, we expected**
12 **that they would, the only changes they would make were**
13 **the changes that we specified to make, not make**
14 **additional changes and bring in new, new arguments or**
15 **new controversial material.**
16 Q. So there was an issue where comments would be
17 provided, and MDNR and EPA could not take comfort that
18 those would be implemented as agreed upon?
19 **A. Exactly.**
20 **MR. SHEBELSKIE:** Object to the form of the
21 question.
22 **BY MR. ROTH:**
23 Q. Okay.
24 **A. But we also were trying to bring these documents to a**
25 **close, you know. We'd been working on this thing for**

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1 CORNELIUS
2 **years and had been doing these documents, and it gets**
3 **worse with the technical memorandum, which went on and**
4 **on and on, you know, numbers of things.**
5 **So, I mean, we were trying to just all**
6 **agree that, you know, this was a scientific**
7 **explanation about PCBs, and we were all going to agree**
8 **to it and move on.**
9 Q. Okay. To your knowledge, were there other instances
10 where the PRPs directly drafted documents that were
11 submitted to MDNR?
12 **A. Well, there were lots of technical memorandum that**
13 **they did.**
14 Q. But what I'm getting at is, were there instances where
15 they were drafted sort of by the PRPs themselves and
16 not their contractor who had been retained to do work?
17 **A. Oh, yeah, yeah, you know, there were inserts into**
18 **documents that we were either told directly or from**
19 **reading them we could, you know -- they didn't follow**
20 **the discussions that we had that we were told that,**
21 **you know, by Mark Brown, basically, that his client**
22 **wanted this in the document. So that's how we came to**
23 **the conclusion that the PRPs drafted it.**
24 Q. Mmm-hmm. And was it the impression of MDEQ and EPA
25 that the inserts were, in effect, putting spin on the

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1 CORNELIUS
2 documents in a way to favor positions that the PRP
3 group wanted to take?
4 **MR. SHEBELSKIE:** Objection to the form of
5 the question.
6 **A. Yes.**
7 **BY MR. ROTH:**
8 Q. Okay, thank you.
9 Okay, I'm now going to hand you a small
10 stack of documents and ask you to review them all, and
11 then I have a set of questions that are sort of common
12 to all of them.
13 **MR. ROTH:** Let's go off the record.
14 **VIDEO TECHNICIAN:** It is 1:46 p.m. We are
15 off the record.
16 (Off the record at 1:46 p.m.)
17 (Back on the record at 1:48 p.m.)
18 **MARKED FOR IDENTIFICATION:**
19 DEPOSITION EXHIBIT 4462 - 4465
20 1:47 p.m.
21 **BY MR. ROTH:**
22 Q. Mr. Cornelius, I've just handed you four documents.
23 Go ahead and just review them. Briefly. I'm going to
24 just read into the record what they are.
25 44 -- Exhibit 4462 is a document bearing

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1 CORNELIUS
2 Bates number WYDQ003271. It's a letter dated May 13,
3 '98, from you to Mark Brown.
4 4463 is a document bearing Bates number
5 KZ-KRSG-00422410. It's a fax and a cover sheet
6 containing a series of letters from you to Mark Brown.
7 4464 is an interoffice communication from
8 you to Alan Howard, bearing Bates number WYDQ004239.
9 **MR. PARKER:** I have 63 and 64 reversed.
10 The fax cover sheet is which one? Look at his, 64.
11 **MR. ROTH:** 4464 is the cover sheet.
12 **MR. PARKER:** Okay.
13 **MR. ROTH:** The fax cover sheet is 4464, I
14 apologize, and then the interoffice memorandum is 63?
15 **MR. PARKER:** Yes.
16 **MR. ROTH:** Okay. And then there is one --
17 **MR. PARKER:** Doing what I can here.
18 **MR. ROTH:** Appreciate the help.
19 **BY MR. ROTH:**
20 Q. And then 4465 is a document bearing Bates number
21 KB1010337. It's a letter dated January 29, '93, to
22 Mark Brown from Mary Geitka. You are not actually
23 copied on this one, but I'll ask you about it.
24 So the first document I want to ask you
25 about is 4465, which is the letter dated January 29,

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1 CORNELIUS
2 '93. And this letter, which is brief, you're not on
3 this letter, sir --
4 **A. Mmm-hmm.**
5 Q. -- but it concerns comments on the description of the
6 current situation. Were you familiar with the process
7 of commenting and providing feedback on the
8 description of the current situation?
9 **A. Yes.**
10 Q. So were you familiar with the issues that were going
11 on between the agencies and BB&L and the KRSG that are
12 described in this letter?
13 **A. Yes.**
14 Q. Okay. The last sentence of the letter says:
15 Please do not incorporate any changes prior
16 to discussing them with us.
17 Why was it necessary to require the KRSG
18 and BBL not to incorporate any changes to this
19 document, the description of the current situation,
20 prior to discussing them?
21 **A. Well, we found that it appeared to become standing --**
22 **standard operating procedures for them to put in --**
23 **they would read our comment, and then to like rebut**
24 **our comment, if they put our comment in at all, then**
25 **they'd come down and they'd put something that would**

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1 CORNELIUS
2 site?
3 **A. Yes.**
4 Q. In the view of the MDNR and the EPA, were these delays
5 driven by a desire by the PRPs to, in essence, turn
6 these documents into advocacy pieces?
7 **MR. SHEBELSKIE:** Object to the form of the
8 question, argumentive, leading, and utterly lacking
9 foundation.
10 **A. Yes.**
11 **BY MR. ROTH:**
12 Q. And that's based on your experience at MDEQ?
13 **A. Yes.**
14 Q. And, to your knowledge, does that view reflect the
15 views of the MDEQ and EPA staff and the staff of all
16 the other agencies that were working on these
17 documents?
18 **MR. SHEBELSKIE:** Same objections.
19 **A. Yes.**
20 **BY MR. ROTH:**
21 Q. Okay, thank you. I'm going to hand you the next
22 document.
23 **MARKED FOR IDENTIFICATION:**
24 DEPOSITION EXHIBIT 4466
25 1:57 p.m.

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1 CORNELIUS
2 **BY MR. ROTH:**
3 Q. I've just handed you Exhibit 4466, which is a document
4 bearing Bates number WYDQ004241. It's an interoffice
5 communication, dated March 23rd, 1999, to Alan Howard.
6 It's from you but signed by Keith, forgive me --
7 **A. Krawczyk.**
8 Q. Krawczyk, okay. Keith Krawczyk worked with you as a
9 Superfund, as a Superfund project manager on this
10 site?
11 **A. Correct.**
12 Q. Okay. So this document indicates that there were
13 issues in the presentation of data in the technical
14 memoranda. In the first paragraph it states:
15 In many cases, there's no consistency
16 between the laboratory data sheets, field
17 documentation, report text, figures, and tables,
18 making it difficult and time consuming to determine
19 what data was collected.
20 Did BB&L regularly fail to present data and
21 the results of their data in a clear and targeted
22 fashion?
23 **A. Yes.**
24 **MR. SHEBELSKIE:** Object to the form of the
25 question.

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1 CORNELIUS
2 **BY MR. ROTH:**
3 Q. Okay. In the view of MDNR and EPA, was -- were the
4 preparation of these documents sloppy?
5 **MR. SHEBELSKIE:** Object to the form of the
6 question.
7 **A. They were sloppy, incomplete, and had a lot of spin to**
8 **them, and that made it difficult to review them, and**
9 **that's why we were reaching out to our division chief**
10 **in numerous letters, trying to get some guidance on**
11 **how to, how to resolve these problems in a -- in his**
12 **opinion, being the supervisor, in an acceptable**
13 **manner, because this was not a common problem that we**
14 **were having.**
15 **I mean, these kind of problems weren't**
16 **occurring on other sites we were working on, but they**
17 **were occurring on this site, and we needed to resolve**
18 **them. So we were looking for guidance from the**
19 **division chief, which is three chiefs up, so ...**
20 **BY MR. ROTH:**
21 Q. The issues that we've been discussing today, they
22 were, in the experience of the agency, unique to this
23 site?
24 **A. Yes.**
25 Q. Okay. And it was necessary to go to the division

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1 CORNELIUS
2 chief three ladders up, because the issues were severe
3 enough that that level of input was deemed to be
4 necessary?
5 **A. Yeah. Well, he was involved in all decision-making,**
6 **as was EPA, and we didn't, we didn't do anything**
7 **unless we cleared it with them. They reviewed the**
8 **letters. The chiefs reviewed the letters we sent out**
9 **and everything else, to make sure that we were**
10 **consistent and that we were following the party, you**
11 **know, the agency line and that we were doing what the**
12 **agency thought was appropriate.**
13 Q. Did Mr. Howard, who was the division chief, support or
14 agree with the views being taken at the staff level
15 with respect to these issues?
16 **A. Yes.**
17 Q. In other words, he agreed that there were substantial
18 problems with the documents being submitted by BB&L?
19 **A. Yes.**
20 Q. And the problems that he agreed with are the type
21 we've discussed?
22 **A. Yes.**
23 Q. Okay. Was there ever a consideration of taking the
24 KRSG to court over these issues?
25 **A. I guess the Attorney General and the agencies thought**

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1 CORNELIUS
2 **A. Yes.**
3 Q. Okay. If you turn the page, it says: The phase seven
4 remedial investigation groundwater data was collected
5 by BBL without MDEQ knowledge, and the MDEQ did not
6 have an opportunity to review comment or approve the
7 phase seven scope of work as required by the AOC.
8 What issue existed with collecting this
9 groundwater data without MDEQ knowledge?
10 **A. Well, we were, we were concerned that the focus of the**
11 **groundwater collection would be to prove that there**
12 **wasn't a problem with groundwater rather than collect**
13 **representative samples.**
14 Q. And so the concern by -- the concern was that by
15 collecting groundwater data outside of MDEQ knowledge,
16 that it would be collected in a way that essentially
17 skewed the --
18 **A. Yeah, well, the agreement was was that we would review**
19 **and approve the work plans, and that hadn't happened.**
20 Q. Is it fair to say that MDEQ and EPA didn't trust BB&L?
21 **MR. SHEBELSKIE:** Object to the form of the
22 question.
23 **A. Yes, I think that's fair to say.**
24 **BY MR. ROTH:**
25 Q. And that the lack of trust was the result of the

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1 CORNELIUS
2 issues that had been occurring with BB&L over the
3 years that work was done on the site?
4 **MR. SHEBELSKIE:** Objection to the --
5 **A. Most definitely, yes.**
6 **BY MR. ROTH:**
7 Q. Okay. I want to go back to a document, but I'm not
8 sure what the exhibit number is.
9 **MR. ROTH:** Could we go off the record,
10 briefly?
11 **VIDEO TECHNICIAN:** The time is 2:09 p.m.
12 We are off the record.
13 (Off the record at 2:09 p.m.)
14 (Back on the record at 2:18 p.m.)
15 **VIDEO TECHNICIAN:** We're back on the
16 record. It's 2:18 p.m.
17 **BY MR. ROTH:**
18 Q. Mr. Cornelius, I'm referring you to an exhibit that
19 we've already examined together. It's Exhibit 4457.
20 And this document is sort of in line with those that
21 we've been reviewing already. I really just wanted to
22 go through it quickly.
23 If you turn to page 2 of this document, it
24 identifies a series of issues that have come up
25 between MDEQ and EPA and BB&L. I just sort of wanted

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1 CORNELIUS
2 to read them into the record and have you sort of
3 comment on them, briefly.
4 So the technical -- below 1.0 it says:
5 The technical memoranda, TMs, written by
6 BB&L on behalf of the KRSG, in general, contain
7 numerous errors, inappropriate information, incorrect
8 calculation parameters, and are missing significant
9 support documentation.
10 Several of these problems continue to exist
11 and new ones are being created, in spite of the KRSG
12 submitting numerous revisions of the TMs in attempts
13 to address the problems identified in the MDEQ
14 comments. As you are well aware, during the last year
15 the MDEQ has made a concerted effort to work with the
16 KRSG to resolve the numerous deficiencies in the TMs
17 so they could be approved. These deficiencies and the
18 KRSG's inability to correct the deficiencies were the
19 topics of the call.
20 Is this paragraph a fairly reasonable
21 summary of the issues that were ongoing in the
22 drafting of documents with BB&L and the KRSG?
23 **A. Yes.**
24 Q. Okay. Point one says that:
25 All parties agreed that the TMs, as

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1 CORNELIUS
2 submitted by the KRSG, are technically and completely
3 inaccurate and need to be corrected in a timely
4 manner.
5 Was there an ongoing problem with documents
6 being technically and completely inaccurate?
7 **A. Yes.**
8 Q. Was there a problem with getting these documents
9 corrected in a timely manner?
10 **A. Yes.**
11 Q. Okay. All parties agree that the quality control
12 review conducted on the TMs by KRSG and BBL in the
13 past was not adequate.
14 Do you recall the ways in which the quality
15 control review was not adequate?
16 **A. The -- when we went through, you know, when you go**
17 **through a document, you know, you come to -- you read**
18 **it and you come to figure whatever and figure whatever**
19 **isn't there, it's not right figure, you know. It was**
20 **just -- it was so, it was so disorganized and missing**
21 **so many things or had additions to it that it was**
22 **extremely difficult for us to review it and just not,**
23 **you know, stamp it incomplete, return to sender, and**
24 **give it back to them, say, you know, we can't do it,**
25 **we can't review something like this, and it delayed**

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1 CORNELIUS
2 the whole process.
3 Q. So documents were egregiously sloppy?
4 A. Yes.
5 MR. SHEBELSKIE: Object to the form of the
6 question.
7 BY MR. ROTH:
8 Q. And missed significant amounts of information?
9 A. Yes.
10 Q. And had severe problems with clarity and organization?
11 A. Yes.
12 Q. Did you ever get an indication that this kind of
13 problem was purposeful?
14 A. Well, after the first two or three times you've seen a
15 document, you almost have to come to that assumption
16 that, you know, this is being done on purpose, because
17 when we comment on something and it doesn't get
18 changed, or it gets changed to even be, you know, kind
19 of different than we had asked for it to be changed,
20 that was an ongoing kind of standard operating
21 procedure, and we were -- we came to the point where
22 we're trying, you can see from the memos, we're
23 requesting our management take actions to change how
24 we are interacting with the PRPs and BB&L to get this
25 done.

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1 CORNELIUS
2 Q. And the issues that were describing the sloppiness and
3 the lack of organization and clarity, that contributed
4 meaningfully to delays?
5 A. Oh, yeah. Oh, yeah.
6 Q. Was there at the outset a view of what the timeline
7 for conducting this RI work, RI/FS work should have
8 been?
9 A. Yeah.
10 Q. What was the thought at the outset? How long should
11 this have really taken?
12 A. You'd have to go back and look at the schedules we
13 used, but, you know, a couple years, at the most, you
14 know, depending -- I mean, from the start it might
15 have taken, you know, a number of years, five, to get
16 everything done, but we were anticipating that we'd be
17 out collecting samples and writing these documents all
18 the time, and, you know, within the first five years
19 we'd have a pretty good handle on at least the upper
20 portion of the site.
21 Q. So the belief was that even for a site of this scope
22 and complexity, within approximately five years MDEQ
23 and EPA and the PRP group would have a good handle on
24 the remedial requirements and could begin to implement
25 the remedy?

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1 CORNELIUS
2 A. Yeah. You've gotta understand, this was basically a
3 simple site. You had mills and landfills who were
4 contaminated, you had a river contaminated, and they
5 were contaminated by one thing, PCBs. It wasn't like
6 you were chasing groundwater plumes, for the most
7 part, because groundwater plumes were all under the
8 landfills. You knew where they were.
9 I mean, this was, this was supposed to be
10 an easy site, and it was supposed to be, you know, a
11 straightforward collect the data, write the report,
12 get on with the remedial actions, so ...
13 Q. So when you say "an easy site," you mean, you know,
14 conceptually straightforward --
15 A. Right.
16 Q. -- just a fair amount of legwork --
17 A. Yeah.
18 Q. -- to do it? So the fact that as of 2000 technical
19 memoranda are still being drafted, in the view of the
20 agency, was this just an extraordinary delay?
21 A. Yes.
22 Q. Okay. And that delay enabled the PRPs to avoid the
23 kind of cost that was, would be necessary to do the
24 actual cleanup of a site of this scope?
25 A. Yes.

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1 CORNELIUS
2 MR. SHEBELSKIE: Object to the form of the
3 question.
4 BY MR. ROTH:
5 Q. And, in your view, the documents indicated an effort
6 to delay?
7 A. We believed that to be the case, yes.
8 Q. And did MDEQ and EPA take -- come to believe that the
9 delay was directly associated with the desire of the
10 PRPs to avoid those costs?
11 MR. SHEBELSKIE: Object to the form of the
12 question.
13 A. Yes, they did.
14 BY MR. ROTH:
15 Q. Okay. We can move on from this document.
16 Now, you're familiar with the fact that in
17 the spring of 1999, the KRSG submitted a proposal to
18 MDEQ for the remediation. I believe this is the RI/FS
19 study?
20 A. The RI/FS part, yes.
21 Q. Okay. And you provided comments on the RI/FS study to
22 Alan Howard, the division chief, correct?
23 A. Yes.
24 Q. Okay. Were comments on the RI/FS study, when
25 submitted in spring '99, conveyed to the PRP group?

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1 CORNELIUS
2 judgments --
3 **A. Yeah.**
4 Q. -- as project manager?
5 **A. Yeah.**
6 Q. He had to do his own coordinating with the agencies
7 and EPA?
8 **A. Yeah.**
9 Q. Okay. Yes?
10 **A. Yes.**
11 Q. Okay. I'm going to hand you the next document, sir.
12 **MARKED FOR IDENTIFICATION:**
13 DEPOSITION EXHIBIT 4470
14 2:49 p.m.
15 **BY MR. ROTH:**
16 Q. Okay, so this is Exhibit 4470. It's document bearing
17 Bates number WY935612. It's a letter dated July 5,
18 2002, to Ms. Sheri Kolak of the USEPA, and it's from
19 Brian von Gunten.
20 **MR. ROTH:** Just for the record, there is
21 some underlining in this document. That was the
22 version that I found in the record. But that is not
23 highlighting or underlining that has been done by me.
24 **BY MR. ROTH:**
25 Q. So in this document, the first paragraph states that

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1 CORNELIUS
2 the draft RI/FS is considered disapproved under
3 paragraph 30(d) of the AOC. So again, the proposal
4 has been rejected, correct?
5 **A. Correct.**
6 **MR. SHEBELSKIE:** Objection, lack of
7 foundation.
8 **BY MR. ROTH:**
9 Q. And the second paragraph says:
10 In the creation and submittal of this draft
11 RI/FS, the KRSG has demonstrated an inability or
12 unwillingness to report facts objectively.
13 Those are the views of Mr. von Gunten,
14 correct?
15 **MR. SHEBELSKIE:** Objection, lack of
16 foundation.
17 **A. They're the views of, of Mr. von Gunten and the DEQ,**
18 **yes.**
19 **BY MR. ROTH:**
20 Q. So let me, let me -- good point. That sentence
21 reflects the views of MDEQ and EPA at the point in
22 time where there is now a different project manager,
23 correct?
24 **MR. SHEBELSKIE:** Objection.
25 **A. Correct.**

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1 **CORNELIUS**
2 **MR. SHEBELSKIE:** Objection, lack of
3 foundation.
4 **BY MR. ROTH:**
5 Q. The next sentence says:
6 The MDEQ does not consider the draft RI/FS
7 a good faith effort to develop reasonable remedial
8 options or impartially evaluate alternatives
9 consistent with the AOC or the National Contingency
10 Plan.
11 This sentence, too, reflects the views of
12 MDEQ and EPA at a time when you're no longer the
13 project manager for the site, correct?
14 **A. Correct.**
15 **MR. SHEBELSKIE:** Objection, lack of
16 foundation.
17 **BY MR. ROTH:**
18 Q. Okay. The next sentence says:
19 The MDEQ believes that KRSG's preferred
20 alternative as a stand-alone remedy does not satisfy
21 the two threshold evaluation criteria under the NCP.
22 Given the MDEQ's experience with the series of
23 inadequate documents consistently produced by the
24 KRSG's consultants, we recommend that the USEPA take
25 over the revision and completion of all RI/FS

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1 CORNELIUS
2 documents for the river operable units.
3 Again, this reflects the views of MDEQ with
4 a different project manager for the site and EPA,
5 correct?
6 **A. Correct.**
7 **MR. SHEBELSKIE:** Lack of foundation.
8 **BY MR. ROTH:**
9 Q. This sentence states that MDEQ is recommending that
10 USEPA take over the revision and completion of all
11 RI/FS documents. Is that an extreme solution?
12 **A. Yes.**
13 **MR. SHEBELSKIE:** Objection.
14 **BY MR. ROTH:**
15 Q. Is that a solution that MDEQ would only propose if
16 there were no other options available?
17 **MR. SHEBELSKIE:** Objection, leading.
18 **A. Yes.**
19 **BY MR. ROTH:**
20 Q. The document references that EPA has taken over as
21 lead for the site, did that happen because EPA was
22 perceived as having more firepower to compel
23 cooperation?
24 **MR. SHEBELSKIE:** Objection, lack of
25 foundation.

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1 CORNELIUS
2 A. **Yes.**
3 **BY MR. ROTH:**
4 Q. The last sentence of the paragraph says:
5 Additionally, as RI/FS negotiations begin,
6 we suggest that the USEPA recommend that the
7 potentially responsible party group obtain a new
8 consultant.
9 Can you just in a sentence or two describe
10 why it appears, what -- your thoughts about why it was
11 necessary to obtain a new consultant?
12 **MR. SHEBELSKIE:** Objection, lack of
13 foundation.
14 A. **Well, the, you know, the continuous efforts that DEQ**
15 **had put in to get documents finalized to move the site**
16 **forward were ineffective, and I think the DEQ believed**
17 **that part of the problem was the consultant was being**
18 **directed to do things that, you know, kept this site**
19 **from getting completed, and this was the final remedy**
20 **to that problem.**
21 **BY MR. ROTH:**
22 Q. There was an astonishing lack of cooperation from the
23 contractor, correct?
24 A. **Correct.**
25 **MR. SHEBELSKIE:** Object to the form of the

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1 CORNELIUS
2 question.
3 A. **Correct.**
4 **BY MR. ROTH:**
5 Q. Thank you. And that lack of cooperation, in the
6 agencies' view, was fueled by the PRPs themselves,
7 correct?
8 A. **Correct.**
9 Q. Thank you.
10 **MR. SHEBELSKIE:** Object to the form.
11 **BY MR. ROTH:**
12 Q. The last paragraph says:
13 Overall, the document seems to have been
14 written by attorneys, not scientists.
15 That was an overarching theme of your
16 experience working with BBL and the KRSG, correct?
17 A. **Yes.**
18 Q. Much of the RI/FS reads as an argumentative advocacy
19 piece intended to persuade the reader that the MDNR is
20 partially to blame for the polychlorinated biphenyl
21 contamination in the river.
22 A. **Yeah, that was, that was a topic of, you know, ongoing**
23 **pursuit.**
24 Q. Did the MDNR ever operate a paper mill?
25 A. **No.**

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1 CORNELIUS
2 Q. Did the MDNR ever discharge PCBs into the site?
3 A. **No.**
4 Q. Did the MDNR ever, to your knowledge, take a single
5 action that caused PCB contamination in the river?
6 A. **No.**
7 Q. Is there any basis whatsoever to put the blame for PCB
8 contamination in the site on the agency that's charged
9 with cleaning it up?
10 A. **Not that I know of.**
11 Q. Many of the KRSG statements in the RI/FS are
12 absolutely incorrect or based on false assumptions.
13 Is that consistent with your experience as
14 project manager?
15 A. **Yes, it is.**
16 Q. Is it unprecedented in your experience as project
17 manager?
18 A. **Yes, it is.**
19 Q. Draft RI/FSs should be revised so that it excludes the
20 blaming and finger pointing and includes
21 factually-relevant information regarding nature and
22 extent of contamination, clear threats to public
23 health and the environment, and unbiased evaluation of
24 appropriate alternatives for remedial action.
25 Does this sentence describe, from your

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1 CORNELIUS
2 experience, consistent pervasive problems dealing with
3 KRSG and BBL?
4 A. **Yes.**
5 **MR. SHEBELSKIE:** Object to the form of the
6 question.
7 **BY MR. ROTH:**
8 Q. Thank you. And again, you had no hand in drafting
9 this letter, correct?
10 A. **No. I hadn't even seen this letter until today.**
11 Q. Okay, but it's fully consistent with your experience?
12 A. **It's fully consistent with my experiences, yes.**
13 Q. Thank you. Were you surprised to learn that later the
14 contractor was in fact replaced?
15 A. **I heard that happened quite a -- not very long ago,**
16 **actually, I guess.**
17 Q. By the way, the October 2000 plan was submitted to the
18 community for review, correct?
19 A. **Correct.**
20 Q. Are you familiar with what the community's reaction to
21 it was?
22 A. **Yes.**
23 Q. Was it unanimously against it?
24 A. **Yes.**
25 **MR. SHEBELSKIE:** Object to the form of the

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1 CORNELIUS
2 now.
3 A. **This?**
4 Q. Yes, sir, sorry.
5 The time you were the project manager at
6 the site, that ten-year period, over the course of
7 that decade there was a large amount of work that the
8 department directed the KRSG group to do, correct?
9 A. **Correct.**
10 Q. And is it your opinion, based on your professional
11 judgment, that all the work that the department
12 directed the group to do during your tenure was
13 reasonable?
14 A. **Yes.**
15 Q. And was necessary?
16 A. **Yes.**
17 Q. And was consistent with the National Contingency Plan?
18 A. **Yes.**
19 Q. In other words, you didn't ask them to do things you
20 thought were unnecessary, right?
21 A. **No.**
22 Q. Or that were inconsistent with the National
23 Contingency Plan?
24 A. **No.**
25 Q. To follow up some questions that Mr. Roth was asking

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1 CORNELIUS
2 you, you testified that you were removed as the
3 project manager in 2000, is that accurate?
4 A. **March of 2000, yes.**
5 Q. Why were you removed?
6 A. **Well, that's, that's still kind of a big question. I**
7 **was told that the director has the ability to reassign**
8 **staff as he thought necessary, and that I wasn't**
9 **working on the Kalamazoo River anymore.**
10 Q. Who told you that?
11 A. **Al Howard.**
12 Q. Did he tell you why the director had made the decision
13 to reassign you?
14 A. **Not really, no.**
15 Q. What did he tell you?
16 A. **He just said that, you know, he didn't -- that KRSG**
17 **had a meeting and that the decision's been made by the**
18 **director.**
19 Q. Well, did you ask Mr. Howard why you were being
20 reassigned?
21 A. **No.**
22 Q. Did you ask the director?
23 A. **No.**
24 Q. Did you ask anyone at the department why you had been
25 reassigned?

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1 CORNELIUS
2 A. **No.**
3 Q. Did you have any inkling or indication in advance that
4 you were going to be reassigned?
5 A. **I knew that the KRSG had, had gone on a witch-hunt**
6 **previously, about two months, maybe three months. I**
7 **had done a radio interview with a local -- it's**
8 **snowing again -- with a local veterinarian, and we did**
9 **a call-in/ask-questions type of interview, and there**
10 **were some things in there that the attorney for**
11 **Georgia-Pacific didn't care for, our responses or my**
12 **responses.**
13 **And they sent in the transcript and said,**
14 **"When Scott said this, he meant this," and we went**
15 **through it and reviewed it all, and, and again, I was,**
16 **you know, within my regulatory framework to advise**
17 **people not to eat fish because of PCB contamination,**
18 **given what the Department of Health, Community Health**
19 **had put out there.**
20 **So I figured that when we flew to EPA and**
21 **sold EPA -- Al Howard, the consultant, and myself went**
22 **to EPA and sold EPA on a cleanup plan, that -- for the**
23 **entire river, that a month later when you get a call**
24 **that says you're no longer working on the site, that's**
25 **probably one of the big factors, that, for whatever**

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1 CORNELIUS
2 **reason, the director and the governor of the state of**
3 **Michigan at the time decided that Georgia-Pacific and**
4 **the, and the KRSG had some arguments that I shouldn't**
5 **be the project manager, Al Howard shouldn't be the**
6 **division chief overseeing it, and the EPA counterpart**
7 **shouldn't be there, either, to change that.**
8 **And, I mean, it was, it was clear to me**
9 **without even having to ask anybody. And I was on to**
10 **another site that I didn't have to deal with the KRSG,**
11 **which was not, not depressing to me at all. I was**
12 **happy to move on and get out of there.**
13 Q. In your answer, you used the term "witch-hunt." What
14 do you mean by that?
15 A. **Well, it was a, it was a totally, you know, incident**
16 **radio interview, where people were calling in and**
17 **asking all kinds of questions. Can we go wade in the**
18 **water? Yeah, you can go wade in the water. Don't eat**
19 **the sediments, don't drink the water, you know. Can I**
20 **eat fish? No, don't eat the fish out of the river.**
21 **Follow the fish advisory thing, kind of thing.**
22 **And there must have been some -- and you**
23 **can probably talk to -- I can't remember his last**
24 **name, even. But, anyways, one of the attorneys at**
25 **Georgia-Pacific wrote up a big complaint, sent it in**

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1 CORNELIUS
2 to the director, who sent it down to Al Howard, and we
3 went through it all, and, you know -- and when they
4 went through it, they found no credibility in the
5 accusations that I had done anything that was remotely
6 wrong, you know.
7 It was just being a public servant, talking
8 to the call-ins, trying to answer the questions the
9 best I could.
10 Q. So Georgia-Pacific sent in a written complaint to the
11 department about this interview you gave?
12 A. Yeah, yeah.
13 Q. And did you see a copy of the complaint?
14 A. No.
15 Q. Did some bosses or superiors in the department come
16 talk with you about the complaint?
17 A. Al Howard talked with me about the complaint, yes.
18 Q. Anybody else at the department?
19 A. No.
20 Q. So that's how you found out about it, from Mr. Howard?
21 A. Yes.
22 Q. What did Mr. Howard tell you about it?
23 A. He said that Georgia-Pacific was upset with the radio
24 interview and they were going to review it. So they
25 reviewed it.

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1 CORNELIUS
2 Q. And who is "they"?
3 A. The -- well, I don't -- Al Howard and the director, at
4 least, you know. It might have been some enforcement
5 people in there. A lot of times when we get
6 complaints, we pull enforcement. For all I know, the
7 Attorney General may have been involved, who knows.
8 Q. And you said that you were then told at some point
9 that based upon that review, your colleagues at the
10 department thought you had done nothing wrong?
11 A. Right.
12 Q. And who told you that?
13 A. Al Howard.
14 Q. All right. And so if they had conducted a review and
15 told you that they didn't think you had done anything
16 wrong, why do you think that was the cause of your
17 being transferred?
18 A. No, I think, I think actually the --
19 MR. SHEBELSKIE: Objection.
20 A. I think actually the going and proposing the cleanup
21 for the river to EPA and getting that accepted by EPA
22 was probably one of the things that led to the
23 replacement.
24 BY MR. SHEBELSKIE:
25 Q. All right, so tell me about that. What was that

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1 CORNELIUS
2 meeting?
3 A. There was a meeting with the head of Superfund at the
4 time, a section in EPA, and we went through and we
5 laid out the costs, the time, the amount of
6 contamination that would have to be removed, the
7 cleanup levels and everything, proposal to remediate
8 the river, and EPA, when we left there, was in
9 agreement that that was an appropriate way to address
10 the site, and we were, you know, you can see from the
11 letters we're at the point where we're taking back
12 things. We're wrapping things up. We're getting
13 ready to move on to the next stage of the FS and the
14 cleanup. So that's where we were at.
15 Q. You said you were transferred in March of 2000, right?
16 A. I was reassigned.
17 Q. Reassigned?
18 A. Only in sites. I still worked in the Superfund. I
19 still sat at the same desk and did the same thing,
20 only I did it at other sites.
21 Q. And I didn't mean to suggest otherwise.
22 A. Yeah.
23 Q. If you could relate that to -- when was this meeting
24 at EPA that you and Mr. Howard attended?
25 A. Oh, it was probably, I'd say a month or two before

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1 CORNELIUS
2 that.
3 Q. And did anyone else from the department go other than
4 you and Mr. Howard?
5 A. No.
6 Q. Was there any suggestion that -- by anyone at the
7 department that you and Mr. Howard shouldn't have gone
8 to that meeting with the EPA?
9 A. No, no, it was -- all those kinds of things are
10 cleared before we go.
11 Q. All right. And that trip was cleared before you went?
12 A. Oh, yeah.
13 Q. And it was your impression at the end of the meeting
14 that the EPA was on board with your proposal?
15 A. That's what they told us. They said that's the way
16 we'll proceed.
17 Q. All right. Then why do you think that meeting led to
18 your being assigned to a new site, given that it was
19 pre-cleared and you thought EPA signed on?
20 A. I speculate that the KRSG didn't like the proposal and
21 they wanted it changed, and the only way to change
22 that proposal was to change the people who had
23 proposed that proposal, and it seemed, it seemed to
24 coincide.
25 Q. All right. But you didn't talk with the director

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BY BILL KRASEAN
KALAMAZOO GAZETTE

Citing frustration with delays he said are out of his control, the head of Michigan's Department of Environmental Quality has asked the Environmental Protection Agency to take over the lead in efforts to clean up the Kalamazoo River.

Russell Harding made the request in a letter Tuesday to the EPA's David Ullrich, acting Region 5 administrator.

"We have been frustrated and citizens have been frustrated for some time by the pace of the remediation," Harding said in an interview Tuesday. "We see it as a truth-in-advertising issue. We can't progress without the EPA's approval, and we get the blame from the environmental people for the slow pace. I don't mind being criticized if I have some control. But I'm not in control."

William Muno, director of the EPA's Region 5 Superfund Division, said Tuesday that while he had not seen the letter, if the state relinquishes it's role as the lead agency, the EPA takes over "by default."

"Long-term, this is a positive thing," Muno said, since it will allow the EPA to implement remediation practices learned at other PCB-contaminated sites in other states.

Brian von Gunten, a DEQ environmental quality analyst who oversees the Kalamazoo River Superfund site, said he expects that it may be fall before the EPA takes charge of the site.

"Many who have followed the frustratingly slow progress on the cleanup of the Kalamazoo River under DEQ leadership have advocated that EPA take over the process," said Don Brown, a retired Western Michigan University chemistry professor.

Brown has followed the river cleanup process for many years as a

Sierra Club representative on the Kalamazoo Environmental Council.

"Now that director Harding also has suggested that," Brown said, "one is led to question two things: What is Michigan's commitment to assuring the quality of our state's water resources and, given current federal funding of EPA, does that agency have the capacity to run the cleanup?"

Brown said he thinks the change will slow the remediation process down, at least initially. "Who knows in the long run," he said.

In 1990, the Kalamazoo River from Kalamazoo to Lake Michigan was declared a federal Superfund site. The 70-mile stretch has sediments containing PCBs left over from paper company practices during the 1950s, '60s and early '70s.

PCBs are considered toxic to wildlife who live along the river and to people who eat fish caught in the river. Michigan's Department of Community Health issues a yearly guide that details what fish should and should not be eaten and by whom.

Four paper companies have been charged with responsibility for the contamination and for paying for a lengthy study of the residual contamination and any cleanup.

Earlier this year a firm representing the paper companies proposed a cleanup process and the DEQ was to have had a counterproposal this summer.

"We thought a year ago that we would be meeting with the DEQ in June to talk about a final remediation," said Mark Brown, vice president of the engineering firm Blasland & Bouck Engineers. B&B was hired to oversee remediation by the paper companies, who have spent more than $25 million so far.

The EPA, however, asked for more samples from the site, delaying

the discussion, he said.

"There will be administrative benefits of having the EPA in charge that will speed up some processes," Mark Brown said. "But I do see that it may add time to the process early on.

"We want things to go quickly. But we're now in a wait-and-see mode."

Harding said residents "are understandably anxious to see a remedy put into place. The state is also ready to move forward. It is apparent, though, that the critical step is the completion of the EPA's decision-making process."

Von Gunten said the DEQ will continue to work closely with the EPA on the site, providing technical and other expertise. It will continue with periodic public sessions to update citizens on the progress of the remediation, he said.

One of those meetings starts at 7 p.m. tonight in the Comfort Inn in Plainwell.

Von Gunten said that of the 67 sites in Michigan undergoing remediation for contamination, about 50 are led by the EPA. "The lead role changes back and forth fairly commonly," he said, especially about the time that the agencies are drafting remediation plans.

Harding said that typically the state begins remediation at cleanup sites within three years while EPA-led sites can take up to 10 years.

He said that the Kalamazoo River was one of the biggest and most complicated sites in the state and would take longer than most. "The EPA will do the best job to reduce the (health) risks of PCBs," he said, "and to make things better on the river.

"The river will never be the same as it was before settlements, however."

Von Gunten said the change will also allow the paper companies to take action - based on state and federal mandates - that would be final. The EPA, he said, would not be able to come back later to demand additional work.

BILL KRASEAN can be reached at 388-8577 or bkrasean@kalamazoogazette.com.

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STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

JOHN ENGLER
GOVERNOR

RUSSELL J. HARDING
DIRECTOR

July 5, 2002

Ms. Shari Kolak
Remedial Project Manager
United States Environmental Protection Agency
77 West Jackson Boulevard SR-6J
Chicago, Illinois 60604-3590

EXHIBIT
7034
DEPONENT NAME: Paul Montney
DATE: 8/16/14

Dear Ms Kolak:

The Michigan Department of Environmental Quality (MDEQ) has completed its review of the draft *Remedial Investigation/Feasibility Study* (RI/FS), *Supplement to the Kalamazoo River*, and *Former Impoundment Approaches* documents, submitted by the Kalamazoo River Study Group (KRSG).

Under the Administrative Order by Consent (AOC) between the parties of the KRSG and the State of Michigan, the draft RI/FS is considered "disapproved" under paragraph 30(d) of the AOC. As the United States Environmental Protection Agency (U.S. EPA) now has the enforcement lead for the river RI/FS, the MDEQ will defer department modification of the RI/FS (also under paragraph 30(d)) to the U.S. EPA. Detailed comments from several reviewers are included in this comment package. All comments in this correspondence should be considered in revising the RI/FS. Additional comments, e-mailed April 5, 2001 to the MDEQ and the U.S. EPA from the National Oceanographic Atmospheric Administration are incorporated by reference. We also recommend utilizing the comments of previous U.S. EPA project managers, such as those transmitted to the MDEQ September 5, 2001. We have attached copies of those comments for easy reference.

In the creation and submittal of this draft RI/FS, the KRSG has demonstrated an inability or unwillingness to report facts objectively. The MDEQ does not consider the draft RI/FS a good faith effort to develop reasonable remedial options or impartially evaluate alternatives consistent with the AOC or the National Contingency Plan (NCP). The MDEQ believes the KRSG's preferred alternative, as a stand-alone remedy, does not satisfy the two threshold evaluation criteria under the NCP. Given the MDEQ's experience with the series of inadequate documents consistently produced by the KRSG's consultant (i.e. technical memoranda, RI/FS documents for other operable units) we recommend

7034

that the U.S. EPA take over the revision and completion of all RI/FS documents for the river operable units. Additionally, as RI/FS negotiations begin, we suggest that the U.S. EPA recommend that the potentially responsible party group obtain a new consultant.

The comments in this letter may refer to concepts or statements that appear in several places in the draft RI/FS documents. This letter does not attempt to list each instance in which a particular concept or statement needs to be changed; revisions should be made to the document globally. The comments in this letter do not imply agreement with any portion of the draft RI/FS not specifically mentioned in this comment package.

Overall, the document seems to have been written by attorneys, not scientists. Much of the RI/FS reads as an argumentative advocacy piece intended to persuade the reader that the MDNR is partially to blame for the polychlorinated biphenyl contamination in the river. Many of the KRSG's statements in the RI/FS are absolutely incorrect or based on false assumptions. The draft RI/FS should be revised so that it excludes the blaming and finger-pointing and includes factually relevant information regarding nature and extent of contamination, the clear threats to public health and the environment, and an unbiased evaluation of appropriate alternatives for remedial action.

We look forward to assisting in revising the RI/FS in any way you deem appropriate.

Sincerely,

George Carpenter for BVG

Brian von Gunten
Project Manager
Environmental Response Division
517-373-6808

Attachment

cc: Mr. Mark Brown, Respondent's Representative (KRSG)
Kalamazoo River Site File

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STATE OF MICHIGAN

DEPARTMENT OF NATURAL RESOURCES

IN THE MATTER OF:

Allied Paper/Portage Creek/Kalamazoo River Superfund (National Priorities List) Site

FINAL ORDER NO. DFO-ERD-91-001

ADMINISTRATIVE ORDER BY CONSENT

1. This Administrative Order by Consent (hereinafter the Order) is entered into voluntarily by and between the Michigan Department of Natural Resources (hereinafter the MDNR), and all of the undersigned Respondents, (hereinafter the Respondents). The Order concerns the preparation of, performance of, and reimbursement of oversight cost for the Remedial Investigation and Feasibility Study (hereinafter the RI/FS) for the listed Superfund Site known as the Allied Paper, Inc./Portage Creek/Kalamazoo River Site (hereinafter the Site). This Order is issued pursuant to the authority vested in the MDNR by Section 7(2) of 1929 P.A. 245, as amended, (the Water Resources Commission Act (hereinafter the WRCA)), being MCL 323.7(2); MSA 3.527(2), and pursuant to the Cooperative Agreement with U.S. EPA, dated December 28, 1990 and the attachments. The Respondents agree not to contest the authority or jurisdiction of the MDNR to issue this Order in any subsequent proceeding to enforce the terms of this Order. The Respondents further agree not to contest this Order pursuant to Section 7(3) of the WRCA. This Order constitutes an enforceable agreement between the State and Respondents pursuant to Section 10 of the WRCA.

DENIAL OF LIABILITY

2. This Order is the product of settlement negotiations. Its execution is intended to serve the public interest and the interests of judicial and litigant economy. The parties agree that its execution shall not constitute an admission of fact or law with respect to any issue dealt with in this Order, nor shall it constitute evidence of same.

PARTIES BOUND

3. This Order shall apply to and be binding upon the MDNR and Respondents, their agents, successors, and assigns, and upon all persons, acting under or for the parties. No change or changes in the ownership or corporate status of any of the Respondents shall in any way alter the Respondents' responsibilities under this Order. Each Respondent shall provide a copy of this Order to any subsequent owners or successors before ownership rights are transferred. The Respondents shall be jointly and severally liable for the performance of the activities specified in the Order and for penalties arising from this Order. The signatories to this Order certify that they are authorized to execute and legally bind the parties they represent.

4. The Respondents shall provide a copy of this Order to all contractors, subcontractors, laboratories, and consultants retained to conduct any portion of the work performed pursuant to this Order, within fourteen (14) calendar

Exhibit 1003

KB10003377

days after the effective date of this Order or after the date of such retention. Notwithstanding the terms of any contract, Respondents are responsible for compliance with this Order and for ensuring that their contractors and agents comply with this Order. Any reference herein to the Order shall mean the Order, any Appendix thereto including any future modifications as provided by the terms of the Order as may be added hereafter, including, any reports, plans, specifications, schedules, and appendices required by this Order which, upon approval of MDNR, shall be incorporated into and enforceable under the Order.

STATEMENT OF PURPOSE

5. In entering into the Order, the mutual objectives of MDNR and the Respondents are: (a) to determine the nature and extent of contamination and any threat to the public health, welfare, or the environment caused by the release or threatened release of hazardous substances, pollutants or contaminants from the Site by conducting a remedial investigation; and (b) to determine and evaluate alternatives for remedial action (if any) to prevent, mitigate or otherwise respond to or remedy any release or threatened release of hazardous substances, pollutants, or contaminants from the Site by conducting a feasibility study.

6. The activities conducted under this Order are subject to approval by MDNR and shall provide all appropriate necessary information for the RI/FS , and for a Record of Decision that is consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (hereinafter the CERCLA) 42 U.S.C. Section 9601 et seq., the National Contingency Plan (hereinafter the NCP), 40 Code of Federal Regulations (hereinafter the C.F.R.) Part 300, 55 Federal Register (hereinafter the Fed. Reg.) No. 46 p 8666 et seq. (March 8, 1990), the Michigan Environmental Response Act, 1982 P.A. 307 (hereinafter the Act 307) and its administrative rules and the Cooperative Agreement with EPA, dated December 27, 1990.

FINDINGS OF FACT

The MDNR has determined, but the Respondents do not acknowledge the following findings of fact:

7. The Site includes Portage Creek from Cork Street to its confluence with the Kalamazoo River and the Kalamazoo River downstream to Allegan City Dam. The Site includes about 3 miles of Portage Creek and 35 miles of the Kalamazoo River from the City of Kalamazoo to the City of Allegan. The Kalamazoo River flows in a westerly direction and is a major tributary to southern Lake Michigan.

8. The sediments, water column and biota in the Kalamazoo River/Portage Creek Site are contaminated with polychlorinated biphenyls (hereinafter PCBs), a hazardous substance and probable human carcinogen. Based on numerous studies conducted between 1972 and 1989, the MDNR has estimated that there are about 200,000 pounds of PCBs in the sediments in and adjacent to Portage Creek and the Kalamazoo River at this Site. PCBs continue to migrate off-site due to the river flow, and substantially contribute to the ongoing contamination of Lake Michigan. The Michigan Department of Public Health has issued a fish consumption advisory (1990) for this site due to PCB contamination. This

MR10003378

warning has been reissued annually since 1977. The Site, including additional portions of the Kalamazoo River, has been designated an environmental contamination site under State Act 307 due to the PCB contamination. In addition, a portion of the Kalamazoo River has been identified as an Area of Concern by the International Joint Commission because of its detrimental impact on Lake Michigan due to the PCB contamination.

8a. Groundwater investigations have identified several plumes of contamination adjacent to Bryant Mill Pond on Portage Creek. Hazardous contaminants identified to date include PCBs, arsenic, lead, phenols, benzene, pentachlorophenol, ethyl benzene, toluene, xylene, tetrachloroethene, cadmium, copper, mercury, nickel, and zinc.

9. The Site was included on the National Priorities List (NPL) pursuant to Section 105 of CERCLA. See 40 C.F.R. Part 300, Appendix B, and 55 Fed. Reg. No.169 p 35519 (August 30, 1990).

9a. The MDNR has identified three potentially responsible parties for the PCB contamination. These are HM Holdings Inc./Allied Paper Inc., Georgia Pacific Corporation and Simpson Plainwell Paper Company.

9b. These three parties have been identified as potentially responsible parties due to past business operations involving the recycling of paper, including deinking, during the period 1950-1975. During this period, PCBs were commonly used in certain types of paper, especially carbonless copy paper. The recycling of paper, including deinking by these parties resulted in the discharge of PCBs to the river, either directly or by sludge disposal practices. The presence of PCB contaminated waste disposal sites located on each of their properties adjacent to Portage Creek or the Kalamazoo River is a direct result of waste treatment systems operated to control the river pollution, and is indicative of the extent of the river contamination.

10. In December, 1987, the State of Michigan filed suit in Federal District Court against HM Holdings Incorporated/Allied Paper Company seeking, among other things, remediation of Bryant Mill Pond on Portage Creek. A consent order was entered in December, 1988, regarding adjacent contaminated lagoon and landfill areas and the point source discharge of PCBs. However, the issue of remediation of Bryant Mill Pond has not been resolved.

11. MDNR has arranged for oversight and review of the RI/FS by both qualified MDNR personnel and qualified contractors.

DETERMINATIONS

12. On the basis of the Findings of Fact, MDNR has determined, but Respondents do not acknowledge that:

a. Each Respondent is a "person" as defined in Section 101(21) of CERCLA, 42 U.S.C. Section 9601(21).

b. Each Respondent is a "responsible party" under Section 107(a) and a "potentially responsible party" within the meaning of Section 122 of CERCLA, 42 U.S.C. Sections 9607(a) and 9622.

c. The Site is a "facility" within the meaning of Section 101(9) of CERCLA, 42 U.S.C. Section 9601(9).

d. The substances identified at the Site are "hazardous substances" within the meaning of Section 101(14) of CERCLA, 42 U.S.C. Section 9601(14).

e. The past, present or potential future migration into the environment of hazardous substances, pollutants or contaminants at or from the Site constitutes an actual "release" or a substantial threat of a "release" into the "environment" as those terms are defined in Sections 101(8) and 101(22) of CERCLA, 42 U.S.C. Sections 9601(8) and 9601(22).

f. The actions called for in this Order will be consistent with the NCP to the extent that the NCP is consistent with CERCLA provided that the Respondents conduct such actions properly and promptly pursuant to this Order.

g. It is necessary, in order to protect the public health and welfare and the environment, to conduct an RI/FS to determine the full nature and extent of contamination that exists at or near the Site and to determine what remedial actions are necessary to be carried out at the Site, or secured through enforcement action.

h. The RI/FS will be conducted properly and promptly by the Respondents, provided that these actions are conducted as described in the Appendix 1 [Statement of Work] and any modifications thereto, and pursuant to all conditions of the Order.

i. The Respondents are qualified to conduct the RI/FS, if the Respondents engage a qualified contractor pursuant to Paragraph 17 of this Order.

j. MDNR has arranged for the oversight and review of the RI/FS by qualified State personnel and qualified contractors.

ORDER

MDNR AND THE RESPONDENTS HEREBY AGREE, AND MDNR HEREBY ORDERS THAT:

13. Implementation: Subject to MDNR's rights to implement its own RI/FS pursuant to Paragraph 45, the Respondents shall perform the RI/FS in accordance with the Statement of Work (hereinafter the SOW), in Appendix 1, and with any modifications made or required by MDNR to bring documents and/or deliverables prepared by the Respondents under this Order into conformance with the requirements of CERCLA, the SOW, and modifications to the SOW, and any work plans prepared under this Order or the SOW, which are incorporated by reference into this Order. Upon the effective date of this Order, Respondents shall commence implementation of this Order and work required by the Statement of Work, and shall conclude implementation of such in accordance with the terms and schedules set forth in this Order, Appendix 1, and any approved Work Plans. The activities conducted pursuant to this Order are subject to approval by MDNR and shall be consistent with the NCP to the extent that the

NCP is consistent with CERCLA. If any inconsistencies between the NCP and CERCLA exist, CERCLA shall govern. Furthermore, if the NCP is amended prior to the signing of a Record of Decision for final remedial action at the Site, MDNR may modify or require modification to the SOW and to any approved Work Plan or other deliverable accordingly, or may require Respondents to develop a new Work Plan or other deliverable accordingly, and the Respondents shall conduct all activities required by the new or modified Work Plan or other deliverable.

MDNR may determine that additional tasks, including remedial investigatory work and/or engineering evaluations, conducted independently of this Order and in addition to MDNR approved tasks and deliverables, but consistent with this Order are part of an RI/FS. The Respondents shall implement any additional tasks which MDNR determines are necessary as part of performing the activities required under this Order. The additional tasks shall be completed in accordance with the standards, specifications, and schedule determined or approved by MDNR.

14. Reimbursement of MDNR Oversight Costs: The Respondents shall reimburse the MDNR or the Hazardous Substances Superfund, as the case may be, for all costs, including interest, incurred after the effective date of this Order by MDNR in overseeing this Order and by MDNR under or in connection with a contract or arrangement between MDNR and a qualified person to assist MDNR in overseeing and reviewing the conduct of activities required under this Order. Reimbursable oversight costs shall include all direct and indirect costs of MDNR's oversight arrangements for the RI/FS, including, but not limited to, time and travel costs of MDNR personnel and associated indirect costs, contractor costs, all costs incurred in conducting a Health Assessment for the Site, compliance monitoring, including the collection and analysis of split samples, inspection of RI/FS activities, site visits, interpretation of Order provisions, discussions regarding disputes that may arise under this Order, review of reports and deliverables under this Order, the costs of redoing any of Respondents' tasks, and any interest that begins to accrue from the due date set forth in the demand for costs incurred.

15. Following each anniversary of the effective date of this Order, MDNR will provide Respondents with a summary of all oversight costs, by major cost categories, incurred during the preceding year with respect to the Site. Respondents shall, within 30 days of receipt of each annual oversight costs summary, remit a certified check for the amount of those costs, made payable to the State of Michigan. If Respondents dispute an oversight cost, pursuant to the procedures of Paragraph 36 Respondents may initiate dispute resolution if Respondents notify MDNR in writing within fifteen (15) days of receipt of the oversight cost summary. Respondents shall pay all oversight costs other than the disputed portion in accordance with this Paragraph. Checks for such payments shall identify the name of the Site and docket number for this Order, and be mailed to:

Assistant Attorney General In Charge
Environmental Protection Division
P.O. Box 30212
Lansing, MI 48909

KB10003381

A copy of the transmittal letter and the check shall be provided simultaneously to the MDNR Project Manager (hereinafter the PM).

16. Observation of Respondents' RI/FS Activities: The Respondents shall allow MDNR's employees, agents, consultants, contractors, and authorized representatives to observe the Respondents' work at the Site in implementing the activities pursuant to this Order. The Respondents shall permit such persons to inspect and copy all non-attorney-client and/or non-attorney work product privileged records, documents, files or other writings related to the Respondents' RI/FS activities and record all RI/FS field activities by means of photographic or other recording equipment; to enter and to freely move about all property on or about the Site; to conduct such tests as MDNR may deem necessary; and to verify the data submitted to MDNR by the Respondents.

17. Engagement of a Contractor: Within forty-five (45) days of the effective date of this Order, the Respondents shall engage a qualified Contractor to perform the technical activities required under this Order. The Contractor shall employ key personnel dedicated to the RI/FS that shall be experienced in performing investigations and studies at hazardous waste site. All work performed by said Contractor pursuant to this Order shall be under the general direction and supervision of a qualified individual with expertise in hazardous waste site investigation and clean-up. Such professional staff sufficient to perform the RI/FS shall be employed by the Contractor prior to engagement by the Respondents. Written notice of the engagement of the Contractor shall be provided to MDNR within five (5) days of such engagement, and a copy of the Respondents' contract with the Contractor, including a statement of qualifications and identification of project personnel, and language dedicating the specific professional staff devoted to the project, shall be provided to MDNR at that time. The Respondents shall notify MDNR regarding the identity and qualifications of all subcontractors as soon as each subcontractor is engaged or at least two weeks prior to the subcontractor's commencement of site work, whichever occurs first. MDNR shall have the right to disapprove, based on professional qualifications, conflicts of interest and/or deficiencies in previous similar work, any Contractor engaged directly or indirectly by the Respondents to conduct work activities under this Order.

18. Financial Assurance: Within thirty (30) days after the effective date of this Order and annually thereafter until certification of the work under Paragraph 43 of this Order, one or more of the Respondents shall demonstrate to MDNR that they meet one of the financial assurance mechanisms specified in 40 C.F.R. Section 264.143 for the estimated costs of work to be performed by Respondents under this Order. Financial Assurance(s) provided pursuant to this paragraph shall total three million dollars ($3,000,000.00)

19. Designation of Respondents' Project Coordinator: Within ten (10) calendar days of the effective date of this Order, the Respondents shall designate a Project Coordinator who shall be responsible for the administration of all actions called for by this Order and shall submit the respective coordinator's name, address and telephone number to MDNR. Any subsequent change in the Respondents' Project Coordinator shall be accomplished by notifying MDNR in writing at least ten (10) calendar days prior to the change.

KB10003382

20. Designation of Government Coordinators: MDNR will designate a Project Manager (PM) for administration of its responsibilities, for oversight of the day-to-day activities conducted under the Order, and for receipt of all written matter required by the Order. MDNR may also designate assistant PMs as necessary. In addition, MDNR will designate a Section Chief (hereinafter the SC) who shall be responsible for the findings of approval/disapproval and comments on major project deliverables under this Order. MDNR will submit the PM's, assistant PM's and SC's name, address and telephone number to the Respondents within fifteen (15) calendar days of the effective date of this Order. The PM and assistant PMs shall have the authority vested in the On-Scene Coordinator and the Remedial Project Manager by the National Contingency Plan, 40 C.F.R. Part 300 et seq.. This includes the authority to halt, conduct, or direct any tasks required by this Order and/or any response action, or portions thereof when conditions present an immediate risk to public health or welfare or the environment. The absence of the MDNR PM or assistant PMs from the Site shall not be cause for the Respondents to halt actions at the Site. Any subsequent change in the MDNR PM, assistant PMs or SC shall similarly be accomplished by notifying the Respondents in writing.

21. Site Access: RESPONDENTS shall guarantee access to their property at the Site for the purpose of implementing this Order. To the extent that any area where work is to be performed under this Order is owned or controlled by persons other than Respondents, the Respondents shall use their best efforts to obtain site access agreements from all site property owners and from owners of any other property on which work is necessary under this Order. Such agreements shall, at a minimum, allow the Respondents and their contractors, MDNR, its designated coordinators, agents, employees, authorized representatives and contractors, to enter freely, and move about for the purpose of implementing this Order or overseeing the Respondents' implementation of this Order. In the event that Respondents conclude that they are unable to obtain a necessary access agreement within the time referenced in the work plan, the Respondents shall immediately notify MDNR in writing and shall include in such notification the name, address and telephone number of the property owner, the location of the property, a description of the efforts made by the Respondents to obtain the necessary access and the reason for their lack of success. The Respondents agree to reimburse MDNR for any costs MDNR may incur in exercising its authority to gain access to the Site.

22. Creation of Danger: Upon the occurrence of any event during the RI/FS that causes or threatens any release of hazardous substances, pollutants or contaminants from the Site into the environment which may threaten the public health, welfare, or the environment, the Respondents shall immediately notify the MDNR Pollution Emergency Alert System (hereinafter PEAS) by calling telephone number 1-800-292-4706 in Michigan or 1-517-373-7660 from out of state and the MDNR PM within twenty-four (24) hours, or in the event of his or her unavailability, shall notify within the same twenty-four (24) hour period, Chief of the Environmental Response Division, MDNR, setting forth: the events that have occurred; the measures taken and to be taken to mitigate any harm caused or threatened by the event; and the measures taken and to be taken to prevent the reoccurrence of such an event. Regardless of whether or not such a report is made to MDNR, if MDNR determines that activities of the Respondents in compliance or noncompliance with this Order have caused or may cause a release of a hazardous substance, pollutant or contaminant or a threat

KB10003383

to the public health or welfare or to the environment, MDNR may (a) order the Respondents to stop further implementation of this Order for such period of time as may be needed to abate such release or threat; and/or (b) undertake any action which MDNR determines is necessary to abate such a release or threat.

23. Health and Safety Compliance and Quality Assurance/Quality Control: The Respondents shall use quality assurance, quality control, and chain of custody procedures described in the "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plan," December 1980, QAMS-005/80, and subsequent amendments to such guidelines, while conducting all sample collection and analysis activities required by this Order. To provide quality assurance and maintain quality control, the Respondent(s) shall submit a Quality Assurance Project Plan to MDNR consistent with the requirements, guidance, and schedule contained in the Statement of Work and comply with the approved Quality Assurance Project Plan. The Respondents also shall prepare a Health and Safety Plan as required and described in the Statement of Work. The accepted Health and Safety Plan shall be consistent with and implement standards promulgated by the Secretary of Labor pursuant to Section 126 of CERCLA and Section 6 of the Occupational Health and Safety Act of 1970.

24. Availability of RI/FS Data: The Respondents shall submit in their monthly progress reports (Progress Reports), as described in Paragraph 33 of this Order, a summary of results of all sampling and/or tests and all other data generated by the Respondents, by their Contractor, or on the Respondents' behalf, in the course of implementation of the Order or otherwise. The full results and any underlying documentation shall be furnished to MDNR upon request.

25. Split Sampling: At the request of MDNR, the Respondents shall provide split or duplicate samples to MDNR and/or their authorized representatives, of any samples collected by the Respondents pursuant to the implementation of this Order. Similarly, the Respondents shall allow such split or duplicate samples to be taken by MDNR and/or their authorized representatives. The Respondents shall notify MDNR not less than four (4) weeks in advance of any sample collection activity. Not less than three weeks in advance of sample collection, the Respondents shall notify MDNR of the sampling date, sampling media, the number of samples from each media unless MDNR specifies a different time period. In the event that MDNR or its authorized representative engages in sample collection activity, the Respondents may, upon request, obtain splits or duplicates of such sample collection activity.

26. Record Preservation: The Respondents shall preserve, during the pendency of this Order, and for a period of not less than six (6) years after completion of work under this Order, all records and documents in their possession or in the possession of their employees, agents, officials, authorized representatives, accountants, contractors, attorneys, successors or assigns, and parent companies, which relate in any way to the site or to implementation of this Order, notwithstanding any document retention policy to the contrary. The Respondents must receive written permission from the MDNR prior to the destruction of any such documents, which permission shall not be unreasonably withheld. A request to destroy any such documents shall be accompanied by a copy of this Order and shall be sent to the following address:

KB10003384

Assistant Attorney General In Charge
Michigan Department of Attorney General
P.O. Box 30212
Lansing, Michigan 48909

Upon request by MDNR, Respondents shall make available to EPA any or all such records and documents or copies of any such records and documents.

27. Place and Manner of Notice: Communications between the Respondents and MDNR, and all documents, including reports, approvals, disapprovals, written notice, and other correspondence concerning the activities performed pursuant to the terms and conditions of this Order, shall be directed through the Respondents' Project Coordinator, and the MDNR PM. For each deliverable document provided to MDNR, five copies and one camera ready original shall be submitted to MDNR unless otherwise requested by MDNR. All such documents submitted pursuant to this Order shall be sent by certified mail, return receipt requested, or by courier, to the MDNR PM, at the following addresses or to such other addresses as MDNR hereafter may designate in writing:

Scott Cornelius
Environmental Response Division
Department of Natural Resources
Knapp's Centre
P.O. Box 30028
Lansing, Michigan 48909

28. Necessity of Formal Approval: No informal advice, guidance, suggestions or comments by MDNR regarding reports, plans, specifications, schedules, or any other writing submitted by the Respondents shall be construed as relieving the Respondents of their obligations to obtain such formal reviews as may be required by this Order.

29. Procedure for Submission of Plans, Deliverables and Reports to MDNR: All plans, deliverables and reports identified in the Statement of Work or the MDNR approved Work Plan for submittal to MDNR shall be so delivered to MDNR in accordance with the schedule set forth in Appendix 1 or otherwise established under this Order. Prior to receipt of MDNR approval, any report submitted to MDNR for approval shall be marked "Draft" on each page and shall include, in a prominent location in the document, the following disclaimer: "Disclaimer: This document is a DRAFT document prepared by the Respondents pursuant to a government Administrative Order which has not received final acceptance from the Michigan Department of Natural Resources. The opinions, findings, and conclusions expressed are those of the authors and not those of the Michigan Department of Natural Resources."

30. Procedure for Review, Revision, and Approval of Deliverables: MDNR will review the deliverables required by this Order to determine whether they are consistent with the requirements of Appendix 1 and the Order and will respond to Respondents with one of four findings:

A. Approval--which means that Respondents shall proceed with the next scheduled RI/FS activity consistent with the deliverable.

KB10003385

B. Approval with Conditions--which means that Respondents, unless they invoke dispute resolution under paragraph 36 of this order, shall proceed with the next scheduled RI/FS activity, subject to certain required modifications or conditions set forth in MDNR comments.

C. Disapproval with Modification Required--which means that the Respondents, unless they invoke dispute resolution under paragraph 36 of this order, shall modify the deliverable to correct the noted deficiencies and resubmit the deliverable consistent with MDNR's comments for further review. Modifications may be required in any original submitted deliverable, any portions of a deliverable, or any deliverable or portion of deliverable resubmitted to MDNR. MDNR will specify a schedule for resubmitting deliverables requiring modifications.

D. Disapproval with MDNR modification--which means that MDNR has determined that it will modify the submission to cure any deficiencies and/or undertake the RI/FS or any portion of the RI/FS. In either case MDNR will recover costs of such modification or work from the Respondents as an oversight cost.

A finding of Approval or Approval with Conditions shall not be construed to mean that MDNR concurs with all conclusions, methods or statements in the deliverables.

31. Incorporation of Deliverables into Consent Order: Any reports, plans, specifications, schedules, and attachments or other deliverables required by this Order are incorporated in to this Order. Any delay or non-compliance with such reports, plans specifications, schedules, and attachments or other deliverables shall be considered delay or non-compliance with requirements of this Order and shall subject the Respondents to penalties pursuant to Paragraph 37 or 38.

32. Excuses for Delays in Performance: With respect to the Respondents' compliance with any interim or final time deadline set forth in this Order, no stipulated penalties or other sanctions will be imposed for delay directly caused by the following which could not have been overcome by the Respondents' due diligence: (i) an act of God; (ii) any delay caused from the public review and comment process as provided in the Work Plan and this Order; (iii) any other cause entirely beyond the control of the Respondents; provided, however, that increases in the cost of performance of the RI/FS shall not excuse such performance nor affect the applicability of the penalty provisions or other sanctions which are provided for under this Order. Such penalties and sanctions shall be avoided only if, and only to the extent that, delays directly caused by conditions specified in (i) through (iii) above materially interfered with or prevented the Respondents' execution of their responsibilities during the period of such delay. The Respondents shall notify MDNR within forty-eight (48) hours in the event that circumstances occur which the Respondents assert should trigger the excuse provisions of this Paragraph, and shall identify with specificity the cause of such delay and the estimated duration of such delay. Within five (5) working days after Respondents first became aware of such circumstances, Respondents shall supply to MDNR in writing an explanation of the cause(s) of any actual or expected delay or noncompliance, the anticipated duration of any delay, the measures

taken and to be taken by Respondents to prevent or minimize the delay or correct the noncompliance, and the timetable for implementation of such measures. Failure to notify MDNR shall result in a waiver of the Respondents' right to assert that the delay should be excused under the terms of this Paragraph. The Respondents further agree to use their best efforts to minimize any delay which may result. The Respondents acknowledge that they will have the burden of justifying excuses for delay in performance under this Paragraph. MDNR will, if appropriate, modify or extend the terms of this Order to accommodate excusable delay pursuant to the provisions of this Paragraph. An extension of one compliance date based upon a particular event does not necessarily mean that Respondents qualify for an extension of a subsequent compliance date without establishing excusable delay.

33. Monthly Progress Reports: The Respondents shall provide monthly written progress reports (Progress Reports) to MDNR. At a minimum, these Progress Reports shall describe the progress made during the preceding month by: (1) describing the actions which have been taken toward achieving compliance with this Order; (2) summarizing all the results of sampling and tests and all other data received by the Respondents; (3) describing actions, data, plans, and procedures which are scheduled for the next month. Progress Reports shall be submitted to the MDNR PM by the twenty-first (21st) day of each month following the last day of the reporting period, beginning after the effective date of this Order. Meetings between the MDNR PM/assistant PMs and the Contractor shall be held at least once per month at the MDNR office in Lansing, unless MDNR determines another location or that a monthly meeting is not required for a particular month. The Respondents and the Contractor engaged to perform work under this Order shall also meet with and make formal presentations to MDNR at the completion of major components of the RI/FS, as specified by the MDNR PM.

34. Public Review of FS Report: When MDNR determines the FS Report required under this Order is acceptable for public review, the FS Report shall be made available by MDNR for public comment for a period of not less than twenty-one (21) days. The dates and length of the public comment period shall be established by MDNR. Following the public review and comment period, MDNR may refer the FS Report back to the Respondents for revision pursuant to public comments and MDNR comments. In addition, the Respondents shall provide information for the Responsiveness Summary as requested by MDNR. MDNR will prepare the final Responsiveness Summary for the RI/FS.

35. Modification of Order: This Order, with the exception of Appendix 1 or deliverables thereunder, may only be modified upon the written agreement of MDNR, by signature of the Director of MDNR, and the Respondents Project Coordinator. Appendix 1 or any accepted deliverables may be modified upon signature of the SC of MDNR.

36. Dispute Resolution: If the Respondents object to any MDNR notice of disapproval or decision made pursuant to this Order, the Respondents shall notify MDNR in writing of its objections within fifteen (15) working days of receipt of the notice. MDNR and the Respondents shall have fifteen (15) days from the receipt by MDNR of the notification of objection to reach agreement. If agreement cannot be reached on any issue within this fifteen (15) day period, MDNR shall provide a written statement of its decision to the Respondents and the Respondents shall implement the activities required by the

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MDNR decision beginning no later than fifteen (15) days after receipt of the MDNR statement. In the event that the Respondents do not implement the activities required by the MDNR decision, the MDNR with the assistance of the Attorney General may take such civil enforcement actions against the Respondents as may be provided by statutory or equitable authorities, including but not limited to, the assessment of civil penalties or damages. In such an event, MDNR retains the right to perform additional studies, and to conduct a partial or complete Remedial Investigation/Feasibility Study and to recover the costs thereof from the Respondents. Engagement of a dispute resolution among the parties shall not be cause for the delay of any work.

37. Stipulated Penalties for Delay in Performance of Major Deliverables: For each day that the Respondents fail to complete a major deliverable identified in the SOW or to comply with any time deadline for any major deliverable established pursuant to this Order, the Respondents, collectively, shall pay the sums set forth below as stipulated penalties:

Period of Failure to Comply	Penalty Per Day
1st - 5th day	$ 250.00
6th - 15th day	$ 500.00
each day thereafter	$4,500.00

Penalties begin to accrue on the day after performance is due, and extend through until the violation is corrected. Stipulated penalties shall accrue during any dispute resolution, except to the extent that Respondents prevail with respect to disputed penalties. If MDNR demands stipulated penalties from the Respondents pursuant to Paragraph 39 of this Order for a failure to meet a compliance deadline set out in this Paragraph or Paragraph 38, MDNR shall not demand stipulated penalties for the Respondents' failure to comply with a subsequent compliance deadline if the Respondents have made a good faith effort to meet the subsequent deadline but have not been able to do so as a result of their failure to meet the original deadline for which penalties have been paid in full.

38. Stipulated Penalties of Other Delays in Performance: For each day that the Respondents fail to comply with any deadline established pursuant to this Order other than a deadline governed by Paragraph 37 hereto, stipulated penalties in the amount of five hundred (500) dollars per day shall accrue on the day after performance is due, and extend through until the violation is corrected.

39. Any penalty accruing under Paragraph 37 and 38 shall be due and payable within ten (10) days of the receipt of a written demand by MDNR. Payment of such penalty shall be made by certified check payable to the State of Michigan, and mailed to the following address with a notation of the Site and docket number of this Order:

Assistant Attorney General In Charge
Michigan Department of Attorney General
P.O. Box 30212
Lansing, Michigan 48909

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A copy of the certified check shall be sent to the MDNR PM within five (5) days of payment. The stipulated penalties set forth in this Paragraph do not preclude MDNR from electing to pursue any other remedies or sanctions which may be available to MDNR by reason of the Respondents' violation of this Order or the Respondents' failure or refusal to comply with any of the requirements of this Order. Such remedies and sanctions include, but are not limited to, suit for penalties, damages, and injunctive relief, and for reimbursement of costs incurred by the State.

40. Civil Penalties for Non-Compliance: Pursuant to Section 10 of WRCA, the Respondents are advised that if they violate, fail, or refuse to comply with this Order, or any portion thereof, the Respondents may be subject to civil fine of not less than $2,500, nor more than $25,000 for each day in which such violation occurs. The Respondents reserve all rights they have to defend against and oppose any such claim by MDNR for additional monetary relief.

41. Indemnification: The Respondents agree to indemnify and save and hold harmless the State of Michigan, its agencies, departments, agents, offices, employees and representatives from any and all claims or causes of action arising from or on account of acts or omissions of the Respondent(s), its agents, successors, and assignees in carrying out the activities pursuant to this Order, except to the extent that an act or omission was directed by MDNR over the Respondents' objection after dispute resolution.

42. Certification of the Respondents' Performance of the Work Activities: Upon issuance of the Record of Decision, MDNR shall determine if the Respondents have met all of their responsibilities under Appendix 1 [Statement of Work], and under the provisions of the Order, including payment of oversight costs and any stipulated penalties or other penalties or damages that the Respondents may have incurred during the course of their activities under the Order. If MDNR determines that such responsibilities have been satisfied, MDNR will, after issuance of the final Record of Decision for the Site, certify to the Respondents that their responsibilities under the Statement of Work, the Work Plan and this Order have been completely and successfully discharged.

43. Covenant Not to Sue: Upon certification by MDNR that the Respondents have completed the RI/FS in accordance with this Order, MDNR covenants not to sue the Respondents for completion of the RI/FS covered by the signed Record of Decision. This covenant not to sue shall not take effect and shall be rendered null and void in the event that the Respondents fail to make all of the payments required of them by this Order. Respondents are not released from liability, if any, for any actions taken beyond the terms of this Order or activities arising pursuant to Section 121(c) of CERCLA.

44. Reservation of Rights: MDNR reserves the right to bring an action against the Respondents under CERCLA and State law for recovery of all past response costs incurred by the State of Michigan at the Site not reimbursed by the Respondents, any costs incurred in the event that MDNR performs all or a portion of the RI/FS, as well as any future costs incurred by the State of Michigan in connection with response activities conducted under CERCLA or State law at this Site. The State expressly reserves any and all rights and defenses that it may have to enforce this Order against the Respondents, including MDNR's right both to disapprove of work performed by the Respondents

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and to require that the Respondents perform tasks in addition to those detailed in this Order. In addition, MDNR reserves the right to undertake actions, including removal and/or remedial actions at any time and to perform any and all portions of the RI/FS which the Respondents fail to perform to MDNR's satisfaction. Issuance of this Order shall not affect or limit in any way any rights which the State may have in relation to any liabilities or obligations which the Respondents or other persons may be subject to under CERCLA or other laws by virtue of any connections that the Respondents or those other persons have or may have had with the Site. The State reserves any and all rights to take any enforcement action pursuant to CERCLA, and/or any other available legal authority, including the right to seek injunctive relief, response costs, monetary penalties and punitive damages for any violation of law or this Order. This Order does not constitute any decision on preauthorization of funds.

45. Other Claims: Nothing in this Order shall constitute or be construed as a release or covenant not to sue regarding any claim, cause of action, or demand in law or equity against any person, firm, trust, trustee, joint venture, partnership, corporation, or other entity, for any liability it may have arising out of or relating in any way to the generation, storage, treatment, handling, transportation, release, or disposal of any hazardous substances, hazardous wastes, pollutants, or contaminants found at, taken to, or taken from the Site. The State of Michigan shall not be liable for any injuries or damages to persons or property resulting from acts or omissions of the Respondents in carrying out the activities pursuant to this Order, nor shall the State of Michigan be held out as a party to, or in any other way be held liable under, any contract entered into by the Respondents or by the Contractor in carrying out the activities pursuant to this Order. This Order shall not estop or limit any legal or equitable claims of the State of Michigan against the Respondents, their agents, contractors, or assigns, including but not limited to, claims related to releases of hazardous substances or other pollutants or contaminants. Respondents further waive all other statutory and common law claims against the State of Michigan for costs of conducting the RI/FS, including, but not limited to, contribution and counterclaims for such costs. Respondents agree to withhold any judicial challenge relating to or arising out of the performance of this Order until after issuance of a final Record of Decision. The parties further agree that the provisions of Section 113 of CERCLA apply to the timing and manner of any judicial review.

46. Other Laws: All actions required to be taken pursuant to this Order shall be undertaken in accordance with the requirements of all applicable or relevant and appropriate State and Federal laws and regulations, including CERCLA; laws relating to occupational safety and health; and other Federal and State environmental laws as defined in EPA and State policy in effect at the time of the signing of the ROD. Other agencies, including the Occupational Safety and Health Administration (hereinafter the OSHA) and the Fish and Wildlife Service (hereinafter the F&WS), may be called upon to review the conduct of work under this Order.

47. Use of Resource Conservation and Recovery Act Facilities: All facilities used by the Respondents for the off-site transfer, treatment, storage or

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disposal of hazardous substances removed from the Site must be in compliance with the applicable requirement of the Resource Conservation and Recovery Act (RCRA), as amended, and the Michigan Hazardous Waste Management Act, 1979 P.A. 64, MCL 299.501, as amended. The Respondents are responsible for complying with these requirements including fulfilling the standards applicable to generators of hazardous waste, found at 40 C.F.R. Part 262 and R299.9101 et seq.. In particular, this responsibility includes using and signing manifest forms for hazardous waste leaving the Site. Further, the Respondents must designate, in a report to MDNR, any facilities that the Respondents propose to use for such off-site transfer, storage, treatment or disposal, and MDNR must approve the use of such proposed facilities.

48. Notice to the Federal Natural Resource Trustee: Pursuant to Section 122(j) of CERCLA, MDNR has notified the Federal Natural Resource Trustees of the scope of the response action, the negotiations with the potentially responsible parties, and of the issuance of this Order.

49. Community Relations: MDNR shall be responsible for preparing a Community Relations Plan and conducting a community relations program. The Respondents and the Contractor engaged to conduct the RI/FS under this Order shall, consistent with the Community Relations Plan: attend and participate in public meetings regarding the Site, to the extent specified by the MDNR PM; prepare fact sheets concerning the Site and activities conducted under this Order for submission to the MDNR PM; and provide timely and appropriate responses to inquiries from the public at the request of the MDNR PM.

50. Separate Documents: This Order may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

51. Effective Date: Final acceptance of this Order by MDNR shall be subject to the publication of the proposed settlement and the opportunity for comments for persons who are not parties to the proposed settlement, and consideration of comments in determining whether to consent to the proposed settlement. After consideration of any comments submitted during a thirty (30) day public comment period, MDNR may withdraw consent to this Order if comments received disclose facts or considerations which indicate that this Order is inappropriate, improper or inadequate. Otherwise, MDNR may execute this Order after consideration of such comments. This Order shall be effective upon the date that the Respondents receive notice that the MDNR Director has signed the Order. All times for performance of activities under this Order shall be calculated from that date.

[Appendix 1: Statement of Work]

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STATEMENT OF WORK
REMEDIAL INVESTIGATION

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

PURPOSE

The purpose of this remedial investigation is to determine the nature and extent of the contamination at the site and to gather all necessary data to support the feasibility study. The Respondents will furnish all personnel, materials, and services necessary for, or incidental to, performing the remedial investigation at the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, hereinafter referred to as the "Site".

The surface water, groundwater, soils, and sediment remedial investigations will focus on the Bryant Mill Pond, Portage Creek, and downstream on the Kalamazoo River to the Allegan City Dam. The scope of the study will also include a soil and groundwater contamination investigation on Performance Paper property south of Alcott Street, and at other facilities currently or previously owned, operated, or leased by respondents which are contiguous to the NPL Site where soil or groundwater contamination exists or is discovered during the course of the RI/FS or design and construction phases.

SCOPE

The remedial investigation consists of eight tasks:

Task 1 - Description of Current Situation
Task 2 - Plans and Management
Task 3 - Site Investigations
Task 4 - Preliminary Remedial Technologies
Task 5 - Site Investigation Analyses
Task 6 - Remedial Investigation Report
Task 7 - Community Relations Support
Task 8 - Additional Requirements

TASK 1 - DESCRIPTION OF CURRENT SITUATION

The Respondents shall review and assess the current site conditions, site history and the nature of response actions taken to date. This task will outline the purpose of the Remedial Investigation (RI) and will be conducted concurrently with Task 2. The data gathered during previous investigations or inspections and other relevant data should be used whenever practicable.

a. Site Background
Prepare a summary of the regional location, pertinent area boundary features, a general site physiography, hydrology, and geology. The total area of the site will be defined, as well as the general nature of the problem, including pertinent history relative to the use of the site for hazardous waste disposal and their interrelations.

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b. Nature and Extent of Problem

Prepare a summary of the actual and potential on-site and off-site health and environmental effects. This may include, but is not limited to, the type, physical state, and amounts of hazardous substances, the existence and conditions of landfills, excavation depths, base grades, amount of fill, affected media and pathways of exposure, contaminated releases such as leachate or runoff, the existence and condition of drums, lagoons, tanks and other containers, and any human exposure associated with Respondents' properties. Describe any reports of human or animal related illnesses that may be related to the Site. Emphasis should be placed on describing the threat or potential threat to public health. Data from previous site work and reports should be summarized with references listed.

c. History of Response Actions

Prepare a summary of any publicly available previous response actions conducted by Federal, State, local or private parties. This summary shall include site inspections, sample surveys, cleanup activities and other technical investigations. This summary shall also address any legal activities undertaken by Respondents or private citizens including suits, PRP searches, etc. A list of documents prepared pursuant to the above activities, including survey reports, sampling results, public legal records, etc., and their physical locations shall be included.

d. Define Boundary Conditions

Establish site boundary conditions to limit the areas of site investigations. The boundary conditions should be set so that subsequent investigations will cover the contaminated media in sufficient detail to support the following activities (e.g., the feasibility study). The boundary conditions may also be used to identify boundaries for site access control and site security.

e. Site Facilities

The Respondents will establish a site office in a safe, secure area, to support all field activities. It will be located in close vicinity to parking with adequate capacity for Federal and State employees. Sanitary facilities will be provided in close vicinity to the office that are readily accessible to all field staff and visitors. The site office will have a telephone with long distance service to support activities by State and Federal employees, their agents and representatives, including contractors. The site office and supporting facilities, including but not limited to decontamination facilities, will be established in accordance with the site Health and Safety Plan.

TASK 2 - PLANS AND MANAGEMENT

Prepare all necessary plans for the remedial investigation. The plans should include a detailed discussion of the technical approach, personnel requirements, and schedules, as well as the following:

a. Work Plan

Develop a detailed work plan for carrying out a RI/FS. This plan shall describe in detail all studies to be conducted including a statement of sampling objectives, specification of equipment, analyses of interest, sample types, and sample locations and frequency, and schedule. The plan

must address all levels of the investigations as well as all types of investigations considered. Consideration should be given to the use of field screening techniques to screen out the samples that do not require off-site laboratory analysis. The plan will identify associated data that may be needed to evaluate alternatives for the feasibility study. The Work Plan will be revised, if necessary, to address problems or issues that occur as a result of new information gathered during the RI/FS. Site maps, with corresponding grid systems, will be prepared as necessary.

b. Quality Assurance Project Plan (QAPP)

Prepare and submit for MDNR approval a plan detailing the collection, handling, custody, transport and analysis of samples and data collected during the course of the remedial investigation. The plan shall assure that the analytical results can be used in any legal proceedings and are consistent with State and Federal guidelines. The plan can be referenced as needed throughout the project to reflect changes in the sampling program, documentation requirements or additional information gathered during the course of the project.

The QAPP will be submitted to and approved by the Michigan Department of Natural Resources (MDNR) prior to the start of the Remedial Investigation at the Site. The purpose of the QAPP is to ensure that formal procedures are available for all activities affecting the quality of data collected.

The QAPP will be prepared according to the guidelines in, "Interim Guidelines and Specifications for preparing Quality Assurance Project Plans" (QAMS-005/80), U.S. EPA, 29 December 1980, including the following:

1. Title page with provisions for approval signatures,
2. Table of Contents,
3. Project description,
4. Project Quality Assurance (QA) organization and responsibility,
5. QA objectives for measurement data in terms of precision, accuracy, completeness, representativeness and comparability for each parameter,
6. Sampling procedures,
7. Chain of custody procedures,
8. Calibration procedures and frequency,
9. Analytical procedures, inclu ; methods verification and standard operating procedures,
10. Data reduction, validation and reporting,
11. Internal quality control checks and frequency,
12. Performance and system audits and frequency,
13. Preventive maintenance procedures and schedules,
14. Specific routine procedures to be used to assess data precision, accuracy, and completeness of specific measurement parameters involved,
15. Corrective action, and
16. Quality assurance reports to management.

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c. Quality Assurance/Quality Control (QA/QC) Review of Historical Studies and Data

Develop a plan for a QA/QC review of existing data and studies. In order to incorporate the data into the RI/FS the Respondents are responsible for obtaining written approval from the MDNR that such data can be used and incorporated into the RI/FS.

d. Data Management Plan

A Data Management Plan shall be developed and initiated to document and track investigation data and results. The plan should identify and set up laboratory and data documentation materials and procedures, project file requirements, and project-related progress.

e. Health and Safety Plan (HSP)

The health and safety of site workers is the responsibility of the Respondents. A Health and Safety Plan shall be submitted to the MDNR for review prior to the start of the Remedial Investigation. The purpose of the HSP is to assure that qualified personnel will be conducting the Remedial Investigation and to minimize the risks to personnel from chemical and physical hazards during the course of work. The plan will be consistent with:

* EPA Interim Standard Operating Safety Guide (September, 1982) and with applicable OSHA standards
* Section 111(c)(6) of CERCLA
* EPA Order 1440.2 - Health and Safety Requirements for Employees Engaged in Field Activities
* EPA Order 1440.3 - Respiratory Protection
* EPA Occupational Health and Safety Manual
* Other EPA guidance as provided
* State safety and health statutes including MIOSHA
* Site conditions

Guidance for preparation of a Health and Safety Plan may be found in "Standard Operating Safety Guides," November, 1984, as amended.

The HSP should include, at a minimum, the following items:

* Minimum training and medical requirements for on-site personnel,
* Health and safety responsibilities,
* Work zone definitions,
* General work rules,
* Contingency plans in case of accident or injury,
* Environmental monitoring and sampling procedures, interpretation and response,
* Decontamination procedures for personnel and equipment,
* Health related information for identified chemicals of concern,
* Site security measures, and
* Procedures for protecting third parties, such as visitors or the surrounding community.

f. Community Relations Plan

The MDNR will prepare a plan addressing community relations in a manner consistent with Task 7, and submit the plan to Respondents for review.

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g. Plan for Satisfaction of Permitting Requirements
Prepare a plan addressing any Federal or State permitting requirements to be addressed as part of the RI.

h. ATSDR Health Assessment
The Work Plan for the Site shall also provide for collection of adequate information to support an Agency Toxic Substances and Disease Registry (ATSDR) Health Assessment which is required by the Superfund Amendments and Reauthorization Act of 1986 (SARA). Since the Health Assessment will be prepared by ATSDR, all draft Work Plans and support documents should be submitted for ATSDR review and comment to ensure that their needs and requirements are being met. In the event that the Health Assessment has already been completed by ATSDR, the RI report should include and address the findings of that report.

TASK 3 - SITE INVESTIGATIONS

The Respondents shall conduct those site remedial investigations necessary to characterize the Site and the actual or potential hazard to public health and the environment. The site investigations will also result in data of adequate technical content to assess preliminary remedial alternatives developed in Task 4 and support the detailed evaluation of alternatives during the feasibility study.

The goals of the site investigation are:

* Fully characterize the chemical nature of the wastes at the Site;
* Define any identifiable contaminant sources at the Site;
* Determine the vertical and horizontal extent of contamination originating at the Site;
* Spatially quantify contamination to the extent necessary to enable preparation of an Endangerment Assessment and a FS, and to the extent that such contamination may be attributable to the Site;
* Identify contaminant migration pathways and movement; and
* Quantify public health and environmental risk.

The site investigation activities will follow the plans set forth in the Work Plan. All sample analyses will be conducted at laboratories following EPA protocols or their equivalents. Strict chain-of-custody procedures will be followed and all sample locations will be identified on the site maps and grid systems as part of the Work Plan.

The MDNR believes the subtasks listed below are consistent with satisfying the goals above. The Work Plan may propose alternate methods of achieving the goals of the Site Investigation. If MDNR determines a proposed alternate method meets the purposes and requirements of this SOW in replacement of the original, the replacement method will be used. MDNR retains approval authority over the initial Work Plan and any additions or modifications thereto.

a. Waste Characterization
Conduct a sampling and analysis program to characterize all material of interest on the Respondents' properties, and other areas of concern which may become evident during the study. These materials should include

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wastes stored above or below ground in tanks, drums, lagoons and other surface water bodies, piles, known disposal areas, spill locations and other similar areas. Efforts should begin with a survey of existing documents and any other data relating to types of waste materials at the Site, and previous sampling episodes performed and their results. A plan shall be developed describing how the characterization will be performed. The characterization should support any subsequent conclusions about developing preliminary remedial alternatives.

Additional sampling may be required should the available information be insufficient to fully characterize the waste materials. The Field Sampling Plan and QAPP will need to describe the sampling analysis techniques appropriate to the site condition.

The number of samples needed to obtain representative data will also be discussed. Elements of the HSP and the QAPP will also apply to sampling.

b. Hydrogeological Investigation

As applicable, develop and conduct a program to determine the nature and vertical and horizontal extent of groundwater contamination in all aquifers, local and regional hydrogeological conditions, groundwater flow rate and direction, attenuation capacity, discharge/recharge areas and effects of ongoing or known potential remedial action(s), mobility of pollutants, soils attenuation capacity and mechanisms. Such information may be available from the USGS, the Soil Conservation Service, and local well drillers.

Subsequent to the survey of existing data, a sampling program should be developed to determine the horizontal and vertical distribution of contaminants. The sampling program may include, but is not limited to, the evaluation of factors affecting groundwater hydrology, such as groundwater flow direction and existence of fractured bedrock conditions, existence of groundwater mounds, divides or old river channels, thickness of the aquifer(s), and interconnection between aquifers. Cross-section diagrams and contour maps must be drawn. The following must also be included in the sampling program in accordance with the QAPP; determination of upgradient levels of contaminants within the sand and gravel aquifer and within the bedrock aquifer (if appropriate), the type of well construction utilized (must be compatible with contaminants encountered), the number and location of wells, chain of custody and record of samples, and the groundwater sampling method.

Geophysical techniques should be considered for use in defining subsurface conditions and design of the sampling program. The investigation shall also assess whether municipal, private, and/or industrial wells in the vicinity could be affected by contaminants from the Site. In addition, the suitability for on-site temporary storage and staging of waste prior to final remedy is to be evaluated. The Respondents will consider using a close support lab with the capability for the quick quantitative screening of water, soil gas, and soil samples with a portable gas chromatograph (GC). Respondents will describe in the Work Plan and Sampling Plan the types of samples that would be run on the GC. Procedures for operating the chromatograph would also be contained in the QAPP.

c. Soils and Sediments Investigation

Develop and conduct a sampling program to determine the nature and vertical and horizontal extent of contamination of surface and subsurface soils and sediments. This subtask may overlap with the hydrogeologic study (e.g., characteristics of soil strata are relevant to both the transport of contaminants in the soil; cores from groundwater monitoring wells may serve as soil samples).

Information regarding local background levels, location of samples, techniques utilized, and methods of analysis should be used to identify the locations and probable quantities of subsurface wastes. This work will be in accordance with the QAPP, the Work Plan, and the Field Sampling Plan.

d. Air Investigation

As applicable, conduct a program to determine the extent of atmospheric contamination. The program would address the tendency of the substances identified through the waste characterization to enter the atmosphere, and local wind patterns. Any work will follow the specifications of the QAPP, the Work Plan, and the Field Sampling Plan.

e. Surface Water Contamination

Conduct a program to determine the extent and nature of surface water contamination at the Site.

f. Biota Contamination

Conduct a program to identify the nature and extent of contamination in biota at the Site.

g. Technical Memoranda

The Respondents shall submit technical memoranda to the MDNR for subtasks within Task 3. The technical memoranda will include:

* Description of the subject activities
* A plot of actual sampling locations along with corresponding sample numbers
* All sample identification information
* Photocopies of all pertinent field notes
* Description of geology and hydrology
* Soil gas concentrations and analyses, if appropriate
* Soil, sediment, biota, and water analysis
* Water quality during drilling
* Contaminant concentration profiles
* Preliminary findings

These technical memoranda are to be submitted after completion of validation of laboratory data. Five (5) copies should be sent to MDNR.

TASK 4 - PRELIMINARY REMEDIAL TECHNOLOGIES

The Respondents will identify preliminary remedial technologies, providing detail sufficient to ensure that site investigations will develop a data base adequate for the evaluation of alternatives during the feasibility study.

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a. Pre-Investigation Action

Prior to collecting additional data, the Respondents will assess the site conditions to determine potential categories of source control and/or off-site remedial actions. Criteria for off-site remedial actions can be found in EPA Interim Policy: "Procedures for Planning and Implementing Off-Site Response Actions" (50 Federal Register 45933. Nov. 5, 1985). Examples of questions to be answered are:

1. Source Control Action

   i. What containment techniques appear feasible to prevent contamination of ground water, surface water, and biota?

   ii. Does incineration or reclamation appear to be a viable option?

   iii. Does on-site treatment appear to be a viable option, and if so, what category of treatment should be investigated (e.g., biological, physical, chemical, thermal)?

   iv. Will substances migrate or continue to migrate off-site if no action is taken? If only source control measures are taken?

   v. Does the apparent volume of contaminated surface water, ground water, soil, or sediment make investigation or treatment impracticable?

   vi. What technologies are available to treat the identified contaminants at the Site?

The MDNR will review and screen the preliminary technologies so that the site investigation can be designed to answer these types of questions and support the feasibility study.

b. Post-Investigation Evaluation

Either during or following the site investigations the Respondents will assess the investigation results and recommend preliminary remedial technologies likely to apply to the site problem. These technologies should be a refinement of the options considered in Task 4a. They will provide the basis for developing detailed alternatives during the feasibility study. The work during the remedial investigation will generally be limited to the following:

1. Recommending types of remedial technologies appropriate to the site conditions.

2. Recommending whether or not to remove some or all of the waste for off-site treatment, storage, or disposal.

3. Determining the compatibility of groups of wastes with other wastes and with materials considered as part of potential remedial action (e.g., slurry walls, lagoon liners). Recommending alternatives for treatment, storage, or disposal for each category of compatible waste.

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TASK 5 - SITE INVESTIGATIONS ANALYSIS

The Respondents shall prepare a thorough analysis and summary of all site investigations and their results. The objective of this task will be to ensure that the investigation data are sufficient in quality and quantity to support the feasibility study. The summary shall be presented to the MDNR as a draft remedial investigation report. Comments on the draft will be addressed in the final document.

The results and data from all site investigations must be organized and presented logically so that the relationships between site investigations for each medium are apparent.

a. Data Analysis
Analyze all site investigation data and develop a summary of the type and extent of contamination at the Site. The summary should describe the quantities and concentration of a specific chemical at the Site and ambient levels surrounding the Site. Also describe the number, location, and types of nearby populations, activities and pathways that may result in an actual or potential threat to public health, welfare, or the environment.

b. Application to Preliminary Technologies
Analyze the results of the site investigations in relation to the preliminary remedial technologies developed in Task 4. Data supporting, or rejecting, types of remedial technologies, compatibility of wastes and construction materials, and other conclusions will be presented.

TASK 6 - REMEDIAL INVESTIGATIONS REPORTS

The Respondents shall prepare a draft report covering the remedial investigation phase and submit five (5) copies to MDNR.

The draft report shall include the results of Task 1 through 5, and should include additional information in an appendix. The report shall be structured to enable the reader to cross-reference with ease. Comments from the MDNR will be incorporated into the Final RI Report, of which copies shall be submitted to the MDNR as mentioned above.

TASK 7 - COMMUNITY RELATIONS SUPPORT

A Community Relations Plan for the Site is required and will be prepared by MDNR. The plan will describe the history of community concern at this site, and identify proposed community relations activities to be implemented during the Remedial Investigation and Feasibility Study. MDNR will provide Respondents with the opportunity to review the plan prior to its implementation.

The Respondents may be required to furnish the personnel, services, materials and equipment required to undertake a community relations program. Although this may be a limited program, community relations must be integrated closely with all remedial response activities. The objectives of this effort are to achieve community understanding of the actions taken and to obtain community input and support prior to selection of the remedial alternative(s).

0003400

TASK 8 - ADDITIONAL REQUIREMENTS

a. Reporting Requirements

In addition to such task reports required by MDNR, monthly reports shall be prepared by the Contractor to describe the technical progress of the project. These reports should discuss the following items:

1. Identification of site activities taken toward achieving compliance with the Administrative Order.
2. Status of work at the site and progress to date, including all sampling and tests and all other raw data produced during the reporting period.
3. Percentage of completion.
4. Difficulties encountered during the reporting period.
5. Actions being taken to rectify problems.
6. Activities planned for the next month.
7. Changes in personnel.

The monthly progress report will list target and actual completion dates for each element of activity including project completion and provide an explanation if any deviation from the milestones in the work plan schedule.

The Monthly Work Assignment Status Report (Technical) will meet the above requirements. Five (5) copies should be sent to MDNR.

KB10003401

STATEMENT OF WORK
FEASIBILITY STUDY

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

PURPOSE

The purpose of this remedial action feasibility study is to develop and evaluate remedial alternatives for the Allied Paper, Inc./Portage Creek/Kalamazoo River Site. The Respondents shall furnish the necessary personnel, materials and services required to prepare the remedial action feasibility study, except as otherwise specified herein.

SCOPE

The feasibility study consists of seven tasks:

Task 9 - Description of Current Situation and Proposed Response
Task 10 - Development of Alternatives
Task 11 - Initial Screening of Alternatives
Task 12 - Laboratory Studies
Task 13 - Evaluation of the Alternatives
Task 14 - Reports
Task 15 - Additional Requirements

A work plan that includes a detailed technical approach, personnel requirements, and schedules shall be submitted for the proposed feasibility study.

TASK 9 - DESCRIPTION OF CURRENT SITUATION AND PROPOSED RESPONSE

Information on the site background, the nature and extent of the problem, and previous response activities presented in Task 1 of the remedial investigation may be incorporated by reference. Any changes to the original project scope described in the Task 1 description should be discussed and justified based on results of the remedial investigation.

Following this summary of the current situation, a site-specific statement of purpose for the response, based on the results of the remedial investigation, should be presented. The statement of purpose should identify the actual or potential exposure pathways that should be addressed by remedial alternatives.

TASK 10 - DEVELOPMENT OF ALTERNATIVES

Based on the results of the remedial investigation and consideration of preliminary remedial technologies (Task 4), the Respondents shall develop a limited number of alternatives for source control and/or off-site remedial actions on the basis of objectives established for the response and applicable agency policy.

KB10003402

The feasibility study will also be conducted in accordance with the Michigan Environmental Response Act (1982 P.A. 307) and rules promulgated under the Act.

a. Establishment of Remedial Response Objectives

Establish site-specific objectives for the response. These objectives will be based on public health and environmental concerns, the description of the current situation (from Task 1 and 9), information gathered during the remedial investigation, section 300.430 of the National Contingency Plan (NCP), 40 CFR 264.100, EPA's interim guidance, EPA's interim off-site policy, and the requirements of any other applicable Federal and/or State environmental standards guidance and advisories as defined under Section 121 of SARA and the Act 307. Preliminary clean-up objectives shall be developed in consultation with the MDNR.

b. Alternative Remedial Actions

Assemble combinations of identified technologies into alternative remedial actions. To the extent it is both feasible and appropriate, alternatives and other appropriate considerations should be developed into a comprehensive site specific approach. Alternatives are to be developed to include the following:

1. Treatment alternatives for source control that would eliminate the need for long-term management (including monitoring).

2. Alternatives involving treatment as principal element to reduce the toxicity, mobility or volume of waste at the Site.

c. Additional Alternatives

Develop additional alternatives:

1. An alternative that involves containment of waste with little or no treatment, but provides protection of human health and the environment primarily by preventing potential exposure or reducing the mobility of the waste.

2. A no action alternative.

3. Alternatives which also provide a performance range equivalent to Type A, B and C cleanups in accordance with P.A. 307 rules.

TASK 11 - INITIAL SCREENING OF ALTERNATIVES

A. Alternatives

The alternatives developed in Task 10 will be screened by the Respondents and the MDNR to eliminate alternatives that are clearly not feasible or appropriate prior to undertaking detailed evaluations of the remaining alternatives. The list of alternatives will be screened based on the NCP, the Act 307, and the rules promulgated under this Act.

B. Alternatives Array Document

Upon completion of Task 11A, the Respondents will develop applicable or relevant and appropriate requirements (ARARs) related to the remaining remedial alternatives. To facilitate this, an alternatives array document will be prepared by Respondents to summarize site description, technology identification and screening, and alternatives development and screening. The document will be submitted to MDNR, who will in turn distribute it to appropriate sections and/or agencies for review and identification of ARARs. As appropriate, MDNR will update the identified ARARs throughout the FS process.

TASK 12 - LABORATORY STUDIES

The Contractor shall conduct any necessary laboratory and bench scale treatability studies required to evaluate the effectiveness of remedial technologies and establish engineering criteria (e.g., leachate treatment; groundwater treatment; compatibility of waste/leachate with site barrier walls, cover, and other materials proposed for use in the remedy). It is expected that the scope of this task will depend on the results of Tasks 10 and 11, and the Endangerment Assessment. The Contractor will submit a separate work plan for any proposed laboratory studies to the MDNR. This submittal will be made in the time frame required to maintain steady progress of the overall feasibility study. Additional studies may also be conducted during the design phase if needed, to refine treatability results or develop detailed design criteria. Prepare a report summarizing the testing program and its results, both positive and negative.

TASK 13 - EVALUATION OF THE ALTERNATIVES

A. Evaluation of the Alternatives

Identify and describe action-specific Federal and State ARARs and other criteria, advisories and guidance to be used in the analysis and selection of a remedy. Alternatives should be analyzed in sufficient detail so that the remedies can be selected from a set of defined and discrete hazardous waste management approaches.

Develop and use information necessary to evaluate each alternative. The alternatives will be evaluated against the broad factors of effectiveness, implementability, and cost, using appropriate and more specific component measures such as protectiveness, compliance with applicable or relevant and appropriate requirements (ARARs), reliability, and technical feasibility. The detailed analysis of each alternative shall include both short-term and long-term considerations for effectiveness, implementability and cost.

B. Comparison of Alternatives

Compare the alternatives to each other using the full array of evaluation factors appropriate at the Site.

KB10003404

Component measures of effectiveness include the degree to which the alternative is protective of human health and the environment. Where health-based levels are established in applicable or relevant and appropriate requirements, they can be used to establish the minimum level of protection needed at the Site. Where these levels do not exist, risk assessments can be used to help establish levels appropriate at the Site. The reliability of the remedy, including the potential need for a cost of replacement, is another important element of effectiveness. Specific measures may also include other health risks borne by the affected population, population sensitivities, and the impacts on environmental receptors. For groundwater response actions, the potential for spread of the contaminant plume and the technical limits of aquifer restoration are necessary measures. Another important measure of effectiveness is the degree that the mobility, toxicity, or volume of the hazardous substance, pollutant, or contaminant is reduced.

Component measures of implementability include the technical feasibility of the alternative, the administrative feasibility of implementing the alternative, and the availability of any needed equipment, specialists or off-site capacity. Specific measures for groundwater response actions include the feasibility of providing an alternative water supply to meet current groundwater needs, the potential need for groundwater, and the effectiveness and reliability of institutional controls.

Component measures of cost include short-term capital and operation costs and any long-term operation or maintenance costs. Present worth analysis may be used to compare alternatives.

Component measures should be tailored appropriately to the Site. Where the measures are likely to be important in discriminating among the alternatives, more emphasis and detail may be appropriate to assist in the selection of a remedy.

C. Preferred Remedy

A chapter to the RI/FS shall be prepared which describes the preferred remedy for the Site.

a. The appropriate remedy shall be recommended among those alternatives that meet four findings:

1. The alternative shall be protective of human health and the environment. This means that the remedy meets or exceeds ARARs or health based levels established through a risk assessment when ARARs do not exist or when they are waived.

2. Except under those circumstances listed in the NCP, the alternative shall attain applicable or relevant and appropriate Federal and State public health and environmental requirements that have been identified for a specific site.

3. The alternative shall be cost-effective, accomplishing a level of protection that cannot be achieved by less-costly methods.

KB10003405

4. The alternative will utilize treatment technologies and permanent solutions to the maximum extent practicable as determined by technological feasibility, availability and cost effectiveness.

b. The preferred remedy should reflect two preferences:

1. Remedies involving treatment that significantly reduce the toxicity, mobility, or volume of hazardous constituents as a principal element.

2. Remedies minimizing the requirement for long-term management of residuals.

c. An alternative may be preferred that does not meet applicable or relevant and appropriate Federal and State public health or environmental requirements under the following circumstances:

1. The alternative is an interim remedy and will become part of a more comprehensive final remedy that will meet applicable or relevant and appropriate Federal and State requirements.

2. Compliance with the requirement will result in greater risk to human health and the environment than alternative options.

3. Compliance with the requirements is technically impracticable.

4. The alternative will attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirement, or limitation through use of another method or approach.

d. The evaluation of alternatives to select the appropriate remedy should meet the required findings in Section 300.430(e)(9) of the NCP and comply with the Act 307. The selected alternative should represent the best balance across all evaluation criteria.

TASK 14 - DRAFT AND FINAL FEASABILITY STUDY REPORTS

Prepare a draft and final feasibility study presenting the results of Task 9 through 13. Submit five (5) copies to MDNR.

TASK 15 - ADDITIONAL REQUIREMENTS

Reporting requirements are described in Task 8 of the remedial investigation scope of work.

KB10003406

The State shall reserve for itself the performance of any endangerment/risk assessment associated with this study.

The following are major deliverables (both in draft and final form) and are subject to stipulated penalties as described in the Administrative Order of Consent:

1. Remedial Investigation/Feasibility Study Work Plan
2. Quality Assurance Project Plan
3. Health and Safety Plan
4. Field Sampling Plan
5. QA/QC Review of Historical Studies and Data Plan
6. Data Management Plan
7. Plan for Satisfaction of Permitting Requirements
8. Remedial Investigation (RI) Report
9. Feasibility Study (FS) Report
10. Alternatives Array Document

The submittal of the Draft Description of Current Situation Document will be within 60 days of the effective date of the Administrative Order of Consent (AOC). The submittal of all major deliverables, except the RI Report, the FS Report, and the Alternatives Array Document, will be within 90 days of the effective date of the AOC. The schedule for the submittal of the RI Report, the FS Report, and the Alternatives Array Document, and any other deliverables, will be established in the RI/FS Work Plan.

KB10003407

REMEDIAL INVESTIGATION MODEL WORK PLAN SCHEDULE

TASK NO.	TASK	OUTPUT	TARGET COMPLETION DATE	ACTUAL COMPLETION DATE
1.	Description of Current Situation	Interim Memorandums, Draft, Final Report		
1a.	Site background			
1b.	Nature and Extent of problem			
1c.	History of Response Actions			
1d.	Define boundary conditions			
1e.	Site facilities			
2.	Plans and Management			
2a.	Work Plan			
2b.	Quality Assurance Project Plan	Draft, Final Report		
2c.	QA/QC-Historical Information	Draft, Final Report		
2d.	Data Management Plan			
2e.	Health and Safety Plan	Draft, Final Report		
2f.	Community Relations Plan	Draft, Final Report (prepared by MDNR)		
2g.	Plan for Satisfaction of Permitting	Draft, Final Report		
2h.	ATSDR Health Assessment			
3.	Site Investigations	Technical Memorandums, Drafts, Final Reports		
3a.	Waste Characterization			
3b.	Hydrogeological Investigation	Note: Monthly progress reports shall be given on the hydrogeologic investigation.		
3c.	Soils and Sediments Investigation			
3d.	Air Investigation			
3e.	Surface Water			
3f.	Biota Contamination			
3g.	Technical Memorandum			

KB10003408

TASK NO.	TASK	OUTPUT	TARGET COMPLETION DATE	ACTUAL COMPLETION DATE
4.	Preliminary Remedial Technologies	Interim Memorandums, Drafts, Final Reports		
4a.	Pre-Investigation Action			
4b.	Post Investigation Evaluation			
5.	Site Investigations Analysis	Interim Memorandums, Draft, Final Report		
5a.	Data Analysis			
5b.	Application to Preliminary Technologies			
6.	Remedial Investigations Report	Draft, Final Report		
7.	Community Relations Support			
8.	Additional Requirements Reporting Requirements	Monthly Progress Reports		

KB1000340

FEASIBILITY STUDY MODEL WORK PLAN SCHEDULE

TASK NO.	TASK	OUTPUT	TARGET COMPLETION DATE	ACTUAL COMPLETION DATE
9.	Description of Current Situation and Proposed Response	Draft, Final Report		
10.	Development of Alternatives	Draft, Final Report		
10a.	Response Objectives			
10b.	Identification of Remedial Alternative Remedial Actions			
10c.	Additional Alternatives			
11.	Initial Screening of Alternatives	Draft, Final Report		
11a.	Alternatives			
11b.	Alternatives Array Document	Draft, Final Report		
12.	Laboratory Studies	Draft, Final Report		
13.	Evaluation of Alternatives	Draft, Final Report		
13a.	Evaluation of Alternatives			
13b.	Comparison of Alternatives			
13c.	Preferred Remedy			
14.	Feasibility Study Reports	Draft, Final Report		
15.	Additional Requirements	Monthly Progress Reports		

KB10003410

IT IS SO AGREED AND ORDERED BY:

Delbert Rector

David F. Hales, Director
Michigan Department of Natural Resources

Date: 12/23/90

IT IS SO AGREED:

HM HOLDINGS, INC.

By: _____
Stuart G. Breslow
Assistant Secretary

Date: 10/20/90

GEORGIA-PACIFIC CORPORATION

By: Andrew F. Hodges
Andrew F. Hodges
Senior Counsel

Date: 9/26/90

PLAINWELL
SIMPSON PAPER COMPANY

By: J. T. Rand
Vice President and
Chief Financial Officer

Date: October 15, 1990

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O. STEWART MYERS
RAYMOND POUPORE

STATE OF MICHIGAN

JOHN ENGLER, Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T. MASON BUILDING
P.O. BOX 30028
LANSING, MI 48909

DELBERT RECTOR, Director

July 24, 1991

Mr. Mark P. Brown, Ph.D.
Manager
Blasland & Bouck Engineers, P.C.
6723 Towpath Road
Box 66
Syracuse, New York 13214

Dear Mr. Brown:

Subject: Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, Comments on the Draft RI/FS Work Plan

The Michigan Department of Natural Resources (MDNR) and the Environmental Protection Agency (EPA) have reviewed the draft submittals of the Work Plan, Quality Assurance Project Plan (QAPP), Field Sampling Plan (FSP), Historical Data QA/QC Plan, Data Management Plan, Permitting Plan, and Health and Safety Plan (HSP) submitted by the PRPs for the Remedial Investigation/Feasibility Study (RI/FS) of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund site as required under the terms of Administrative Order by Consent (AOC) DFO-ERD-91-001. The MDNR has determined that the draft work plan and associated documents as submitted are unacceptable because they are inconsistent with the requirements of the AOC. As set forth in the AOC "The purpose of this remedial investigation is to determine the nature and extent of the contamination at the site and to gather all necessary data to support the feasibility study". With this letter the MDNR, in accordance with the AOC, is notifying the PRPs of the finding of "Disapproval with Modification Required" for the Work Plan and all associated documents, dated March 1991.

Comments on the QAPP were supplied to the PRPs on June 13, 1991. On June 26, 1991, representatives from the MDNR, the EPA and Blasland & Bouck discussed the QAPP comments during a conference call.

According to the finding of "Disapproval with Modification Required" the Respondents shall modify the deliverables to correct the noted deficiencies and resubmit the deliverable consistent with MDNR's comments, for further review.

The revised deliverables must be submitted to the MDNR by September 15, 1991.

Sincerely,

William F. Bradford

William Bradford, Chief
Superfund Section
Environmental Response Division
517-335-3393

Enclosure
cc: Ms. Terese Van Donsel, EPA
Ms. Kathy Robb, Hunton & Williams
Mr. Andrew Hogarth, MDNR

The Michigan Department of Natural Resources (MDNR) is providing the Potentially Responsible Parties (PRPs) with the following comments to assist the PRPs in making the necessary changes to the Remedial Investigation/Feasibility Study (RI/FS) Draft Work Plan (the work plan) and associated documents for the Allied Paper, Inc./Portage Creek/Kalamazoo River (API/PC/KR) Superfund Site.

GENERAL COMMENTS

1. Format

The PRPs shall provide both the requested number of hard copies and an electronic format copy of all submittals. The electronic format copy of the submittals shall be in Word Perfect.

All pages of all submittals shall be numbered in the document control format. This allows for additions, deletions, and corrections in existing pages to be made quickly and easily as subsequent submittals are received or updated. This format change will also expedite review of the submittals.

2. Disclaimer

All disclaimers for the work plan and associated documents need clarification. As it reads now it sounds like the Administrative Order by Consent (AOC) has not yet been finalized. To rectify this situation, end the first sentence after "Administrative Order", and start the second sentence with "This document has not received..."

3. Scope of RI/FS

After reviewing the work plan and the "Description of the Current Situation" for the API/PC/KR site, it has become evident that the difference between the boundaries of the National Priorities List (NPL) site and the area to be investigated during the RI to determine the nature and extent of the contamination, continues to be a point of confusion for the PRPs. The Federal Register Vol. 55, No. 169, 35504-35505, clearly states that the NPL does not describe releases in precise geographical terms;

> ...Although CERCLA "facility" is broadly defined to include any area where a hazardous substance release has "come to be located" (CERCLA Section 101(9)), the listing process itself is not intended to define or reflect the boundaries of such facility or release. The names of the sites are provided for purposes of identification only; the site is not limited to the boundaries of properties that may be referred to in the name...

When discussing the area to be investigated during the Remedial Investigation (RI) all reference to the NPL boundaries is inappropriate and confusing. Consequently, all references to the NPL site boundaries must be removed from the work plan and associated documents.

The National Contingency Plan (NCP) [40 CFR 300.430(d)(2)(55 FR 8847, March 8,1990] also states that;

> ...The purpose of the Remedial Investigation (RI) is to collect data necessary to adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives. The scope and timing of the these activities should be tailored to the nature and complexity of the problems and the response alternatives being considered...

After careful review of the work plan submitted by the PRPs and examination of the existing conditions in Portage Creek and the Kalamazoo River, the MDNR and the EPA have determined that the proposed scope of the RI/FS outlined in the work plan is insufficient to adequately characterize the site with respect to the nature and extent of the contamination. In addition, it has also been determined that the RI proposed in the work plan would be insufficient for the development and evaluation of remedial alternatives.

The existing data indicates that PRP-owned facilities upstream of the site are both known sources and potential sources of PCBs and other contaminants to the Kalamazoo River and the site. These facilities include Willow Boulevard site, "A" site and Kings Highway site. The data also indicates that contamination has migrated downstream from the site. Under the terms of the Administative Order by Consent (AOC) DFO-ERD-91-001 and the NCP, the RI needs to include an investigation of these potential sources and the downstream migration of contaminants.

> ...EPA regulations do provide that the nature and extent of the threat presented by a "release" will be determined by an RI/FS as more information is developed on site contamination [40 CFR 300.430(d)(2)(55 FR 8847, March 8,1990]. During the RI/FS process, the release may be found to be larger or smaller than was originally known, as more is learned about the source and the migration of the contamination. However, this inquiry focuses on an evaluation of the threat posed; the boundaries of the release need not be defined, and in any event are independent of listing...

In order to comply with the AOC and be consistent with the NCP the MDNR is directing the PRPs to redraft the work plan so that it will adequately characterize the site and determine the nature and extent of the contamination. The RI needs to include both the upstream potential sources starting immediately above the PRP-owned potential sources (i.e. Willow Boulevard site, "A" site and Kings Highway site) and extend downstream to the furthest point of contaminant migration. The areas to be investigated on Portage Creek remains unchanged at this time, pending further information. The MDNR will consider a proposal for a phased approach for investigations on certain areas of the site.

The work plan needs to include a list of all the areas to be investigated. This list should include the Allied Paper property, Performance Paper Mill and property, Simpson Plainwell Paper Mill and property, 12th Street Landfill, Willow Boulevard site, Kings Highway site, King Mill and King Street Storm Sewer, the "A" site, the 3 miles of Portage Creek, and the Kalamazoo River from above the "A" site to the furthest downstream point of the contaminant migration. Ceresco Dam Impoundment should also be listed as a potential background site.

4. Historical Data

The work plan is inconsistent in its assessment of the information that can be interpreted from the historical data. Samples that show a problem seem to have been dismissed by saying that they "apply to previous and not the current situation" while other samples become good enough, without QA/QC review and MDNR approval, to determine that "only confirmatory samples need to be taken". The MDNR believes that since no remediation has occurred on this site that the past samples represent a fairly accurate picture of the situation. The next draft of the work plan should use the existing data (pending QA/QC review and approval) consistently with this in mind. Along the same line, the PRPs shall avoid making and presenting assumptions in the work plan that dismiss the need for investigation during the RI unless they can support their statements with data.

5. Naming and Terms

For clarity and consistency, the former Plainwell, Otsego and Trowbridge Dam Impoundments should be referred to by name throughout the work plan, and not as the MDNR or State owned impoundments. Also, change "Ceresco Lake" to "Ceresco Dam Impoundment".

The use of the term "remnant deposit areas" in the work plan is confusing. These areas should be referred to as former impoundment sediments.

6. Grid System Approach

The MDNR and the EPA have determined that the transect approach needs to be replaced by the grid system approach. The proposed investigation which utilizes a transect approach for the Kalamazoo River and Portage Creek is not broad enough to characterize PCB bearing sand/silt/clays and organics in any meaningful way. This investigation must characterize the site by defining the nature and extent of contamination. By using the transect approach, there is a high probability that the investigation will miss a majority of the PCB contamination. The MDNR has determined that the first step in the investigative process must be to map the sediments/soils of the areas to be investigated. Using the proposed transect approach this mapping would be impossible.

Given the extent of the area to be investigated, the work plan needs to employ a grid system approach. The grid should cover the entire site and be used for all investigations. The grid will tie together the necessary sediment/soils mapping to all the different media sampling locations, aid in the sampling locations selection process, and aid in the identification of the areas that need to be remediated. Since we have no indication that the river/creek sediments or the soils to be investigated are homogeneous with respect to PCBs and other contaminants, the transect approach has been determined to be inadequate. See the attached guidance on how the grid system should be laid out (Attachment 1). This approach will provide the information necessary for determining the nature and extent of contamination and for the development and evaluation of remedial alternatives. The PRPs may also want to consider a geophysical survey using the grid system as a priliminary investigative technique for the appropriate areas.

7. Site Investigations

The site investigation proposed in the work plan is not consistent with the requirements and goals established in the AOC. Under the terms of the AOC,

"The Respondents shall conduct those site remedial investigations necessary to characterize the Site and the actual or potential hazard to public health and the environment. The site investigations will also result in data of adequate technical content to assess preliminary remedial alternatives developed in Task 4 and support the detailed evaluation of alternatives during the feasibility study". The goals of the AOC are stated below.

"The goals of the site investigation are:

* Fully characterize the chemical nature of the wastes at the Site;
* Define any identifiable contaminant sources at the Site;
* Determine the vertical and horizontal extent of contamination originating at the Site;
* Spatially quantify contamination to the extent necessary to enable preparation of an Endangerment Assessment and a FS, and to the extent that such contamination may be attributable to the Site;
* Identify contaminant migration pathways and movement; and
* Quantify public health and environmental risk."

8. Sampling Comments

The proposed sampling contained in the work plan will be insufficient to fully characterize the nature and extent of the chemical contaminants at the site which is a the stated goal of the AOC. All proposed sediment, soils, surface water and groundwater sampling must be designed to adequately characterize the vertical and horizontal extent of contamination for all media as stated in Task 3 of the AOC. Based on the available data and the purpose of the RI as stated in the NCP, there is no reason to limit the investigation of other potential chemical contaminants as currently proposed in the work plan. The must adddress the heavy metal and organic (including dioxin and dibenzonfurans) contamination of the site.

It is indicated that the top 2 inches of the sediment cores will be sampled for total organic carbon (TOC). This is unacceptable. All soil/sediment/residual samples should be analyzed for TOC to determine organic content of the samples.

9. Background Site Comments

The number and type of background sites need to be expanded to include wetlands, floodplains and instream habitats for comparison to riverine portions of the site. The selection of Ceresco Dam Impoundment as a background location can only serve for comparisons to the former and existing onsite reservoirs.

Delete "Morrow Lake" where it appears throughout the text as a background or reference sampling location. This lake is contaminated and therefore would be unacceptable for background or reference data.

10. Model Identification Comments

A proposed high flow event in the work plan is identified as beginning when the flow exceeds 1,000 cfs. However, the work plan does not contain sufficient information for the MDNR to evaluate if this is acceptable. Once the work plan has identified the model to be used in the RI/FS, MDNR will be able to evaluate this flow in reference to the data requirements of the model.

11. Feasibility Study

Currently, the parts of this work plan dealing with the FS tasks are inconsistent with the AOC and the NCP. The portions of the work plan dealing with the Feasibility Study should be pulled into a separate Section of the work plan. At this time, the work plan should describe the general FS as set forth in the AOC.

12. Treatability Studies and Innovative Technologies

Two interrelated areas that the work plan completely neglects are treatability studies and innovative technologies. Under the terms of the AOC (Task 4 in the SOW) "The Respondents will identify preliminary remedial technologies, providing detail sufficient to ensure that site investigations will develop a data base adequate for the evaluation of alternatives during the feasibility study. The work plan needs to address Task 4.

Identification of innovative technologies and remedial technologies should occur during the RI. Also, treatability studies should be conducted on both innovative technologies and other remedial technologies that are identified. This site has a number of unique characteristics that can be utilized to make the preliminary screening of these technologies easier.

13. Operable Units and Interim Responses

As stated in the NCP, "Operable unit means a discrete action that comprises an incremental step toward comprehensively addressing site problems. This discrete portion of a remedial action response manages migration, or eliminates or mitigates a release, threat of a release, or pathway of exposures. The clean up of a site can be divided into a number of operable units, depending on the complexity of the problems associated with the site. Operable units may address geographical portions of a site, specific site problems, or initial phase of an action, or may consist of any set of actions performed over time or any actions that are concurrent but located in different parts of the site".

Due to the extent and complexity of the study area, the immediate restoration goals must focus on source controls. After reviewing the available options for accomplishing source control, the MDNR and the EPA have determined that a source control operable unit approach for the lagoons, landfills and the Bryant Mill Pond and Portage Creek area is the approach best suited for this situation. The MDNR is directing the PRPs to develop the work plan with the following areas as operable units;

Operable Unit 1, Bryant Mill Pond and Portage Creek
Operable Unit 2, Willow Boulevard site

Operable Unit 3, Allied Paper property landfill and lagoons
Operable Unit 4, "A" site
Operable Unit 5, Kings Highway site, King Mill and King Street Storm Sewer

Another concern is the on-going contamination of the Portage Creek and Kalamazoo River from the Bryant Mill Pond (Operable Unit 1) and Willow Boulevard site (Operable Unit 2), respectively. An interim response needs to be conducted on these two operable units in order to eliminate or significantly reduce the migration of contamination from these two source areas. The MDNR is directing the PRPs to develop the RI/FS work plan that proposes a number of interim response actions that will eliminate migration of contamination from these source areas.

14. General Wetlands Comments

The work plan is inadequate in characterizing the contamination of the wetlands. To determine the locations for sampling points in the exposed sediments/wetland areas the investigation needs to use a grid system. Both the wetlands in the site area and the 100 year floodplain elevation for the Kalamazoo River and Portage Creek should be integrated into the grid system and mapped. All activities proposed for these areas should be clearly identified on the maps, with an explanation in the text as to how these activities will be conducted. The PRPs should assure that all appropriate permits are obtained for activities proposed in these areas. Wetlands should be mapped by using the Joint Federal Manual for Wetlands Delineation of January 1989.

Certain hydric floodplain soils may be locally significant for their ability to adsorb non-polar compounds, due to the inclusion of high organic content, muck soils. Since these organic soil inclusions may be coincidental with wetland forest vegetation, these areas should be considered high risk areas for ecological impairment. The need for "hot spot" removals of floodplain soils should be evaluated when source controls are being formulated.

Forested wetlands may have formed in low areas at places along the Kalamazoo River and in Portage Creek floodplains that are depressional or at the foot of slopes. The U.S. Department of Agriculture (USDA), Soil Conservation Service (SCS) Soil Surveys for Kalamazoo and Allegan Counties indicate that the Glenora sandy loams are generally poorly suited to seepage field development due to their porosity. This characteristic would also affect the ability of these soils to hold PCBs discharged in surface or groundwaters. A major consideration, however, is the interbedding of muck soils in the wet soil inclusions noted above.

15. General Comments on Surface Water

It was difficult reviewing much of the proposed investigations related to surface water. This work plan needs to include the framework for interpreting the data. During the prescoping meeting (February 14, 1991) Mr. Mark Brown and others presented the preliminary outline of the work plan. At that time he indicated that the PCB release model they planned to use required water column input data of 3 rain events and 8 base flow events. But in this work

plan there is not any mention of the model to be used or the inputs and specific data requirements needed for development of the model.

The work plan indicates that most of the historical data is insufficient for the purposes of the RI/FS. However, in many instances, the work plan appears to be repeating previous studies. The work plan must indicate the framework for data evaluation, so that the MDNR can determine if all of the necessary information will be collected. The work must identify the specific data needs for any models to be used and indicate why previous data is inadequate and how the proposed studies will provide the necessary data.

For example, in the work plan (Page 5-43) the PRPs proposed water column monitoring to provide information on material transport. A series of caged fish studies may be as good or better way of measuring materials transport. The work plan must describe how the data will be used so the MDNR can determine which method is appropriate.

It is difficult to figure out exactly how many samples are to be collected for each location and each matrix. The work plan text, Table 5.2 and Field Sampling Plan are not always consistent. This information must be consistent. The total number of samples by area and by sample matrix is provided in Table 5.2. This should also be indicated in the appropriate text sections of the work plan. In addition, the Field Sampling Plan text should either refer back to the work plan or discuss all samples to be collected. As it stands now it seems to simply describe select sampling as on Page 2.5 in its discussion of in-stream sediment investigations.

Additional sampling stations need to be added to the event and baseline sampling downstream of Lake Allegan. The water column concentration of PCBs has been found to be highest in the Kalamazoo River just downstream of Lake Allegan. This will be a factor in evaluating remedial alternatives.

16. General Air Quality Comments

The work plan is deficient and inadequate on assessment of air quality issues at this site. The only air monitoring currently called for is work area sampling using a portable PID instrument. These instruments are not sensitive to PCBs, a contaminant of concern at this site. The work plan must be revised to include an air monitoring plan to investigate the migration of PCBs and other contaminants from areas of concern. Sampling and analyses should be conducted according to EPA Method TO-10 ambient air sampling method for PCBs. The situations that need to be investigated through air monitoring are 1) off site migration of contaminants into the residential and industrial areas surrounding the site, and 2) contamination of public recreation facilities such as the Allegan County Fairgrounds, boat launches and picnic/recreation areas. The RI should also investigate whether these areas are contaminated from river sediments being brought onshore, due to the possibility of exposure to PCBs by inhalation of dried sediments.

17. Residential, Industrial and Agricultural Wells

The investigation needs to include the identification of existing residential, industrial and agricultural supply wells located within a 1/4 mile radius of the site. If there is little or no data available within a 1/4 mile radius,

the radius of investigation should increase to 1/2 mile. All information concerning these wells (municipal and county records) should be included in the appendices.

If existing residential wells are identified in the vicinity of the landfill, they should be sampled as part of the RI not just identified as proposed in the work plan.

18. General Groundwater

The proposed investigation is inadequate in characterizing the groundwater contamination at the site. Therefore, the PRPs need to conduct the investigation employing a grid system. The work plan indicates that movement of PCBs from the Allied property soils and exposed floodplain sediments into the groundwater, and groundwater flux from contaminated areas into the Kalamazoo River is not a concern due to its low solubility in water. Furthermore, the work plan indicates that groundwater flow is generally toward the river, rather than away from it, lessening the concern that groundwater could be further contaminated by PCBs in the river or floodplain sediments. Under certain hydrogeological/soil conditions, PCB movement in groundwater may be negligible. However, for this site the data does not exist to make this determination. The RI must investigate this situation and evaluate the environmental risk. In order to accomplish this objective, the data must be collected for each of the various hydrogeological and soil conditions present at the site. In addition, this data is needed to adequately evaluate remedial alternatives.

19. General River and Creek Sediment Sampling

The work plan is inadequate to characterize the river and creek sediments. The work plan needs to address, for the grid system approach, a number of questions that it neglected to address for the transects approach. For more detail see the discussion on investigation of the site using the grid system presented in General Comment #6.

During the upcoming sediment sampling program, the location of the samples and their purpose remain subject to "field reconnaissance". The work plan must state exactly what field reconnaissance will provide, including detail. This "field reconnaissance" needs to include detailed mapping of the sediments.

The worst problem areas should be targeted by proposing a reasonable sedimentological model. The most obvious model will be that PCBs will move in the sediments associated with oil and grease and the fine sediment like silts/clays, especially those associated with the paper waste. The energy associated with deposition of silts/clays and organic matter in general will correspond to that depositional regime most likely to accumulate PCBs. Sands, on the other hand, would probably be unlikely to host abundant PCBs in an active river system. Sands are characteristic products of a relatively high hydraulic energy depositional environment that would tend to naturally clean oils and greases off particles rather than contaminate them. Therefore, it is necessary to avoid sampling of sand bars, channel islands of sands, and all other ASTM D433-63 COARSE to MEDIUM SAND bodies in the Kalamazoo River system, especially those that are relatively new areas of "ongoing sediment deposition" unless there are some extenuating circumstances. Sample locations

should be selected on the grid after mapping has been completed, using standard sieve size analyses. The coarse or single class sediments will probably have been naturally cleaned up or the contaminants will have been significantly diluted, so these sediments should not be targeted.

20. General Ecological Comments

Follow the procedures in the Superfund Ecological Assessments Guidance Manual of September 29, 1988 to determine whether or not a causal relationship exists between the wastes found on-site and any discernible ecological effects. To address this concern, the Manual requires the following information:

1) a basic inventory of the current status of selected components of the biological community in the area of the site;

2) chemical analyses of the appropriate media to establish the presence, concentrations and variabilities of toxic chemicals;

3) ecological surveys to establish that adverse ecological effects have occurred; and,

4) toxicity tests to establish a link between the adverse ecological effects and the toxicity of the waste.

The work plan does not address all information needed for an ecological assessment. The example ecological assessment work plan (Attachment 2) describes what constitutes an ecological assessment. At a minimum, the work plan should state that the following information should be assembled for a preliminary ecological assessment: The information in items 1, and 4 through 7 in Task 1 (items 2 and 3 are already proposed objectives of the work plan); and the items in Task 2. As stated in the ecological assessment work plan, Tasks 3 through 6 are not required for all sites. Once adequate data is received on contamination and the preliminary assessment is completed, the MDNR and the EPA Biological Technical Assistance Group (BTAG) will review the information to determine the need for more detailed studies.

The screening methodology that should be employed for ecologically significant chemical contaminants is the site ranking procedures devised by Don Steffik of the USDI FWS. This method incorporated a table ranking the relative persistence of chemicals in the environment which was developed by the U.S. EPA. This list should be updated for use at this site by categorizing chemicals with known physical-chemical properties in the range of those originally found on the table.

21. General Comments on Biota Sampling

The work plan is inadequate to assess environmental risks posed by the site and needs to be completely redrafted to include assessment of the environmental risk. The major shortcoming of the work plan is the absence of any mechanism by which to evaluate a baseline risk assessment for biota. The PRPs were provided a study proposal as guidance in development of the RI/FS being prepared. These preliminary characterization studies were summarily discounted in the work plan. The stated reasons for not performing site investigations on fish and wildlife resources are not documented in the work plan by literature citations and are inconsistent with the known bioeffects of

PCBs. Therefore, in regard to environmental risk, the work plan is flawed because the scope of the proposed RI is limited to assessing the risk to human health from consuming fish and turtles.

Since Section 3 of the work plan dismisses environmental risk from PCBs as being inseparable from past resource impairments resulting from conventional pollutants, the following sections are similarly deficient. The MDNR strongly disagrees with this rationale for the dismissal of environmental risk. Based on the proposed sampling plan for water, sediment/soils and edible portions of fish and turtles, it will not be possible to perform a credible environmental risk assessment for biota. Also see Comment #67 and #74.

GENERAL COMMENTS BY AREA

22. General Comments on The Allied Hydrogeological Investigation Monitoring Well Installation and Ground Water Sampling

The work plan is based on the assumption that there are three separate aquifers (or saturated zones) beneath Allied Paper's residual disposal facility. However, the existing data does not support this conclusion. According to reports in Section 5.1.1 of "Investigations of the Historical Residuals Dewatering Lagoons and Seeps 1 & 2", there is an upper (first) saturated zone (approximately 780 - 790 feet above MSL), a middle (second) zone located below a layer of stiff sandy clay (approximately 760 - 770 feet above MSL), and a lower (third) zone (below 760 feet above MSL). From the same reference, the upper and middle zones "are probably hydrologically connected but is likely poor because of the continuous layer of stiff clay running under the HRDL that separates them". There is no evidence of any "continuous" clay layer west of SB503 and is completely undefined at MW25. This "continuous" lower aquifer is solely defined by 1) a relatively high static water level in MW11 (where no surveyed elevations are offered on adjacent wells) and 2) a comparative difference in the static water levels of MW16b and MW16c. Two 800 foot cross sections through the Bryant HRDLs and items 1 & 2 above are not sufficient to demonstrate the proposed hydrogeological relationship.

The existing data does not demonstrate the proposed assumption described above. Therefore, it is necessary to rewrite a work plan utilizing all data to develop (or redevelop) a working geologic and hydrogeologic model that supports any and all scenarios such as the "continuous high pressure saturated zone". Interpretation by means of fence diagrams, cross sections, potentiometric groundwater flow maps of all distinct aquifers by head relationships, migration paths, etc. will be necessary. In order to prove the extent of a continuous clay layer and high pressure zone under the HRDLs and/or the Allied Landfill, it will require reworking existing data sets and additional monitoring wells deep enough and numerous enough to be conclusive. There must be supporting data to the north, west, and south of SB501, SB502, and SB503 in the Bryant HRDLs and the adjacent landfill with fence diagrams and north-south and east-west cross sections that define screen placement, static water level elevations, surface elevations, lithology description and symbol. For every separate aquifer (or saturated zone) there must be a separate potentiometric map with well designation, values, migration paths, and flow directions labeled. Site wide geochemical testing and development of Stiff and Piper diagrams of monitoring wells will be necessary. The work plan proposes shallow and deep well pairings. It is unclear which zones are being

compared. If it involves the lower (or third) zone, then more wells than just those adjacent to the river will be required. There must be placements between BLMW-1 and the wells along the river (every three to four hundred square feet). To differentiate between three aquifers (or zones), groups of three wells will be necessary to provide groundwater quality and elevation comparisons. Vertical sampling will be necessary to determine contaminant environmental paths.

Three shallow wells (MLMW-1, MLMW-2, and MLMW-3) are proposed in the Monarch HRDL for an interpretation of the groundwater/surface water relationship. For a better understanding of the groundwater, there should be two deep wells paired with two of the shallow wells (MLMW-1 and MLMW-2). Groundwater quality and elevation data should be obtained from all new wells.

Existing wells to be sampled and analyzed should be expanded and checked. Section 5.4.2.2 pg. 5-17 indicates that existing wells MW-7, MW-10, MW-22, MW-26, MW-11, and MW-24 will be sampled and analyzed. MW-12 and MW-25 should be included completing an upper-zone/deep zone profile. It should be noted at this point that the quarterly and annual groundwater monitoring program for this disposal facility includes: MW-1, MW-2, MW-3, MW-5, MW17A, MW17B, MW19B, MW19C, MW19D, MW21, and MW112. These wells should also be sampled as part of the RI.

23. <u>Allied Soil Investigation</u>

The PRPs have proposed 14 hand boring locations around the perimeter of the Bryant and Monarch HRDLs. It is indicated that the borings will be advanced to a depth of one foot and a representative composite sample of the material will be collected. This is unacceptable. Depending on location, boring depth will approach 15 feet and samples should be taken every 2 feet. To properly investigate the leaching of PCBs through the dike walls, samples must be taken until the saturated underlying soils are identified. Soil and groundwater samples should be analyzed 2 feet into the saturated soils. The PRPs are expected to produce a sample analysis map for all contaminants found. Specifically for PCBs, the map would have sampling results per every two feet along with boring elevations.

In the work plan draft, the MLSS and DLHB series hand borings within the HRDL and dewatering lagoon areas are to be advanced until refusal or the underlying in situ soils have been encountered. A representative sample of the underlying soils from 2-4 feet in depth below the residuals (in all MLSS and DLHB series borings) should be collected. What must be added is that if boring encounters refusal then another boring must be performed adjacent to the interrupted boring. Data from all borings (complete and incomplete) must be reported. At least one sample every two feet should be analyzed for PCB content and one sample per boring for a full CLP-TCL/TAL scan. MLSS-1, MLSS-3, and MLSS-5 should be bored into the underlying soils until a soil sample just above the water table and a sample of groundwater can be extracted. These 6 samples should be analyzed for CLP-TCL/TAL constituents. It should be noted that if areas of excessive organic content (e.g. peat, muck, darker soils) are encountered below the residuals or if oil/grease or characteristic gray paper sludge are found within the residuals, they should be preferentially sampled.

The proposed hand boring locations are acceptable with a few additions and relocations. A proposed boring BLHB-10 located just south-east of BLMW-4 (Attachment 3) should be sampled in the same manner as the BLHB group. A proposed boring MLHB-6 located near the end of the dike to the south-east of MLHB-5 (Attachment 4) should be sampled as well. BLMW-10 and BLHB-6 are important as these areas show potential of contaminant accumulation. An additional BLHB-11 hand boring is recommended on the inside of the meander (near the creek) between MW3 and BLMW5 (Attachment 4). One sample from each foot of BLHB-11 should be analyzed for PCB constituents. Two additional borings DLHB-6 and DLHB-5 should be sampled further north-east of DLHB-2 and DLHB-3 respectively (Attachment 3). DLHB-5 and DLHB-6 will be closer to the retaining dike where greater settling may occur.

The work plan should include an investigative proposal for 1) the extremely high heavy metals contamination detected during the investigation for the Portage Creek diversion project; and 2) the extended sediment sampling in the vicinity of, and in relation to the two seeps to identify the concentration and extent of the PCB contamination that the MDNR has provided documented concern. Also, no contingencies have been presented for obtaining information concerning other sites of contamination adjacent to the API/PC/KR site, such as the Strebor site. These sites could become very important when developing and evaluating remedial alternatives, and must be addressed in the investigation.

The following information is needed to determine if the proposed sampling is adequate: How will the limited number of samples be used to determine spatial extent of residuals present in and outside of the landfill? How will the data be used in identifying chemical migration pathways and movement? Will a model be used? How will the data be used in evaluating remedial alternatives? This type of information should be provided for all proposed investigations in the work plan.

24. General Comments on The Bryant Mill Pond Former Impounded Sediments Work Plan

The work plan is inadequate to characterize this area. A grid system must be used in this area. The work plan proposes twenty locations for sampling and analysis of sediments from the former Bryant Mill Pond. These sediments are now exposed above the normal creek waterline, but have not been accurately mapped on a topographic map. As a result, many of the proposed boring locations are believed not to be representative of a Bryant Pond sediment, nor its flood plain. In the "Description of the Current Situation: Volume 2 of 2", Figure 11, a general former Bryant Mill Pond border is indicated, and even by this reference only 3 out of 20 proposed locations fall within the former impoundment. BMP-3 through BMP-12 are not close enough to the river especially BMP-4, 5, 6, 8, 9, and 10. BMP-13 should be at least 100 feet further north. The proposed sampling at 6 inch intervals is acceptable, however, sampling must enter the clean underlying soils. Previous boring data indicates that the greatest concentration of PCB contamination in the Bryant Mill Pond sediments are found at depths below those proposed for this sampling.

Borings RP-1 through RP-5 have been proposed for the purpose of providing risk assessment related information. The specific purpose and rationale for

choosing these and only these locations is not clear. Why do these specific lots "appear" to have received fill? What is the elevation and slope in the areas of these locations? The reasons for location and analysis should be discussed in the work plan.

The Bryant Mill Pond work plan cannot be further reviewed until the relationship between the boring locations and the former pond water elevations are illustrated on a detailed two foot contour topographic map incorporating the grid system (an extension of figure 10 from "Allied Paper: Addendum to the Hydrogeologic Investigation). It should also be noted that a PCB and other contaminant analysis maps (similar to figure 10 in "Description of Current Situation") must be produced from the results of this investigation.

25. General Comments on the Portage Creek Floodplain Soils Work Plan

The work plan is inadequate to characterize this area. A grid system must be used in this area. There is not enough information available in this section of the work plan for further comment. The two areas proposed for sampling are described as areas where flooding is "suspected" to have occurred, yet it is not explained why or to what extent. The work plan refers the reader to figure 10, yet there is nothing on figure 10 north of Alcott Street. In the first area, five sampling locations are proposed to be randomly distributed (which is unacceptable) in an area of undefined dimension and topographic relief. Sampling location should be contained on the grid system. These five borings should go down into the clean underlying soils (instead of the proposed 1 foot) as similar boring upstream indicate that the greatest concentration of PCB contamination is often found below this proposed sampling depth. These samples should be tested for all CLP-TCL/TAL constituents. More information (current and historical), exact locations, and topographic maps (with floodplain boundaries) of the two areas proposed are required for further comment.

It should also be noted that in the "Description of the Current Situation" PCB concentrations were reported in 1983 from samples taken downstream toward the confluence of the Portage Creek and the Kalamazoo River. These areas need more investigation.

26. General Comments on The Simpson Plainwell 12th Street Landfill Hydrogeologic Investigation

The work plan is inadequate to characterize this area. The work plan proposes four wells to be installed in the vicinity of the 12th Street Landfill to monitor the water table conditions, direction of groundwater flow, and to determine groundwater quality. The proposal that one upgradient well and only three downgradient wells could provide enough data to make evaluations for the entire landfill is unacceptable even at a preliminary stage. There are at least ten acres of possibly contaminated groundwater that must be investigated. Samples must be taken throughout the landfill and the adjacent perimeter in grid fashion. Since groundwater discharge into the river is of major concern, there should be at least two more wells between the landfill and the Kalamazoo River drilled and completed in the first saturated zone encountered. If the first zone encountered is greater than 10 feet in thickness, then the aquifer should be vertically sampled at 10 foot intervals.

There should be another upgradient well location chosen in addition to 12MW-1 to the south of the landfill. Since there is no previous well data, it cannot be assumed that groundwater flow direction is in a northeasterly direction. In addition, 12MW-1 is located in an area characterized by high sand and gravel content down slope from the landfill susceptible to contamination by surface run-off recharge and potential groundwater mounding under the fill.

The work plan indicates that "if residuals are encountered... the well will not be installed at that location". This is unacceptable. This is a historically documented landfill and by definitive character contains residuals. The purpose of drilling and sampling is to maximize the possibility of finding contamination and thereby determining the nature and extent of the contamination. If residual material is encountered during drilling it is to be sampled and logged and drilling continued taking precautions to avoid transporting contaminants to a greater depth. If the PRPs wish to drill wells not encountering residuals, they may do this in addition to, and in comparison to, planned wells.

Ten hand borings (12HB-1 through 12HB-10) have been proposed for soil investigations around the perimeter of the landfill. Since surface drainage (and localized subsurface drainage) flows to the east, north, and west, there should be: (1) two more pairs of hand borings between the 12HB-1/12HB-3 pair and the buildings adjacent to the upgradient well 12MW-1; (2) two more pairs of hand borings between the 12HB-4/12HB-5 pair and the 12HB-8/12HB-9 pair; (3) a hand boring to form a radial line with 12HB-10; and (4) additional hand borings between the well locations along the Kalamazoo River. There should also be testing on the south side of the landfill. All borings should be advanced through the underlying in situ soils. Samples should be collected at 2 foot intervals and analyzed for CLP-TCL/TAL constituents, including a sample from the underlying soils.

The ten borings 12SS-1 through 12SS-10 are proposed to be drilled in the landfill, however there is no description of rationale used in choosing the proposed locations. Why are there no borings to the south-east of 12SS-3 and 12SS-5? Sampling must be more thorough than proposed and incorporate the underlying in situ soils, similar to the 12HB boring series commented on above.

It is imperative that the investigation characterizes the vertical extent of contamination at all sampling locations. The following information is needed to determine if the proposed sampling is adequate: How will the limited number of samples be used to determine spatial extent of residuals present in and outside of the landfill? How will the data be used in identifying chemical migration pathways and movement? Will a model be used? How will the data be used in evaluating remedial alternatives? This type of information should be provided for all proposed investigations in the work plan.

In order for any further comment on the work plan for the 12th Street Landfill, a more accurate and detailed map (Figure 11) will be required. This map must include the bermed area (see page 5-26), proposed boring and well locations, the 1987 and 1989 sludge PCB boring locations with corresponding sample results, and a 2 foot contour topographic map (because of the low comparative relief of this site).

27. General Comments on the Kalamazoo River Floodplain Soils Work Plan

The work plan is inadequate to characterize this area. A grid system must be used in this area. There should be more than two consecutive 6 inch samplings per boring. There should be a more thorough analysis of sediment samples than proposed. Sample collection and analysis should be similar to that of the Portage Creek Floodplain Soil investigation described above with the appropriate grid system changes. An evaluation of flood prone areas and sampling locations will require available flood data and topographic information which should be forwarded to the MDNR along with the revised work plan. In addition, the area to be sampled must be characterized by a flood recurrence interval of 100 years. There is not enough information available in this section of the work plan for further comment.

SPECIFIC COMMENTS

28. Page 1-1, Para. 2

The statement that the site is located in the vicinity of the city of Kalamazoo is too restrictive.

29. Page 1-1, Para. 4

Instead of "one location," saying "several locations" better reflects the groundwater contamination problems on the Allied property.

The MDNR can not "write-off" groundwater due to the statement by ATSDR that the groundwater problem appears to be localized. ATSDR based their statement on the limited information available at the time and it's statements should not be construed as justification for narrowing the scope of the RI. See General Comment #18.

30. Page 1-2, Para. 2

The first sentence should read as follows: "...evaluate remedial alternatives for the remediation of PCB contaminated soils, sediments, groundwater and surface water."

31. Page 1-2, Para. 3 & 4

The work plan is inconsistent on the matter of what requirements will be complied with during the performance of the RI/FS. Cite Paragraph 13 of the AOC. Make this change throughout the document.

32. Page 1-2, Para.4

Delete the word "all" in both locations in the following sentence: "This plan describes all studies to be conducted and addresses all levels of investigations."

33. Page 1-3, Para. 1

Delete the first sentence and replace it with the following from the AOC: "The purpose of the Remedial Investigation (RI) is to determine the nature and

extent of the contamination at the site and to gather all necessary data to support the feasibility study."

Change to read: "These objectives are embodied in the applicable or relevant and appropriate requirements (ARARs)."

Replace the word "so-called" with "the".

Delete "... according to the different types of cleanup provided...". Delete "The evaluation of ... environmental protection objectives." See the National Contingency Plan (NCP) for detailed discussion of alternative evaluation and selection. State the criteria according to the NCP.

34. Page 1-3, Para. 2

The RI/FS will also include preparation (by MDNR) of a Baseline Risk Assessment.

Evaluation of alternatives is done in the FS.

Cite the selection criteria outlined in the NCP.

35. Page 1-4, Para. 1

These "subobjectives" should be changed to more closely reflect the goals of the site investigation which are listed in the SOW under Task 3. The PRPs have reworded the goals resulting in a limitation in the extent of the investigation. This is unacceptable.

Change "potentially affected media" to "affected and potentially affected media".

Delete the word "significant" from the third subobjective under #1.

36. Page 1-4, Para. 2

Delete the phrase "if any" when discussing risks posed by the site.

37. Page 1-4, Para. 4

Last bullet - Delete the phrase "for source control and/or off-site remedial action".

38. Page 1-5, Para. 1

Define the acronym CLP-TCL/TAL here, where it first appears.

Change the last bullet from "Develop and recommend a preferred alternative" to "Evaluage remedial alternatives".

39. Page 1-5, Para. 3

Cite the Plan and page number that contains a list of the CLP-TCL/TAL constituents.

Delete reference to whether or not areas to be investigated are within or outside of the NPL boundaries. See General Comment #3.

State how far upstream Ceresco Dam Impoundment is located. The information is provided later in the document, but would be valuable here.

It would be helpful to state the length of each area/reach starting from the upstream boundary of the site down to the river mouth.

40. Page 1-5, Para. 4

Lake Allegan is part of the investigation. This is not due primarily to its recreational importance, but due to the volume of PCBs (100,000 lbs) contained in the lake.

Delete "Morrow Lake. See General Comment #9.

41. Page 1-6, Para. 1

Replace "former paper mill residual lagoons" and "more recently used treatment lagoons" with "Historic Residual Dewatering Lagoons (HRDLs)" and "Active Residual Dewatering Lagoons (ARDLs)", respectively. Be consistent.

Why are only "specific areas" of the Allied property being investigated? Provide rationale for not investigating the rest of the property and why certain areas have been targeted.

42. Page 1-6, Para. 2

Give further details of the prior groundwater investigations. Do they or do they not involve Allied property as a potential source area?

43. Section 2, General Comment

Very little mention of PCBs in this section. When referring to "deposited sediments" refer to "PCB contaminated sediments".

The areas to be investigated as outlined in the work plan will not identify the nature and extent of contamination. To be considered a complete investigation, the RI must address the question: How far downstream does the PCB contamination extend? Also the additional potential source areas upstream (i.e. the Willow Boulevard, Kings Highway, King Mill, King Street Storm Sewer and "A" sites) need to be investigated.

44. Page 2-1, Para. 1

The general location map is not "(Figure 1)" as stated in the text. Make necessary change.

Include all the areas to be investigated in a clear site description and on the maps.

45. Page 2-2, Para. 1

Change this paragraph to indicate that: "The water level in the impoundments

has been drawn down due to the removal of the dams down to their sills. However, the dams still impound water."

The date of the "Description of the Current Situation" document will need to reflect the revised document.

46. Page 2-2, 2-3, 2-7, 2-8, 2-9

The Field Sampling Plan prescribes soil or exposed sediment sample composites of the top six inches to one foot of soil/sediments. As exposure to contaminated soil through contact and fugitive dust mainly involves the actual surface of the soil, composites including deeper soil may misrepresent the actual hazard from surface soil contamination. For risk assessment purposes only the sampling of soil and exposed sediment that are no more than three inches in depth need to be included in the RI.

47. Page 2-4, Para. 1

Delete the phrase "(outside the NPL Site)" from both number 5, 6 and throughout the text. See General Comment #3.

The MDNR believes that Allied Paper/HM Holdings, Inc. owns the Bryant Mill Pond Area. If so, state the fact here. If there is a different owner, please identify.

48. Page 2-5, Para. 2

Add to the last sentence: "...installed by Allied as directed by the U.S. Environmental Protection Agency."

49. Page 2-5, Para. 3

Replace the word "normal" with "present".

50. Page 2-6, Para. 1

Delete the description: "The Division of Fisheries describes the river as containing a good fish habitat."

51. Page 2-6, 2-8 and 2-9

The vegetation on the formerly-impounded sediments should be generally described in the RI Report. A general description of habitat or land use should also be included for the full length of the river which is addressed by the RI. A more detailed description of habitat and vegetation should be included for wetland areas and other significant ecological habitat potentially impacted (e.g. any State or Federal natural reserves).

52. Page 2-7, Para. 1

In this section and subsequent sections, change reference of "historically deposited sediments" to "historically deposited sediments contaminated with PCBs" as appropriate.

53. Page 2-7 and 2-9 through 2-11

The "swampy" areas should at a minimum be identified using the method described in the Federal Manual for Identifying and Delineating Jurisdictional Wetlands. Wetland acreage should be estimated.

54. Page 2-11, Para. 1

Need to reference the source of information concerning wetlands.

55. Page 2-11, Para. 2

Include that PCBs were in use in 1955 when sludge deposition began at the site.

56. Page 2-11, Para. 5

In a Section titled "Site Characteristics" a discussion on reference and background data is inappropriate.

57. Page 3-1 to 3-9.

As now written, "Section 3 - Initial Site Evaluation" is inappropriate. This section should address how the work plan will evaluate chemical migration, public health exposure and environmental risk, not present the opinions of the PRPs prior to the completion of the RI/FS.

58. Page 3-1, Para. 3

State that: "The RI will investigate groundwater and surface water flow patterns." Preliminary evaluations are not sufficient.

59. Page 3-2, Para. 2

The MDNR and the EPA consider PCBs to be probable human carcinogens. It is inappropriate to use the work plan as a platform from which to challenge the Department's and Agency's position on PCB toxicity. The text should be revised to reflect the standard agency position on PCBs and PCB exposure.

60. Page 3-3, Para. 2

Ingestion of contaminated fish and turtles should also be considered.

61. Page 3-3, Para. 3

The work plan indicates that soils and residuals at Allied property are not conducive to dust generation. This is not the situation. During field investigations, staff of the MDNR have observed that the surface of the exposed contaminated sediments in Bryant Mill Pond and residuals in the lagoons become very dry, cracked and flaky in the summer.

62. Page 3-4, Para. 1

Note that the fence constructed under an Administrative Order by Consent with

EPA is to be upgraded as per direction of OSC, Paul Steadman. Contact Allied attorney for further information.

63. Page 3-4, Para. 2

Note the dangers associated with trespassing on the unstable Allied property. Include discussion of potential flooding in the area of the Bryant Mill Pond. Could contaminated residuals be transported outside of the fenced-in area? Also include discussion on burrowing activities.

64. Page 3-4, Para. 3

Delete the statement that exposure to groundwater "will not occur". It is premature to assume that this is accurate. See General Comment #18.

65. Page 3-5, Para. 3

Flooding and erosion (in addition to "burrowing activities") could also bring paper mill residuals to the surface and increase the opportunity for exposure via direct contact or incidental ingestion. In general, flooding, burrowing and excavation increase the opportunity for exposure via direct contact or incidental ingestion.

The situation of the HRDL and ARDL on Allied property, with regard to threatened release needs to be discussed. Contact Allied's attorney for information.

Are the maintenance personnel "health and safety trained"? Please have PRP provide names and certification of training and required refresher courses. Is health monitoring being done?

66. Page 3-6, Para. 5

It is unclear what floodplain soils are being referred to here and what the previously stated reasons are that are referred to in the text. The exposed contaminated sediments in the former Plainwell, Otsego and Trowbridge Dam Impoundments cover a large surface area and some of this surface area does become dry in the summer. MDNR staff have noted that this occurs. See Comment #61.

Address both sediments and surface water as potential exposure pathways. If these exposure pathways are present for trespassers on Allied property then they are also present for nearby residents who may visit the creek or river.

67. Page 3-7, Para. 1

Rewrite this paragraph. The RI needs to investigate the possibility of erosion of contaminated soils/sediments.

The Preliminary Health Assessment indicates that inhalation and incidental ingestion of fugitive dust is a potential pathway for human exposure to site-related contaminants. Local residents have asked if any sampling of air and/or particulates at the site boundary has been done. MDNR cannot find any

record of any sampling. Therefore it is premature to state that airborne particulates are not a likely concern. This type of sampling needs to be incorporated into the work plan. The Sampling Plan does include a reference to "ambient air monitoring" (Section 3.9, p. 3-7), however, it does not give any further description of what is planned. This deficiency needs to be corrected.

The Preliminary Health Assessment (page 20) identifies "soils carried by the wind, and air" as one of the "significant pathways for environmental transport of contaminants from and within API/PC/KR [site]". The document also identifies inhalation of volatile contaminants and contaminated dust as potential pathways for human exposure to the contaminants at this site (page 24). Several segments of the Site consist of sediments and soils from former impoundments and floodplain that are now above the normal water line. These include the Former Bryant Mill Pond, the stretch of Kalamazoo River between Main St., Plainwell and Plainwell Dam and between the Otsego City Dam to the Trowbridge Dam. Most areas of the Site "are freely accessible" and trackout of contaminated material may be a significant problem. The contaminated material tracked out of various contaminated areas are then subject to wind dispersion. Given these circumstances, the migration of PCBs by air route should be investigated by ambient air sampling at various locations throughout the Site. The work plan simply rules out air migration of PCBs by stating that inhalation exposures are not significant because the sediment areas and surface soils are well-vegetated and in many places are saturated year round. This is incorrect and unacceptable. See Comment #61.

68. <u>Page 3-7, Para. 2</u>

Delete statement that "..residential exposure to groundwater originating from the Allied property is not expected". This is premature speculation.

69. <u>Page 3-7, Para. 4</u> <u>Environmental Risk</u>

Because PCBs can accumulate in the food chain, an ecological assessment for this site is appropriate. This ecological assessment should utilize a phased approach starting with the lower trophic levels. However, this phased approach is not intended to limit the scope of the ecological assessment. It is reasonable to expect that it may be necessary to include a risk assessment for selected wild species to fully characterize the environmental risk. For example, an exposure assessment for Bald Eagles, an endangered species present at the site (based on consumption of fish, surface water, etc.) is very likely. The PRPs need to meet with the MDNR and discuss further the data needs for the risk assessment.

The phrase "close proximity" is redundant.

Delete all but the first sentence. This sentence should be modified to indicate that PCBs are a bioaccumulative substance and that Kalamazoo River and Portage Creek biota, especially the fish, are known to have accumulated high levels of PCBs. It is <u>unacceptable</u> to virtually write-off evaluation of the effects of PCBs by stating that they could not be easily discriminated from responses to past ecological change on the river.

70. Page 3-8, Para. 1

Bioaccumulation is not the only known effect of PCBs upon organisms living in the Kalamazoo River and Portage Creek. PCBs impact phytoplankton, zooplankton, and fish as well as fish-eating birds and mammals. The homeostasis of the river is affected at the most basic level of the food chain. Eliminate discussion in the work plan and instead expand discussion in the RI Report. Be sure to explain how PCB congeners most similar to TCDD have been found to have the greatest environmental risk.

71. Page 4-1, Section 4.1

Section 4 has almost excluded environmental risk. This section needs to address the environmental risk from contamination as well as the risk to human health.

The soil/sediment/residuals samples which are screened for the EPA CLP-TCL/TAL should be analyzed for chlorinated dibenzo-p-dioxins and chlorinated dibenzofurans due to their association with types of paper mill processes. Select fish samples from each sample location should be analyzed for the MDNR Fish Contaminant Monitoring Program constituent list to allow for comparison to historical sampling (Attachment 5). A percentage of all samples, including surface water, groundwater, sediment/soil/residuals and biota, should be analyzed for congener specific PCBs due to the increasing importance of congener specific data in toxicity evaluations. The PRPs need to meet with MDNR and discuss this matter.

This section should be revised to include an investigation of air as a potential migration pathway.

72. Page 4-1, Para. 4

Delete "most" and add "a".

73. Page 4-1, Para. 5

The text states that "samples of environmental media...will be analyzed for a full array of hazardous constituents." Specify the "full array".

74. Page 4-2, Para. 3

Change first sentence to read as follows: "The ATSDR preliminary health assessment generally discounts the potential of PCB contaminated groundwater as a known route of exposure noting ..."

Add the following sentence: "However, groundwater may be a migration pathway for contaminants, including PCBs, from the landfill areas to Portage Creek and the Kalamazoo River."

75. Page 4-2, Para. 4

Delete this paragraph. It is factually incorrect and the specified approach to groundwater is unacceptable. Groundwater management is already an issue and the work plan must address the groundwater contamination, including the

seep that is northeast of the landfill that is highly contaminated with heavy metals. The RI must identify the source and extent of this contamination.

The Preliminary Health Assessment explicitly recommends investigation of the tetrachloroethylene and metals found in the groundwater at the Allied Paper site. However, as stated in the next paragraph, "The work plan does not presently propose further work to define the sources of these other constituents (if any). If groundwater management becomes an issue with regard to the feasibility of a particular remedial alternative, issues regarding other chemicals in groundwater may need to be further addressed at that time." No explanation is given for not addressing the matter, beyond a statement that, "the potential for human exposure to these materials appears to be minimal due to the localized nature of groundwater contamination and the general movement of groundwater away from water supply wells (p. 1-1)." The work plan accurately cites the Preliminary Health Assessment for this conclusion about the potential for exposure, but neglects to mention the recommendation for further investigation. There are too many unknown factors to treat the situation on an "if necessary" basis. Groundwater is an issue and will be thoroughly investigated during the RI.

76. Page 4-3, Para. 2

Include in this paragraph the biota to be sampled as part of the RI.

Collection and analysis of biota necessary to determine the environmental risk due to the contamination will be characterized in the RI. The MDNR, EPA and the U.S. F & W Service are currently discussing the extent of the collection and analysis of biota necessary for this site and will be providing guidance to the PRPs in the near future.

77. Page 4-3, Para. 3

Delete "potential" in #3 and change the "Potential Source Areas" subheading to "Identified Source and Potential Source Areas".

Add a fifth objective: "Investigation should evaluate risks to the environment posed by contaminated sediments and floodplain soils."

78. Page 4-3, Para. 4

More details are needed in the "Source Area" Section. List all source areas, besides just Simpson Plainwell Mill and Performance Paper Mill. Source areas or Potential Source Areas, where PCBs and other contaminants are most likely to collect are areas such as catch basins, sump pumps, grey tank, stained soils, process lines, dry wells, chemical storage areas, and floor areas in the mills and floor drains. Maps of these areas need to be prepared so the MDNR can determine if there are other source areas. Also, see General Comment #3.

Include Willow Boulevard site, "A" site and Kings Highway site/King Mill/King Street Storm Sewer in the investigation. As PRP-owned facilities, these are continual sources or potential sources of contamination to the river and the site. It would be illogical to cleanup the Kalamazoo River when there is a

continuing source of contaminants from a PRP owned facility that threatens to recontaminate downstream areas to be remediated.

79. Page 4-4, Para. 1

Delete the last sentence: "Groundwater transport...".

80. Page 4-4, Para. 3

Delete the sentence: "In addition, for the development of certain...".

81. Page 4-5, Para. 3

Change: "presumably PCBs in particular" to "including but not limited to PCBs".

Delete the phrase "and indeed as is now known from experiences at a number of other similar sites".

82. Page 4-5, Para. 4

Replace "perhaps the most" with "one of the most".

Delete the words "albeit anecdotal".

83. Page 4-6, Para. 1

Change: "would be conducted" to "will be conducted." and delete "if various ecosystems...characterized".

84. Page 4-6, Para. 2

Delete this paragraph.

85. Page 4-6, Para. 3

"Sampling and analysis of those organisms would..." State which organisms?

86. Page 4-6, Para. 3

Delete "However, extensive sampling, beyond ... limited usefulness of the RI/FS."

87. Page 4-6, Para. 3

Although it is true that, "..., there are no standard procedures to assess the health effects of such exposure to organisms other than humans ", standard procedures are not necessary to show basis for ecological risk. Therefore, statement is irrelevant and should be deleted. In fact, delete all the way to the end of the paragraph, so that the paragraph concludes with "...predatory organisms".

The intent of the U.S. Fish and Wildlife Service (FWS) proposed sampling plan which was provided to the PRPs, was to establish and evaluate the

environmental risk. However, this work plan has almost totally neglected the subject. The MDNR, EPA and the FWS are currently discussing the extent of the collection and analysis of biota necessary for this site. The MDNR will be providing guidance to the PRPs in the near future on this matter.

Also, this paragraph implies that the U.S. FWS is planning on going ahead with this study concurrently with the RI, which is inaccurate.

88. Page 4-7, Para. 1

Immaterial. EPA and MDNR must do an ecological risk assessment. As on page 3-7, it is unacceptable to virtually write-off evaluation of the effects of PCBs by stating that they could not be easily discriminated from responses to past ecological change on the river.

89. Page 4-7, Para. 2

The MDNR will be providing guidance to the PRPs in the near future on this matter. See Comment #87.

90. Page 4-7, Para. 3

Discussion concerning 1985 waterfowl samples is more appropriate for the RI Report. Remove from the work plan.

91. Page 4-7, Para. 4

Delete this paragraph. The MDNR disagrees with the view that ecosystem indices are not useful.

92. Page 4-8, Para. 1

This paragraph is confusing the terms remedial, interim and removal actions. Check the NCP and rewrite the paragraph. Note that the fencing of the site was a removal action.

93. Page 4-8, Para. 2

Operable units and interim operable units require RODs. Revise per the NCP.

94. Page 4-8, Para. 4

Delete the remainder of the paragraph beginning with: "The impoundments are not...". Discussions of problems concerning past remedial planning do not belong in this document.

95. Page 4-9, Para. 2

Delete the last sentence. The time it takes to conduct the RI/FS will not be driven by the agency reviews, but by the quality of the documents provided to the agency by the PRPs' contractor.

96. Page 4-9, Para. 3

Change "primarily PCBs" to "including, but not limited to PCBs".

97. Page. 4-10, Para. 2

Delete first sentence. It is unclear why the statement is made that existing water column data applies to previous conditions. Water sampling of the

Kalamazoo River and Portage Creek for PCBs, although limited, has been conducted since any major changes have occurred. This data also applies to the current situation.

98. Page 4-10, Para. 3

Water column sampling should also be done in Lake Allegan and Ceresco Dam Impoundment.

99. Page 4-10, Para.4

Sediment samples should be analyzed for Total Organic Carbon (TOC) and grain size. This will become important information when determining if the sediments sampled would be expected to contain PCBs.

Delete the statement that "...only confirmatory samples will need to be taken." Until the past data is approved for inclusion in the RI/FS, it is too soon to say that only confirmatory samples will need to be taken.

List the impoundments by name that are being referred to in this paragraph.

100. Page 4-10, Para. 5

What do the PRPs base their conclusion on that the correlation between soil texture/lithology and PCB concentration is weak?

101. Page 4-11, Para. 3

Delete the following phrase: "appears to be the most significant potential" and replace with "is a significant route".

102. Page 4-12, Para. 1

The acronym "CLP-TCL/TAL" was used in the beginning of the document but not defined. It needs to be defined the first time it is mentioned.
See Comment #38.

103. Section 5.0, General Comment

This section should identify each task from the SOW with its appropriate task number as identified in the SOW. This will become very important for monthly progress reporting.

104. Page 5-1, Para. 2

The Description of Current Situation Document must reflect the change in area to be investigated during the RI.

105. Page 5-2, Para. 4

The purpose of the HSP is more extensive than the reasoning given here. See the SOW.

106. Page 5-3, Para. 2

Delete "potential" and "potentially" from the subheading and from other

locations in the section. In this section, and other areas of the work plan the discussions on source areas are nebulous. The work plan seems to be neglecting the extensive data that has been obtained on the river and creek that identifies some of the source areas.

Delete the word "urban" from the first sentence.

Delete the sentence: "Due to their low solubility and ...".

The potential source evaluation should include an investigation of the former King Mill in Kalamazoo. It was a deinking mill. The residuals on site have been sampled by the MDNR and found to contain PCBs. A connection to the Kalamazoo River (presumably via the King Street storm sewer) was known to exist in the past.

This section should specify that the RI Report will include a description of the wastes which have been disposed of by the mills and the processes by which the wastes were generated. Also estimates of the amount of waste and the location of disposal areas should be included. Detailed maps of each of the facilities showing process lines, dry wells, chemical storage areas, etc. should be provided. This information will help the MDNR and the EPA to better access other potential sources.

The work plan objective appropriately seeks to define the extent of contamination. Additional data may be needed for ecological descriptions of the site (resulting in a preliminary ecological assessment to determine whether further studies are needed). The MDNR will be providing guidance to the PRPs in the near future.

107. Page 5-3, Para. 3

The necessary site investigation activities on Performance Paper Mill and Simpson Plainwell Paper Mill have been left out of the work plan. The work plan needs to include activities to determine if there are any contaminated areas within or around these mill sites. Sampling should target the areas that PCBs and other contaminants are most likely to collect, such as catch basins, sump pumps, grey tank, stained soils, process lines, dry wells, chemical storage areas, and floor areas in mill and floor drains. Maps of these areas need to be prepared so the MDNR can determine if there are other source areas. The proposed work only addresses the stormwater and wastewater from the plants. Incorporate comment into all following descriptions of investigations.

Investigation into contamination at the mills must also look at other areas of contamination including site soils. Incorporate comment into all the following descriptions of investigations.

108. Page 5-4, Para. 4

Mill A referenced here is not shown on Figure 13 and should be added with an indication that it has been removed. Also, if there is/was a Mill B it should also be shown on the figure. Many of the mills have been demolished. If any of these mills, such as the King Mill, used recycled materials in their production process they should be identified and investigated as well.

109. Page 5-5

Note where the different activities take place on the Allied property.

110. Page 5-8, Para. 5

This paragraph states that stormwater samples will be collected and the previous paragraph states that "stormwater sampling techniques will not be employed". Clarification is needed.

111. Page 5-9, Para 1

The first line of the paragraph on this page is an incomplete sentence.

112. Page 5-9, Para. 3

One of the primary work tasks listed is "Reconnaissance/Existing Well Inventory". The work plan must make sure that all private and public water systems within and around the site are discussed in the text and mapped. This is important in assessing the risk posed to humans from consumption. Also, any wells (private or public) within the site boundaries should be analyzed for all CLP-TCL/TAL constituents as part of the RI.

All water systems contained in the area to be investigated during the RI that use the Kalamazoo River as a source of drinking water must be sampled at the surface water intake and analyzed for all the CLP-TCL/TAL constituents.

113. Page 5-10, Para. 2

Delete the last part of the first sentence beginning with: "therefore, only ...".

The Allied Paper property has been the focus of several investigations. However, these investigations were so fragmented and limited in their scope that they produced very little useful information. This area still needs to be thoroughly investigated. This area contains PCB and heavy metal contaminated seeps and an undetermined source of groundwater contamination which have never been adequately investigated.

114. Page 5-11, Section 5.4.2.2

This section should include the necessary investigations to identify the sources and extent of contamination in relation to the heavy metals seep encountered during the test pit work conducted as part of stream diversion design field studies.

115. Page 5-11 Para. 4

The investigation needs to include the identification of existing residential, industrial, and agricultural supply wells located within a 1/4 mile radius of the site. Also, delete the phrase "(if any)".

Include the municipal and county records in the appendices and the names of the homeowners with wells.

116. Page 5-12, Para. 2

The fifth sentence should read as follows: "The deep wells will monitor groundwater conditions below a speculative clay layer...".

117. Page 5-14, Para 1

Be specific as to what types of "additional data" will be obtained from these wells.

The last sentence refers to BLMW-5 and BLMW-6 as a well cluster and they are not. Correct this error.

118. Page 5-15, Para. 3

Bailing is an unacceptable development technique for wells.

119. Page 5-16, Para. 1

Delete the first sentence on this page. It is incomplete and reiterates what is already on the bottom of the previous page.

120. Page 5-16, Para. 2

Add "existing" between "The" and "wells".

121. Page 5-16, Para. 3

First sentence should read as follows: "This work task... from selected wells including all new wells within Allied Property".

122. Page 5-16, Para. 5

Two complete rounds of groundwater sampling are necessary for this area. The second round of sampling will not be limited to only those constituents that "occur at concentrations significantly above background levels". This same comment applies to paragraph 1 on page 5-25. Compounds in the parameter list

for the second sampling event will be the full CLP-TCL/TAL unless the MDNR directs the PRPs to alter the parameter list.

123. Page 5-17, Para. 2

Provide construction information and boring logs for the existing wells for review prior to initiation of the RI. The wells and associated data can not be used if improperly constructed, as determined by the MDNR.

124. Page 5-17, Para. 2 and 3

Include wells MW25, MW12, quarterly, and annual monitoring wells (see General Comment #22) in wells selected for sampling.

125. Page 5-17, Para. 4

Specify, which aquifers will be mapped. How many well locations are going to be added to the current work plan to construct credible potentiometric maps?

126. Page 5-18, Para. 2

Specify how long the PRPs plan to collect static water level measurements on a monthly basis. This should be conducted for a minimum of six consecutive months.

127. Page 5-18, Para. 3

Specify how a determination will be made regarding whether or not the aquifers are connected.

128. Page 5-19, Para. 3

The number of soil borings proposed for the Allied Paper property is insufficient.

Nine hand borings are planned for the perimeter of the Bryant HRDL. An additional soil boring should be taken in the vicinity of MW-5. Previous sampling has detected PCBs in MW-5 and has indicated the source may be contaminated soils.

Five borings are planned for the Monarch HRDL and four from the dewatering lagoon area. The work plan should indicate how these locations were selected. For example, were they selected as worst-case locations or by a grid and random sampling methodology?

129. Page 5-19 through 5-22

Specific comments on the Allied Soil Investigation will not be significant considering that the majority of text reviewed requires rewriting. See General Comment #23.

130. Page 5-20, Para. 2

List all other compounds, in addition to PCBs that were detected during past sampling.

Discrete samples are preferred over composite samples, for all except point source sampling, because under most situations these are more representative.

Run a full CLP-TCL/TAL scan on a larger number of samples.

131. Page 5-21, Para. 1

A complete CLP-TCL/TAL scan should be run as a minimum, on one sample collected from the residuals and one from the underlying soils for comparison purposes.

132. Page 5-21, Para. 3

A description of the second type of composite samples is missing. However, it may be a moot point because discrete samples are preferred over composite samples because under most situations these are more representative.

133. Page 5-23, Para. 1

Delete the phrase "(if any)".

Change "1/4 mile" to "a 1/4 mile radius". See General Comment #17.

134. Page 5-23, Para. 3

Delete first sentence. The work plan indicates that "if residuals are encountered... the well will not be installed at that location". This is unacceptable. This is a historically documented landfill and by definitive character contains residuals. The purpose of drilling and sampling is to maximize the possibility of finding contamination and thereby determining the nature and extent of the contamination. If residual material is encountered during drilling it is to be sampled and logged and drilling continued. If the PRPs wish to drill wells not encountering residuals, they may do this in addition to, and in comparison to, planned wells.

135. Page 5-24, Para. 1

Define and elaborate on the term "continuously sampled" in the first sentence.

136. Page 5-24, Para. 4

The text states that compounds occurring "significantly above background levels" would be eliminated. Compounds in the parameter list for the second sampling event will be the full CLP-TCL/TAL unless the MDNR directs the PRPs to alter the parameter list. Change text to reflect this fact.

137. Page 5-26, Para. 1

The following information is needed to determine if the proposed sampling is adequate: How will the limited number of samples be used to determine spatial extent of residuals in the landfill and present outside the landfill? How will the data be used in identifying chemical migration pathways and movement? Will a model be used? How will the data be used in evaluating remedial options? This type of information should be provided for all proposed investigations in the work plan.

138. Page 5-26, Para. 2 and 3

It is unclear what is meant in these paragraphs. First it is indicated that ten hand borings are planned for outside of the perimeter of the landfill. Then it is stated that borings will be conducted on a line at 50 foot intervals extending outward until no residuals are encountered. The MDNR recommends that the borings extend out in 50 foot intervals along the grid until the last boring indicates no residuals are present.

139. Page 5-26, Para. 3

Delete "...or until access prohibits further sampling". It is the PRPs responsibility to obtain access for all work necessary to complete the RI. Access will not be allowed to prohibit the completion of the RI. The PRPs should be taking this time to identify any areas that will need access agreements and obtain permission from the landowner in a formal agreement as soon as possible.

140. Page 5-26 through 5-28

Specific comments on the 12th Street Landfill Soils Investigation will not be significant considering that the majority of text reviewed requires rewriting. See General Comment #26.

141. Page 5-28, Para. 3

A sample should also be collected for analysis from the underlying soils to provide information on the vertical extent of contamination.

142. Page 5-29, Section 5.4.3

Reorganize section so that there is a subsection that corresponds to each identified reach.

How will the data proposed for collection be used to map the horizontal and vertical extent of contaminated in-stream and exposed sediments? The work plan indicates that previous sampling is inadequate for purposes of the RI/FS. How is the proposed data to be collected going to provide any better information than previous studies? There will still be a limited amount of data and a mechanism is needed to establish the extent of contamination for the entire site. How do the PRPs propose to do this if they don't plan on correlating sediment contamination with sediment type as in the GZA/Donahue conceptual design for the Plainwell, Otsego, and Trowbridge Dam Impoundments areas?

143. Page 5-29, Para. 3

The document should indicate which impoundments are referred to by "other". Presumably it refers to the Otsego City, Allegan City and Lake Allegan Impoundments.

144. Page 5-30, Para. 1

Morrow Lake is not acceptable for providing "reference conditions". This needs to be eliminated throughout the text. See General Comment #9.

145. Page 5-31, Para. 4

Identify the length of each of the reaches and the area in acres that is covered by surface water, former impoundment sediments, and floodplain.

146. Page 5-32, Para. 2

It is indicated that the top 2 inches of the sediment cores will be sampled for total organic carbon (TOC). This is unacceptable. All soil/sediment/residual samples must be analyzed for TOC to determine organic content of the samples. This comment applies to other appropriate sections of the work plan.

147. Page 5-32, Section 5.4.3.2

Similar to the approach taken in Section 5.4.3.3, a select number of in-stream sediment samples including samples from Bryant Mill Pond and the former Plainwell, Otsego, Trowbridge Impoundments, must be analyzed for the CLP-TCL/TAL constituents.

The site reconnaissance should include a mapping of the depositional areas.

148. Page 5-33, Para. 2

Is the proposed radioactive dating work going to complement the previous sediment dating conducted by GZA/Donahue or is it going to just be a duplication of effort? How will this information be used during the feasibility study? If the proposed work is expected to be used to predict current or future depositional rates, how will it address the difficulties in this approach identified by the GZA/Donahue Burial Rates study?

149. Page 5-33, Para. 4

How will the TOC data be used to normalize PCB concentrations? How will sediment PCB concentrations and relative bioavailability be evaluated in relation to meeting Applicable or Relevant and Appropriate Regulations (ARARs) and evaluating remedial alternatives? Collecting TOC data from the top 2 inches of materials only is unacceptable. Also, see comment above regarding Page 5-32, Paragraph 2.

150. Page 5-34, Para. 1

How will the former river water line be determined? This needs to be designated on the maps.

The grid system in the former impoundment areas should extend outward from the river to above the elevation of the former impoundment.

151. Page 5-34, Para. 2

This paragraph is very confusing. Samples for analysis should be collected along the grid and spaced closer than proposed in this draft. Also, samples for analysis should be collected from material most likely to contain PCBs (i.e. with high TOC), not from material most representative of the transect.

152. Page 5-35, Para. 2

Delete the phrase: "Although it is not anticipated that any hazardous constituents will be present".

Change to reflect that: "Location for analysis will be determined by the field team in consultation with MDNR or MDNR oversite consultants."

153. Page 5-35, Para. 3

Delete the reference to Morrow Lake. The wording "significant concentrations above those detected in Morrow Lake samples" as a determination for whether or not additional sampling will be necessary, is unacceptable. Instead state that "The results should be compared to Ceresco Dam Impoundment and risk-based cleanup numbers. Any constituents detected at significant concentrations above those detected in Ceresco Dam Impoundment, or above risk-based cleanup numbers, should be further investigated. This determination will be made by MDNR."

154. Page 5-35, Para. 4

See comment #141.

155. Page 5-36, Para. 2

The work plan needs to increase the intensity of the study using the grid system. However, the three to five transects proposed in the work plan were determined to be extremely insufficient.

Use 100 year flood elevation, not 50 year.

Incomplete sentence: "Field observations including the lithology of the samples."

156. Page 5-38, Section 5.4.3.6

See comment #141.

Delete reference to Monarch Mill Pond in determining the "significant concentration" or using this as background. Instead state that "The results should be compared to Ceresco Dam Impoundment and risk-based cleanup numbers. Any constituents detected at significant concentrations above those detected in Ceresco Dam Impoundment, or above risk-based cleanup numbers, should be further investigated. The MDNR will determine if additional activities are appropriate."

157. Page 5-38, Para 2

Paragraph needs to be reworked.
Are they proposing to composite these samples? Discrete samples are preferred.

Samples should be collected near where the seeps and contamination have previously been identified.

Use of Monarch Mill Pond as background reference for Portage Creek is unacceptable.

158. Page 5-39, Para. 2

Delete this paragraph. MDNR disagrees with this characterization of the existing data base produced by Limno-Tech, Inc.

159. Page 5-39, Para. 3

State clearly how many samples will be collected for analysis and at what depths. The sampling must go into the underlying soils.

160. Page 5-39, last paragraph continuing onto 5-40

Sampling in the residential areas for gathering Risk Assessment information is fine. The MDNR will use the future residential scenario which will include an assumption that contaminated areas of Allied property will be developed for residential use.

161. Page 5-40, Para. 1

The rationale for location of borings RP-1 through RP-5 needs to be included in this paragraph. Make clear the purpose for choosing these and only these locations for sampling in this area. What documentation do we have for stating that these lots were filled? Where was the fill obtained (i.e from an outside source or from the Bryant Mill Pond area)?

162. Page 5-40, Para. 2

The first sentence should read as follows: "A groundwater monitoring well (BPMW-1) screened in a shallow...").

163. Pages 5-40 and 5-41

The discussion here about monitoring wells and groundwater sampling should be moved to Section 5.4.2 - Hydrological Investigations.

164. Page 5-41, Para. 1

The first sentence should read as follows: "The data... to groundwater in this direction".

165. Page 5-41, Para. 3

There is no "PC-1" on Fig 10.
Change "preliminary assessment" to "investigation".

166. Page 5-41, Para. 4

The number of samples is inadequate for this area and more samples should include the full scan CLP-TCL/TAL analyses.

Figure 10 reference should be changed to Figure 3.

167. Page 5-41, Para. 5

Use 100 year flood elevation, not 50 year.

168. Page 5-42, Section 5.4.3.8

The investigation at the King Street Storm Sewer needs to be expanded to include sampling of the dike walls at the King Street Landfill and the King Mill. In 1987, sampling conducted by the MDNR (samples split with Georgia Pacific), found PCBs at up to 57 mg/kg in surficial soil samples from the base of the dike wall. The extent of contamination along the base of the dike wall has not been adequately characterized. Sampling should be conducted along the base of the dike walls and a few soil borings should be collected through the dike wall to determine the extent of contamination.

169. Page 5-42, Para. 4

What is meant by "qualitatively" in the second to the last sentence of paragraph? Analyses should be run to quantify this information.

170. Page 5-43, Para. 4

The work plan states that data is being collected for estimating material transport. What model will be used to estimate materials and PCB transport? The model selected must be approved by MDNR before being employed.

171. Page 5-44, Para. 3

At least one additional sampling station should be added to the event and baseline sampling just downstream of Lake Allegan. The water column concentration of PCBs has been found to be highest in the Kalamazoo River just downstream of Lake Allegan. This will be a factor in evaluating remedial alternatives.

172. Page 5-45, Para. 3

"Describe" in the first sentence should be "described".

173. Page 5-45, Para. 4

One rain event sample from each water sampling location must be screened for the CLP-TCL/TAL for comparison to base flow samples.

174. Page 5-46, Para. 1

The detection limit for PCBs in water samples should be 0.01 ppb and 500 ppb for the soil/sediment samples. Do not use the wording "suitably low detection limits".

175. Page 5-47, Biota Investigation

Biota investigation proposed in the work plan is insufficient. Direction from the MDNR forthcoming.

176. Page 5-48, Background Section

PCB levels in fish collected will be compared with other PCB levels reported in the literature.

177. Page 5-49, Para. 3

"Moderate" should be replaced with "elevated". What is the bearing of the FDA guideline of 2 mg/kg PCBs? Presumably fish tissue concentrations will be compared to other ARARs including MDNR Surface Water Quality Standards including the Cancer Risk Value (CRV).

178. Page 5-50, Para. 2

The work plan indicates that if a complete sample of each target species cannot be obtained at each location, an alternative species will be used to complete the sample. The results of two different species cannot be averaged together for statistical analyses. If it is necessary to substitute an alternate species, a complete sample of twelve of that species must be collected.

179. Page 5-51, Fish Sampling Locations

Our experience on site indicates that it may be difficult to obtain the desired species from Monarch Mill Pond. The Mill Pond is heavily sedimented and the upstream area of Portage Creek is a trout stream.

180. Page 5-52, Para. 6

It may be inappropriate for the Monarch Mill Pond to be used for determining background PCB concentrations in fish.

181. Page 5-54, Para. 1

Mapping should include areas of ecological importance.

182. Page 5-54, Risk Assessment

As stated in the enclosed Ecological Assessment work plan (Attachment 2), the components of the human health risk assessment may also be applicable for the ecological assessment. For example, an exposure assessment for fish consumers other than humans could be performed (see page 5-59).

183. Page 5-55, Section 5.5.3

MDNR will develop exposure scenarios as well as perform risk calculations.

A survey of agricultural and industrial water users should be conducted to provide information for exposure assessments.

184. Page 5-59, Para. 2

What is the purpose of the angler survey?

185. Page 5-60, Section 5.5.4

The MDNR will prepare the toxicity assessment.

186. Page 5-60, Section 5.5.5

Delete the last 2 sentences.

187. Page 5-62, Section 5.8

Revision of documents should not be submitted as "Final" and distributed without MDNR approval. Revisions should be submitted as "Draft" until MDNR formally approves document. PRPs are directed to paragraph 29 of the AOC for guidance on this issue.

188. Page 5-62, Section 5.9

Note that MDNR has prepared the Community Relations Plan. Delete "...and will be subject to review...of the plan".

189. Page 5-63, Para 2

Typo in the second sentence of paragraph ("will").

190. Page 5-64, Section 5-11

Task 1. "Description of Current Situation", does not describe the nature and extent of contamination. This is to be determined during the RI. Changes to the "original project scope" need be justified only by stating that RI work will characterize the nature and extent of contamination. It is inappropriate and incorrect for this document to state that the agencies must justify looking at anything outside of what is talked about in the "Description of Current Situation". The MDNR is not bound by the area addressed in the "Description of Current Situation".

191. Pages 5-68, 5-69, Section 5.15.2

The text in this section rambles. Use discussion directly from the NCP.

192. Pages 5-69, 5-70, Section 5.15.3

Use definitions from NCP. The MDNR will not approve, and U.S. EPA will not concur with document's approval, if text incorrectly paraphrases requirements of the NCP.

193. Tables 3-1 through 3-3

Delete these tables from work plan. They are more appropriate in the RI or FS Reports. Also check for references to the tables in the text.

194. Table 5-1

The work plan parameter list in this table does not include Dibenzofuran and Dioxin. These parameters should be included in the sludge analysis plan.

195. Table 5-2

This table should be revised to include the air quality pathway investigations.

196. FIELD SAMPLING PLAN

Specific comments on Section 2 Sample Location and Designation and Section 3 Sampling and Field Procedures will not be significant since the text reviewed requires considerable rewriting to support the revised work plan.

Be consistent with PRP name (i.e. "study group" instead of "sponsor group").

197. Page 1-2, third listed goal

Need to define both horizontal and vertical extent of contamination. This should be clearly stated.

Other screening devices, besides the HNu (or other PID), are needed.

198. Page 3-4, Para. 2

The screened portion of the monitoring well should be a maximum, not a minimum, of 5 feet in length, unless there is a highly fluctuating water table.

199. Page 3-6, Section 3.8

Pump testing is preferred by the MDNR. However, because of the extensive redrafting needed on the work plan, the evaluation of the use of data from a slug test (rising head test) to calculate estimates of the hydraulic conductivity can not be adequately evaluated at this time.

200. Page 3-7, Section 3.9

Where is the air monitoring for other chemicals of concern (i.e. PCBs)?

201. Appendix A, Page A-6

It is unacceptable to dispose of soil boring cuttings and sod in plastic bags, even though temporary. This material should be placed in the 55 gallon drums, immediately. Also, state how the PRPs will determine proper disposal of the waste soils.

202. Appendix B, Page B-7

Equipment cleaning procedures:

Step three: When analyzing for organic contaminants, the preferred solvent rinse is methanol.

The last step when analyzing for inorganic contaminants should be a rinse with distilled water instead of tap water.

203. Appendix D, Page D-1

List all constituents that the PID will be used to detect.

204. Appendix D, Page D1-1, Section II

Again, list all constituents that the HNu will be used to detect.

205. Appendix E, Page E-1

Either PVC or stainless steel may be acceptable for well construction. However, this will be a well specific determination and a lot depends on the conditions found at the different areas of the site.

206. Appendix G, Page G-1, Para. 1

Bailing is an unacceptable well development technique.

207. Appendix J, Page J-1, Para. 1

No wells should be sampled until at least two weeks, not one week, after well development.

208. Appendix J, Page J-5, #13

Instead of stating that "the required purge volume of water" will be removed from the well during purging, be more specific and state that the well will be purged until the pH, conductivity, and temperature have stabilized, and give a minimum volume with contingencies to conduct more purging if the MDNR determines it is necessary.

209. Page 0-2, Section III

Sample collections for Bryant Mill Pond need to be combined with a mark and recapture study to ensure fish sampled in Bryant Mill Pond have been resident there for some time. Past studies found that when we marked fish in April and collected samples in July, a large number of fish captured in July, were unmarked. Only marked fish should be collected for analysis. The fish sampling should be conducted in July and August for comparison to historical data.

The fish sampling should target site ranges similar to those collected historically at each sampling site to allow for comparisons.

210. Page 0-4, Number 3

The standard edible portion for smallmouth bass is skin-on fillets with scales left on. All of the species listed under skin-on fillets in GLEAS Procedure 31 are processed with scales on.

211. Appendix P

The point source samples should be 24-hour composite samples except for volatile organics which should be grab samples.

HEALTH AND SAFETY PLAN

212. There must be a written respiratory protection program for the selection, use and maintenance of the respirators which will be used at the site. The written program must be in accordance with OSHA 29 CFR 1910.134. If a corporate plan has been written, it must be available to all site personnel.

213. There should be a statement in the HASP that all work performed over or near water will comply with OSHA 29 CFR 1926.106.

214. Specifically, what monitoring equipment will be used? What probes will be used? What is the frequency of monitoring? Where will monitoring be performed, in the breathing zone? How and when will the equipment be calibrated? This is all required information that must be in the HASP.

215. There was no discussion of setting up support, decontamination, and exclusion zones. Where will they be located? They must be clearly designated at the site.

216. Page 4-3 states a sustained reading of 5 PID units will trigger an upgrade to Level C. What if a sustained reading of 4 units is noted? The TLV for benzene and TCE is 1 ppm. MDNR recommends specific monitoring for these chemicals. If this is not performed, the upgrade action level should be set at any sustained PID reading above background.

217. The HASP should also reference the OSHA expanded standards for benzene 29 CFR 1910.1028; and lead 29 CFR 1910.1025. These regulations must be adhered to at the site.

218. Table 6 should indicate chromium and lead as suspected carcinogens.

OTHER COMMENTS

219. Due to the extensive redrafting necessary on the work plan the Historical Data QA/QC Plan, Data Management Plan and Permitting Plan should also be redrafted accordingly and submitted for review with the other deliverables.

Attachment 1

WMD/MDNR DRAFT GUIDANCE
MAY 1988

- Act 64/RCRA Clean Closure
- Real Estate Transactions
- Non-Act 64/RCRA Facilities
- Clean Declaration

HOW CLEAN IS CLEAN?

The State of Michigan has a straight forward position on the question of restoration of groundwater contaminated by an illegal discharge, how much clean-up is required when closing a hazardous waste facility (clean closure), or cleanup of a spill of hazardous materials. State Law, Act 245 and the associated "Groundwater Regulations" require restoration of a contaminated aquifer to its original condition (see paper by J. Bails entitled Aquifer Restoration, March 8, 1984).

Although some proposals will be made to leave some level of contaminants in the soils or groundwater, our position must be that contaminants be removed to non-detectable or, in the case of materials which naturally occur in soils, background levels. Soils and/or groundwater sampling must be included in any cleanup or closure to demonstrate that the site has been effectively restored to its original condition. Cleanups to any other level must be carefully worked out with Enforcement staff input and approval, taking into account applicable regulations and legal responsibilities. Waste and/or soil removed should be classified for disposal as hazardous or nonhazardous to determine disposal options and handling requirements (i.e. solid waste under Act 641 versus a hazardous waste under Act 64).

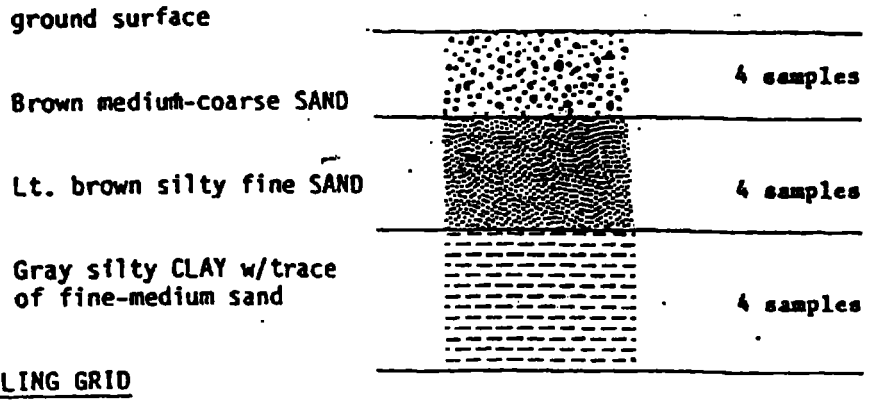
The following are recommended procedures for evaluating a proposed cleanup and site restoration. These procedures are not "absolutes". Other approaches may be developed and submitted for approval. This system, if used, however is acceptable.

A. ESTABLISHING SOIL BACKGROUND

1. Background should be established for site specific waste constituents or specific chemicals used in various processes or facility operations. These should fall into three general categories: a) the EP toxic METALS (arsenic, barium, cadmium, chromium, copper, lead, mercury, silver, selenium and zinc) using a total metals (dry-weight mg/kg) test procedure for the soil analysis, b) ORGANIC CONSTITUENTS, and c) other SITE SPECIFIC WASTE CONSTITUENTS (example Cyanide) as totals.

2. A bare minimum of 4 samples should be used to establish "background" in soils to account for natural occurrences and variability within each distinctive soil horizon. Background samples must be collected in an "uncontaminated" area. Based on waste type, contaminant mobility, operation practices and soil type (sand, silty sand, clay) an estimate of contamination depth should be made and background samples taken at comparable depths. Multiple soil horizons should have "background"

established separately (i.e. minimum 4 samples per each soil unit).



B. SAMPLING GRID

1. A grid system should be established over the specified closure area. Grid point representation should be proportioned to size of area for equal weighting. It is recommended that one of the following equations be used to determine grid intervals for stationing.

using: 1) $\sqrt{\frac{A\pi}{GL}} = GI$ or 2) $\sqrt{\frac{A/\pi}{2}} = GI$

"large site" "small sites"

where: GL = length of area to be gridded
A = area to be gridded (sq. ft.)
GI = grid interval

The first equation results in an extremely heavy weighting for small sites but good representation for large areas and the second equation results in a very light weighting for large sites but good representation for small sites. It appears that some boundaries for applying these equations to various size ranges of sites is appropriate. Possible ranges could be a) 0-0.25 acres, b) 0.25-3.0 acres and c) 3.0 acres and greater.

To even further simplify this application we have developed a chart based on an average size range of sites (1 acre = 43,560 sq. ft.).

Site Acreage	Sq. Feet	Grid Interval
0.001-0.25	43-10,890	20 ft. (minimum 9 sample stations)
0.025-3.00	10,890 - 130,680	40 ft.
3.00 +	130,680 +	60 ft.

"Large size" sites (over 10 acres) — Use equation #1

2. Sampling format should include either a) all grid point stations as determined by B.1., or b) using the Systematic Random Sampling Method as referenced in SW-846, Section 9.1.1.3.3, or c) using an approved "phased" method of the grid coverage as determined in B.1.

3. Depth increments would be dependent on type of subsurface soils. For soil testing within the contaminated area we would generally recommend using 0.25-0.5 foot depth intervals for clays and 1.0 to 5.0 foot depth intervals for silts-sands. The selection of depth increments would also depend on initial soil contamination concentrations (i.e. at ground surface), mobility of contaminant, or height of liquid head on ground surface. Samples collected from specified depth(s) could be either single or in multiple replicates.

C. ORGANIC CONSTITUENT EVALUATION

1. Usually, non-detectable levels would be used to delineate clean versus contaminated soils. The following analytical methods are to be used on soil samples:

   a. For volatile organics, sample preparation should follow EPA SW-846 techniques (8.24, 8.82 or 8.83). Sample collection, preservation and handling is to be referenced to appropriate Method 8010, 8015, 8020, or 8030 for pertinent information. Analysis should be done following EPA Methods 5020 (head space) or 5030 (purge & trap) using EPA validated methods 601, 602, and/or 624 accordingly.

   b. For extractable compounds, sample preparation should follow EPA techniques (8.85 or 8.86). Procedures should be completed following EPA Methods 3540 (Soxhlet) or 3550 (Sonication). The resulting extract should be analyzed following the conditions described in EPA Method 625.

2. The quantitative limit of detection is defined as: st/sb =3.0, where st is the gross analyte response and sb is the average instrument background single response (noise). The instrument background signal response (sb) is based on the height of peak to peak response of the baseline in an area close to the actual or expected analytic peak. The detection limit is defined as the quantity of the analyte which produces a signal response greater than or equal to three (3.0) times the background instrument noise.

3. An alternative method which uses background levels in native soils may be used as a baseline for measuring contamination. Such an alternative method must be approved by the Waste Management Division in writing.

If background sampling has established organic compounds in soils (e.g. coal fragments will given off naphthalene) then contamination would be determined by using a Student's T-test at the 99% level of confidence or other approved statistical method.

D. HEAVY METALS EVALUATION

For metals (for example: As, Ba, Cd, Cr, Cu, Pb, Hg, Ag, Se, Zn, Ni and Mn), it is recommended to use a total metals (dry weight basis mg/kg) test procedure to minimize additional sources of variation since these constituents are naturally occurring. After background is established as per section A.2., contamination would be determined by using a Student's T-test at the 99% level of confidence or other approved method to compare background data to the suspect samples. Any statistically significant increase above background will be considered contaminated.

Sample collection, preservation, handling and preparation is to be referenced to EPA Method 3050. Analysis is to be by flame or furnace atomic absorption spectroscopy. Attachment 1 is a summary of typical soil levels on a State-wide basis for comparison purposes only.

E. WASTE SPECIFIC CONSTITUENTS

For inorganic constituents and waste specific constituents we recommend use of total analysis (dry-weight basis) to minimize additional sources of variation since some of these constituents may be naturally occurring. After background is established (see A.2.), contamination would be determined by using a Student's T-test at the 99% level of confidence or other approved statistical method.

F. STATISTICAL COMPARISONS

1. The t-test should be an "approved" method since there are a number of variations. We recommend the Gosset Student T-test (1908) where:

$$t = \frac{|\bar{x} - \bar{y}|}{\sqrt{S\,\frac{1}{N} + \frac{1}{M}}} \qquad \text{with } S = \sqrt{\frac{M(s_1)^2 + N(s_2)^2}{N + M - 2}}$$

and / / denotes the absolute value sign, S represents the standard deviation, with N being the population of s_2 and M the population of s_1, N + M - 2 the degrees of freedom and s_1, s_2, ... s_n are the sample standard deviations.

2. Cochran's Approximation to the Behrens-Fisher Student's t-test is also available for evaluating background variance versus exceedences (i.e. contamination) as referenced in the 40 CFR 264, Appendix IV. Note this statistical comparison method does

require sample data at each station to be two or more samples. No composite samples. (n 2)

3. Average Replicate T-test (TEGD Sept. 1986)

4. Using mean and variance of background values to establish an upper limit for delineating significant concentrations such as:

   a) x + 3S of "background" data as the maximum allowable limit, where 3S equals three times the standard deviation, and $\bar{x}$ equals the mean. Note this statistical method only requires one sample per station.

5. For non-detect values, it is recommended to use either of the following procedures for any of the preceding statistical methods:

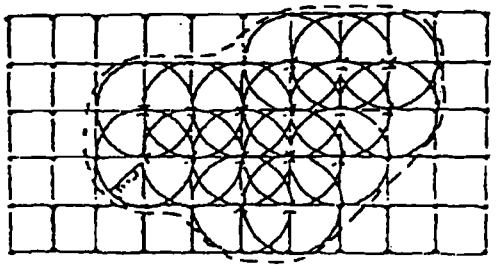
   a) alternate "0" and detection value (dv) for a net value of half the detection value with a variance, or

   b) the Continuity Correction procedure with the t-test, where if background data is non-detect then use S = ½ dv. Attachment 2 is a summary explanation for performing the t-test with Continuity Correction.

G. EXCAVATION

Excavation of contaminated areas should be based on the established grid system interval (as recommended in B.1). The radius of excavation around the contaminated sample point(s) is equal to the grid interval (GI = r). Excavation depth would be to the deepest point of contamination. After excavation, the grid must be resampled to verify that the area is free of contamination. If continued contamination is detected, the excavation format is repeated until a satisfactory result is obtained.

Example:



GL = 150
A = 11,250
GI = 15.3

° Sample Station
x Contaminated Station
r = GI = 15 feet

Contaminated soil removal in granular non-cohesive soils may stop at the water table, if encountered, except all waste material must be removed even if it is below the water table. If contaminated soils remain, groundwater monitoring must be done to check for contamination. If contamination is found, groundwater purging or some other method of plume management must be developed, approved and implemented.

H. DISPOSAL OPTIONS

Disposal of excavated waste or soil, and purged groundwater must be in accordance with all applicable State regulations. For example, air stripping of contaminated groundwater requires a permit from Air Quality Division. Disposal options in the following order of preference include:

1. Removal for incineration
2. Removal for treatment
3. Removal for landfilling
4. In-place treatment/stabilization
5. Encapsulation/control migration

Proposals for new or innovative technologies or solutions will also be considered. Specific situations are discussed below for off-site disposal options according to the current Michigan regulations. It must be determined whether the waste and the facility in question is regulated or not under RCRA and Act 64 (Hazardous Waste Laws).

RCRA/ACT 64 REGULATED HAZARDOUS WASTE SITES

Waste Material

- Listed waste - must go to Act 64/RCRA permitted TSD
- Characteristic waste - Act 64/RCRA TSD, or if treatment renders material non-hazardous, to Act 641 landfill.

Soils

- Metal contamination - If EP TOXIC, or a listed metal, contaminated soils must go to an Act 64/RCRA TSD. If soil concentrations are not EP TOXIC but still above background, they can go to an approved Act 641 landfill only if the metal(s) of concern is not listed.

- Reactive - a determination that the contaminated soils do not meet the criteria set forth in 40 CFR 261.23(a),5. The test method is "Test Method to Determine Hydrogen Cyanide Released from Waste". Interim proposed method recommended by U.S. EPA SW-846 Section 7.3.3.2. Contaminated soils containing more than 250 ppm total cyanide may be considered reactive. If soils are found reactive, no landfilling is allowed. Soils/wastes must be pretreated to reduce cyanide concentrations so that the contaminated soils are not reactive.

- Organics - if listed waste contaminants, then soils are a hazardous waste by the mixture rules. If not listed, then soils should be tested for appropriate waste characteristic test to determine waste classification.

Attachment 2

REGION V SCOPE OF WORK FOR ECOLOGICAL ASSESSMENT

This Scope of Work should be properly integrated into the Scope of Work for the full Remedial Investigation. It is presented here as an independent document to better show the individual tasks involved.

Tasks 1, 2, 7, and 8 should be conducted for all sites. The need for Tasks 3-6, which involve more detailed ecological work not necessary for all sites, will be determined by the results of Task 2. This Scope of Work should be appropriately modified to meet the needs of individual sites.

Task 1. Characterize site based on existing data and limited field work, including:

1. Physical description of the site and its surroundings, including topography, hydrology, and other features of ecological interest such as soil types and disturbance history, including detailed maps.

2. Nature and extent of contamination by medium and contaminant type.

3. Identification of site-specific conditions pertinent to the evaluation of fate and transport processes occurring at the site, such as amount of soil erosion.

4. Identification of potential and probable exposure points for ecological receptors.

5. Habitats and species (including threatened and endangered species) potentially exposed to contaminants. Habitat descriptions should be based on available information and a field reconnaissance by a trained ecologist. Experts on local flora and fauna should also be consulted.

6. Any known or observed effects of site contaminants to biota, such as fish kills or other obvious impacts.

7. Data needed for further site characterization (to be collected in Task 1a).

Task 1a. If needed and authorized by site manager, further characterize site based on additional field studies, including:

1. Habitat identification and evaluation.

2. Qualitative and semiquantitative surveys of flora and fauna.

3. Toxicity tests.

4. Additional sampling to define contamination.

5. Identification of appropriate reference sites for comparison to each potentially exposed habitat.

Task 2. Prepare preliminary ecological assessment, including:

1. Initial identification of ecological receptors (from Tasks 1 and 1a).

2. Initial toxicity assessment of site contaminants. This initial assessment should be based on information gathered during the site characterization, literature-based information on contaminant fate and toxicity, available criteria and standards (e.g. Ambient Water Quality Criteria), and ARARs. The potential for adverse ecological effects from contaminant exposure should be assessed. This preliminary assessment will necessarily contain much uncertainty; a conservative approach should be used.

3. Determine the need for further studies to complete the ecological assessment. Some sites may not require additional studies, such as those where exposure to ecological receptors is known to be minimal. The site manager has the ultimate responsibility for determining the need for further studies and should consult ecological experts in making this determination. When the initial toxicity assessment provides ambiguous or uncertain conclusions, additional field data are needed (Tasks 3-6).

Submit interim report to site manager for review.

Not all sites will require Tasks 3-6. The results of Task 2 determine the need for these Tasks.

Task 3. Prepare detailed Work Plan for further site investigations, including, as appropriate:

1. Identification of ecological assessment endpoints. Endpoint selection criteria must be clearly explained.

2. Qualitative, semiquantitative, and quantitative surveys of flora and fauna.

3. Chemical sampling in potentially exposed habitats and reference sites.

4. Laboratory and *in situ* toxicity testing.

5. Tissue analyses.

For each proposed study above, provide:

a. Study objectives and relevance to overall risk assessment objectives. Study objectives could include documentation of actual or potential endangerment or effects to the environment, the definition of spatial and temporal extent of contamination, development of remediation criteria, or evaluation of ecological effects of remedial alternatives.

b. Proposed field or laboratory methods, with appropriate reference to Agency guidelines or other source.

c. Expected sampling locations (including detailed maps), sampling dates, and sample sizes.

d. Statistical methods to be used and data quality objectives to meet statistical significance criteria.

e. Quality control procedures.

Submit Work Plan to site manager for review and approval. Revise per site manager's direction.

Task 4. Conduct those studies approved by site manager for immediate execution. Submit interim report to site manager for review.

Task 5. Revise Work Plan per site manager's direction. Conduct next phase of studies as approved by site manager. Submit interim report to site manager for review. Repeat this step as needed.

Task 6. Prepare summary of biological and chemical data for review by site manager.

Task 7. Prepare draft ecological assessment report.

NOTE: Depending on the level of effort decided on by the site manager, not all of the specific elements listed below (those not in bold-face type) may appear in a given assessment. For instance, not all sites will require toxicity testing or the full array of quantitative field studies. The following outline should be modified to account for the studies actually undertaken at the site.

1. Site characterization and identification of potential receptors (include detailed maps where appropriate).

   a. Physical description of the site.

b. Nature and extent of contamination by medium and contaminant type.

c. Potentially exposed habitats and species.

2. Selection of contaminants and ecological endpoints of concern.

a. Contaminants of concern and rationale for selection.

b. Ecological endpoints of concern and rationale for selection.

3. Exposure assessment.

a. Sources and exposure pathways of contaminants of concern.

b. Fate and transport analysis, including possible food chain transport.

c. Estimation of exposure point concentrations by habitat, species, and exposure scenario.

d. Uncertainty analysis.

4. Toxicity assessment.

a. Toxicological properties of contaminants of concern.

b. Site-specific toxicity tests--laboratory and in situ.

c. Existing toxicity-based criteria and standards.

d. Uncertainty analysis.

5. Risk Characterization.

a. Observed adverse effects in potentially exposed habitats compared to reference sites, such as (but not limited to) mortality (observed on-site or in toxicity tests), behavioral effects, presence or absence of key species, reproductive effects, or altered community composition.

i. Analysis of contaminant concentrations in relation to observed adverse effects

ii. Predicted (or observed) population-, community-, and ecosystem-level effects of observed effects

b. Comparison of exposure point concentrations with relevant benchmark values. Possible additive, synergistic, or antagonistic effects of contaminant mixtures should be considered.

   i. Comparison with appropriate criteria (such as Ambient Water Quality Criteria) and standards (such as State Water Quality Standards)

   ii. Comparison with contaminant levels known to cause effects from published or peer-reviewed literature. Possible population-, community-, and ecosystem-level effects should be predicted based on these comparisons.

c. Likely ecological risks associated with present and future land use scenarios.

d. Ecologically relevant ARARs.

e. Ecological considerations in selecting remedial alternatives (including no action).

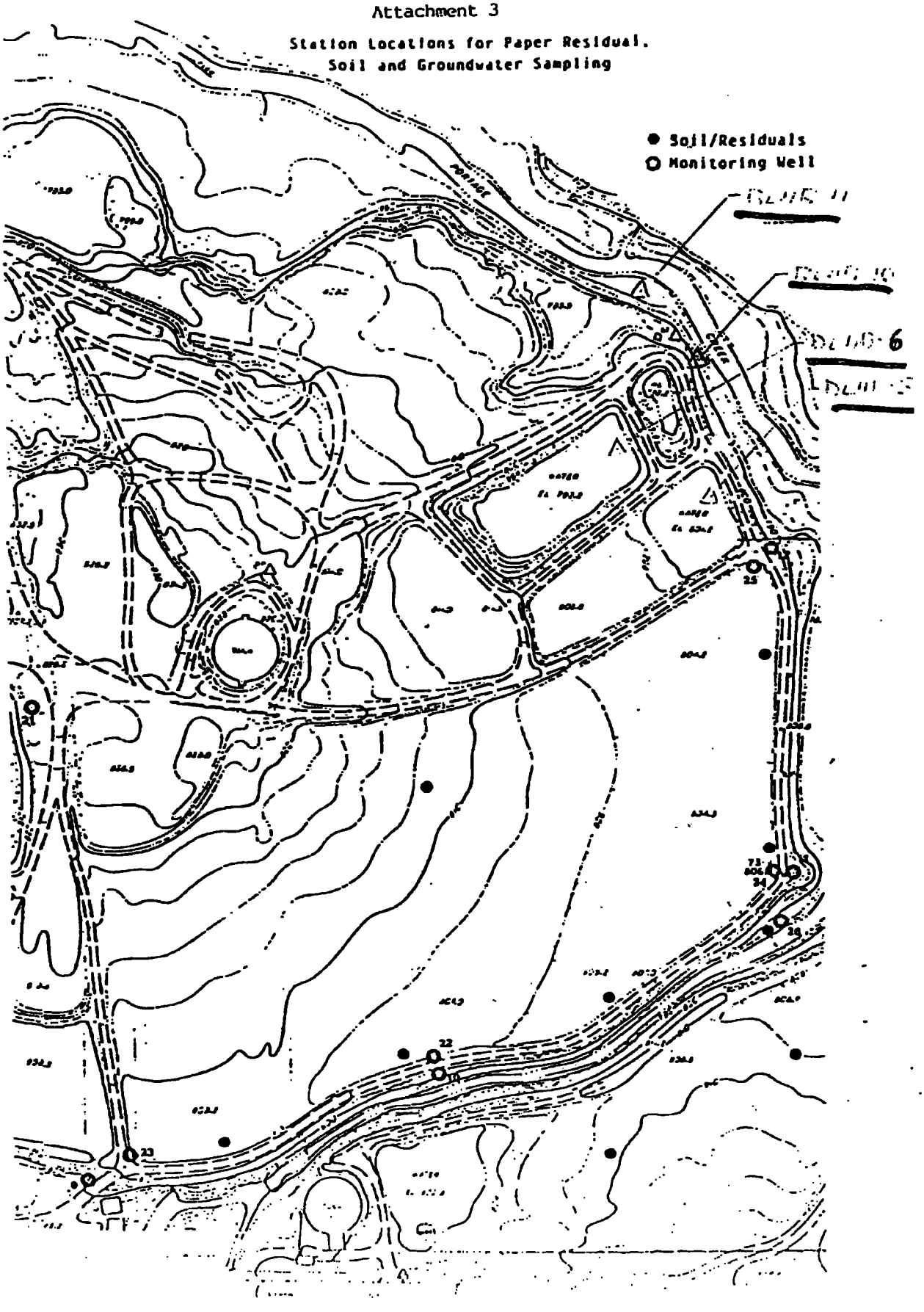
f. Uncertainty analysis.

Submit draft ecological assessment to site manager for review.

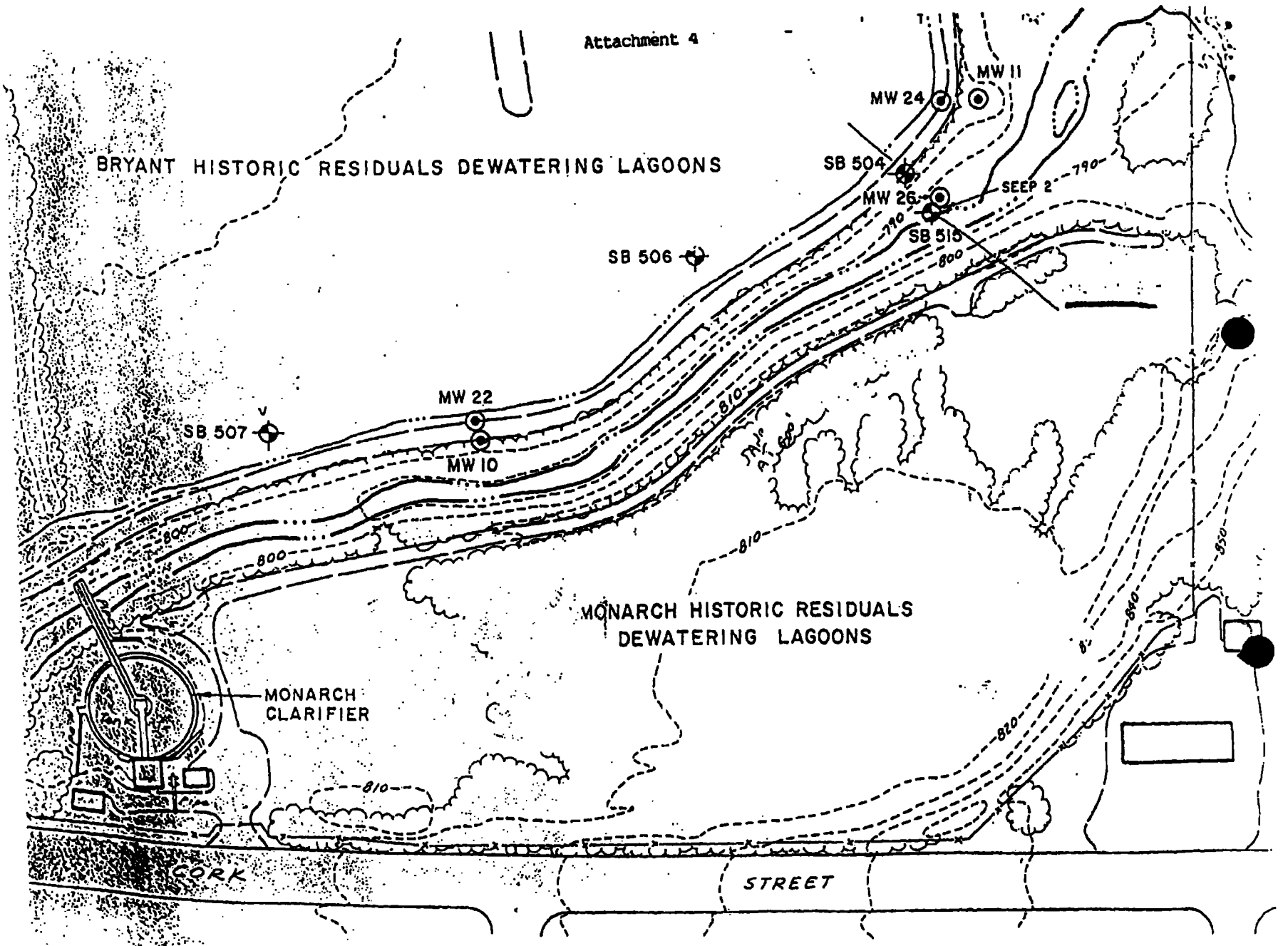
Task 8. Revise draft ecological assessment per site manager's review comments and submit final ecological assessment for inclusion in RI/FS.

Attachment 3

Station Locations for Paper Residual, Soil and Groundwater Sampling



Attachment 4



Attachment 5

List of Analytical Parameters for FCMP.

Standard Analysis (MDPH)

Hexachlorobenzene
Mirex
gamma-BHC (Lindane)
Heptachlor
Aldrin
Dieldrin
4,4'-DDE
4,4'-DDD
4,4'-DDT
Heptachlor epoxide
Oxychlordane
gamma-Chlordane
trans-Nonachlor
alpha-Chlordane
cis-Nonachlor
Octachlorostyrene
Pentachlorostyrene
Hexachlorostyrene
Heptachlorostyrene
Congener specific PCB's
PBB (FF-1, BP-6)
Toxaphene
Total Mercury

Polychlorinated Dibenzodioxins and Dibenzofurans

Dioxins

2,3,7,8-TCDD
1,2,3,7,8-PCDD
1,2,3,4,7,8-HxCDD
1,2,3,6,7,8-HxCDD
1,2,3,7,8,9-HxCDD
1,2,3,4,6,7,8-HpCDD
1,2,3,4,6,7,8,9-OCDD

Furans

2,3,7,8-TCDF
1,2,3,7,8-PCDF
2,3,4,7,8-PCDF
1,2,3,4,7,8-HxCDF
1,2,3,6,7,8-HxCDF
1,2,3,7,8,9-HxCDF
2,3,4,6,7,8-HxCDF
1,2,3,4,6,7,8-HpCDF
1,2,3,4,7,8,9-HpCDF
1,2,3,4,6,7,8,9-OCDF

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Remedial Investigation/ Feasibility Study Quality Assurance Project Plan

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Kalamazoo River Study Group

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

June 1993

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Remedial Investigation/Feasibility Study Quality Assurance Project Plan

Kalamazoo River Study Group

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

June 1993

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SUPERFUND SITE

REMEDIAL INVESTIGATION/FEASIBILITY STUDY
QUALITY ASSURANCE PROJECT PLAN

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REMEDIAL INVESTIGATION/FEASIBILITY STUDY
QUALITY ASSURANCE PROJECT PLAN

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PREFACE

This Quality Assurance Project Plan (QAPP) supports the Remedial Investigation/Feasibility Study (RI/FS) Work Plans, dated June 1993 (Work Plans) prepared on behalf of the Kalamazoo River Study Group (KRSG) by Blasland & Bouck Engineers, P.C. (Blasland & Bouck). This QAPP serves two functions: 1) to identify the protocols, and methods which will be employed to obtain quality data during the RI/FS, with respect to the data quality objectives; and 2) to set forth the methods to be used in the RI/FS field investigations.

This QAPP is the outcome of two prior QAPP submissions and subsequent review and comment by the Michigan Department of Natural Resources (MDNR) and the United States Environmental Protection Agency (USEPA) in addition to the discussion of those comments and project scope during a series of technical meetings with MDNR which concluded on January 5, 1993. Prior versions of the QAPP were submitted on March 27, 1991 (before the expansion of the project scope), July 8, 1992, and February 1993. Written comments from MDNR and USEPA on these versions were transmitted by MDNR on June 13, 1991, December 15, 1992, and May 12, 1993, respectively. This document reflects both the methods proposed by Blasland & Bouck and the requirements of MDNR.

Typically a QAPP is one volume in a two-volume Sampling and Analysis Plan (SAP) in which the first volume is the Field Sampling Plan (FSP) and the second volume is the QAPP. For the purposes of this study, however, the Site has been divided into several Operable Units, each of which has its own Work Plan and FSP. This QAPP is designed as an "Umbrella QAPP" to support the collective Work Plans and their associated Field Sampling Plans.

The umbrella QAPP concept was proposed by MDNR and USEPA to accommodate the large geographic scale of the Site, the present level of uncertainty regarding the ultimate extent of the investigation, and the uncertain status of field-screening procedures that might be applied to the Site. This umbrella QAPP provides an expanded set of methods, all of which are not presently proposed for use but which may be employed at sometime during the RI. The umbrella QAPP in this sense is also a menu of analytical methods and quality control (QC) procedures to support future phases of investigation as may be necessary.

Information which normally would be found in the QAPP, such as specific sampling requirements and locations and numbers of samples to be taken, will be found in the Operable Unit FSPs. The FSPs which are attached to the individual Work Plans provide the rationale for the locations and numbers of samples and analytes.

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SECTION 1 - PROJECT DESCRIPTION

1.1 Introduction

This Quality Assurance Project Plan (QAPP) documents the quality assurance/quality control (QA/QC) procedures to be followed in connection with the Remedial Investigation/Feasibility Study (RI/FS) at the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (Site). This volume presents a project description; proposed project organization and responsibility; objectives of the quality assurance program; an overview of both field-related and laboratory analytical QA/QC procedures; procedures for sample and document custody; calibration procedures and frequency; data assessment procedures; and QA reporting. (A reference list of acronyms used in this document is provided following the Reference section).

The QAPP was prepared utilizing the United States Environmental Protection Agency (USEPA) reference documents: Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA - Interim Final (USEPA/540/G-89/004); and Preparation Aids for the Development of Category 1 Quality Assurance Project Plans (USEPA/600/8-91/003).

This QAPP supports five Work Plans and Field Sampling Plans (FSPs). The Site has been divided into four Operable Units as well as the River and Mill investigations. As an "umbrella QAPP", site-specific sampling information such as sample locations and numbers that would normally be found in the QAPP are found, instead, in the individual FSPs.

This QAPP does, however, include details on sampling and field procedures, sample handling and documentation, and field QA/QC.

The procedures specified herein will be used for sampling soil, paper-making residuals, sediment (in-stream and floodplain), groundwater, surface water, and air.

1.2 Objectives

The overall objectives of the RI/FS are to:

- Assess the presence and distribution of polychlorinated biphenyls (PCBs) and other constituents, as necessary, within the Site;
- Evaluate the potential for migration of PCBs and other target constituents, as necessary, from the sediments of Portage Creek and Kalamazoo River and other areas to be investigated;
- Determine the potential risks to public health and the environment from the PCBs and other identified constituents associated with the Site; and
- Develop and evaluate potential remedial measures to address concerns at the project Site.

These objectives are more focused than those for a typical RI/FS because significant work efforts have been previously performed by others to characterize the Site. Specific information on the use of data from all tests to be performed is provided in the Work Plans.

1.3 Site Description

The Allied Paper Inc./Portage Creek/Kalamazoo River Superfund Site is located in the mid-section of the Kalamazoo River watershed, within Kalamazoo and Allegan Counties, Michigan. As described on the National Priorities List (NPL), the "NPL Site" includes 35 miles of the Kalamazoo River from the river's confluence with Portage Creek downstream to the Allegan City Dam, and

approximately 3 miles of Portage Creek from Cork Street to its confluence with the Kalamazoo River.

The RI will include additional areas both upstream and downstream of the NPL Site. The entire area subject to RI activities is referred to as the "Site". The Site includes approximately 75 miles of the Kalamazoo River from Morrow Lake to the mouth of the river at Saugatuck and 3 miles of Portage Creek, in addition to the following areas:

- Portage Paper Mill and property;
- Former King Mill property;
- Georgia-Pacific Corporation Kalamazoo Paper Division Mill and property;
- King Street storm sewer outfall;
- Simpson Plainwell Paper Company Mill and property;
- Allied Paper, Inc. Operable Unit;
- King Highway Landfill Operable Unit;
- Willow Boulevard/A-Site Operable Unit; and
- 12th Street Landfill Operable Unit.

The four operable units will each have separate Work Plans (Blasland & Bouck, 1993a-d), and an additional Work Plan will incorporate the remaining areas (Blasland & Bouck, 1993f).

Morrow Lake and Ceresco Dam Impoundment are located on the Kalamazoo River upstream of the NPL Site. Morrow Lake, which is apparently not influenced by current and former operations of the KRSG, would potentially serve as a source of baseline data upstream of the Site. Ceresco Dam Impoundment, located approximately 55 miles upstream of Morrow Lake, could potentially serve as a source of background data during the evaluation of remedial alternatives.

A more complete summary of the site description, site history, and previous sampling and analysis efforts is provided in the previously submitted Description of the Current Situation (Blasland & Bouck, 1992).

1.4 RI Work Tasks, Overview, and Rationale

The following details of the RI are provided in the individual Work Plans:

- Descriptions of field activities;
- Rationale for the selection of sampling locations;
- Assessments which will be conducted during the RI; and
- A project schedule.

Many of these activities require the collection of analytical data. The appropriate analytical procedures to achieve the required quality are presented in the following sections of the QAPP.

1.5 RI Data Quality Objectives

Data quality objectives (DQO) specify the quality of the data required to support the purpose and intent of the given sampling and analysis activity. DQOs are based on the intended uses for the data. As such, different data uses and needs may require different levels of data quality. USEPA DQO guidance (1987a and b) recognizes that the DQO components are contained within the various plans. Therefore, general project DQOs for the investigation are summarized in this section, with more detailed information provided in the RI Work Plans.

Preliminary DQOs were identified during RI scoping and incorporated into the development of the Work Plans, FSPs, and QAPP. Consistent with USEPA

guidance, preliminary DQOs were established to ensure that field investigations produce data of adequate quality and sufficient quantity to form a sound basis for decisions relative to the RI objectives. The DQOs may be refined as more information becomes available.

The intended uses and DQOs for each parameter investigated are summarized in Tables 1-1, 1-2, and 1-3, for water, soil/sediment/paper-making residuals, and air, respectively. The DQO summary for each investigation presented in the tables integrates DQOs relative to the following components:

- Investigation objectives;
- Data uses;
- Data types;
- Data quality;
- Data quantity;
- Sampling and analytical methods; and
- Data precision, accuracy, representativeness, completeness, and comparability (PARCC parameters).

A brief discussion of each of these DQO components is provided below.

1.5.1 Investigation Objectives

The Administrative Order by Consent (AOC) for the NPL Site specifies that the RI will be conducted to characterize the Site and the actual or potential hazard to public health and the environment. The site investigation will also result in data of adequate technical content to assess preliminary remedial alternatives and support the detailed evaluation of alternatives during the FS.

Six goals were identified in the AOC:

- Fully characterize the chemical nature of the materials at the Site;
- Define identifiable constituent sources at the Site;
- Determine the vertical and horizontal extent of chemicals originating at the Site;
- Spatially quantify constituents to the extent necessary to enable preparation of an Endangerment Assessment and a FS, and to the extent that such constituents may be attributable to the Site;
- Identify constituent migration pathways and movement; and
- Quantify public health and environmental risk.

Generally, the data generated during the RI will be used to determine the distribution and fate and transport of PCBs within the environs such that: 1) risks to human health and the environment (if any) can be determined and the need for remediation assessed; and 2) a FS to evaluate potential remedial alternatives can be performed.

Additional chemicals will be analyzed to evaluate potential additional environmental/biological concerns present at the Site.

1.5.2 Data Uses

For the RI, data will be used for the following general purposes:

Site Characterization - Data are used to determine the nature and extent of constituents at a site. This category usually requires the largest data collection effort. Site characterization data are generated through the sampling and analysis of potential sources and environmental media.

Health and Safety - Data are typically used to establish the level of protection needed for investigators or workers at a site, and if there should be an immediate concern for the population living within the site vicinity.

Risk Assessment - Data are used to evaluate the threat posed by a site to public health and the environment. Risk assessment data are generated through the sampling and analysis of environmental and biological media, particularly where the potential for human exposure is great.

Evaluation of Alternatives - Data are used to evaluate various remedial technologies. Engineering data are collected in support of remedial alternative evaluation and to develop cost estimates. This may involve performing bench-scale or pilot-scale studies to determine if a particular process or material may be effective in mitigating site chemicals.

Engineering Design of Alternatives - Data collected during the RI/FS can be used for engineering design purposes to develop a preliminary data base in reference to the performance of various remedial technologies. Data types collected during the RI/FS which are applicable to the research and design process include waste characterization and preliminary volume estimates.

Potentially Responsible Parties (PRP) Determination - Data may be used to help establish the source of constituents. Data are used to link constituents found on a site to chemicals found in the environment.

Data uses for each parameter to be analyzed are summarized in Tables 1-1 through 1-3.

1.5.3 Data Types

Data types refers to the categories of data which are included in the RI. The Work Plans provide discussion of data types and the rationale for their inclusion. Summaries of the various media and parameters that will be sampled for the RI are provided in Tables 1-1 through 1-3.

1.5.4 Data Quality

To provide the appropriate level of data quality for the intended data uses, DQO guidance (USEPA, 1987a) identifies five general levels of analytical options available to support data collection activities. These levels are distinguished by the types of technology and documentation used, and their degree of sophistication. For this RI, an expanded interpretation of the various levels is provided below:

Level V - Non-Standard Methods: Analyses which may require method modification and/or development. Contract laboratory program (CLP) Special Analytical Services (SAS) are considered Level V. Level V support is used to provide data that cannot be obtained through standard methods. Analysis of samples at this level may involve research, development, and documentation of a new method or the modification of an existing method. No Level V analyses are anticipated at this time.

Level IV - CLP Routine Analytical Services (RAS): This level is characterized by rigorous QA/QC protocols and documentation and provides qualitative and quantitative analytical data. The use of SW-846 Methods with CLP requirements for documentation provides a Level IV equivalent data package (USEPA, 1991a; USEPA, 1991b). For example, in this RI, PCB samples will be analyzed using USEPA SW-846 Method

8081 (USEPA, 1990), as provided in Appendix S, with CLP type documentation (USEPA, 1991a). All Target Compound List/Target Analyte List (TCL/TAL) and polychlorinated dibenzo-p-dioxins/polychlorinated dibenzofurans (PCDD/PCDF) analyses also fall under this category. Level IV data are typically used for the confirmation of lower level data, risk assessment, and to obtain highly documented data.

Level III - Laboratory Analysis using Methods other than the CLP RAS: This level involves the use of standard USEPA approved procedures. Some procedures may be equivalent to CLP RAS containing the same rigorous QA/QC protocols as used in Level IV analyses, but without the CLP requirements for documentation (USEPA, 1991c; USEPA, 1991d). Level III data are used for site characterization, environmental monitoring, confirmation of field data, and to support engineering studies. Level III analyses can be used to provide data for risk assessment requirements. The supplemental parameters such as total organic carbon (TOC), oil and grease, chloride, and sulfate would fall under this category.

The documentation available depends on the type of analysis requested.

Level II - Field Analysis: Level II field analyses are characterized by the use of portable analytical instruments which can be used on-site or in mobile laboratories stationed near a site (close-support labs). Qualitative and quantitative data can be obtained, depending upon the types of contaminants, sample matrix, and personnel skills. Level II data are used to provide "quick turnaround" results for ongoing field activities or where initial data will provide information for further

investigation. Field gas chromatograph (GC) analysis would be considered Level II. Level II data are typically confirmed by submitting a select number of duplicate samples (generally 10 to 20 percent) for Level III or IV analyses. No Level II analyses are proposed at this time.

Level I - Field Screening: This level is characterized by the use of field instruments and field chemical kits which can provide real-time data to assist in the optimization of sampling point locations and for health and safety support. Level I data can be used in refining sampling plans and determining the extent or presence or absence of contaminants at a site. Field measurements such as pH, temperature, and conductivity are Level I analyses. Immunoassay techniques are also technically considered Level I analyses; however, they can be used in certain cases as Level II equivalents. In these cases, the analyses would take place in the field as in Level II with a certain percentage being confirmed with Level III or IV analyses. Details on the specific applications for immunoassay are presented in the Work Plans.

Data quality levels for this RI are identified in Tables 1-1 through 1-3.

1.5.5 Data Quantity

Previous data was used to the extent possible to identify data quantities required. The rationale for specific sample locations and quantities is provided in the Work Plans.

The RI will include sampling of soils, residuals, sediments, surface water, groundwater, leachate, and air for analysis for target chemical constituents or groups of constituents, specifically PCBs and the TCL/TAL parameters. The intent of such efforts will be to assess the presence, extent, and concentrations of the constituents in the medium in question.

The data will be used both for site characterization and for risk assessment purposes.

Due to the intended data uses, the analyses for these constituents will be performed at Level IV.

In addition to analysis of target constituents, samples may also be analyzed for certain supplemental parameters. For example, soil/sediments/residuals may be analyzed for TOC to aid in the assessment of gradients in PCB concentrations. Surface water samples may be analyzed for total suspended solids (TSS) and/or dissolved suspended solids to estimate the amount of suspended solids in transport in the water and the dissolved factor thereof. In other cases, surface water samples may be analyzed for parameters to characterize general water quality such as chloride, sulfate, nitrate, and alkalinity. Analysis for these parameters will be performed at Level III.

As part of some investigations, water samples will be analyzed in the field for specific conductivity, temperature, pH, dissolved oxygen (DO), and turbidity to characterize general water quality or to evaluate sediment transport. Analysis for the parameters will be performed at Level I.

1.5.6 Sampling and Analytical Methods

Sampling and analytical methods presented in the FSP and this QAPP were selected to provide the required data quality. A summary of the analytical methods that will be used for this RI is provided in Table 1-5.

1.5.7 Quality Control Parameters

Quality control parameters are measures of analytical QA/QC consisting of precision, accuracy, representativeness, comparability, completeness, and sensitivity. Each of these parameters is defined in Section 3. To evaluate

data precision and accuracy, QC limits provided in the methods will be utilized when available. Method-specified QC limits for PCB, PCDD, PCDF, and CLP TCL and TAL analyses are provided in Table 1-6 and 1-8. Guidelines for the assessment of supplemental parameters are provided separately in Table 1-7. The sample quantities and locations identified in the Work Plan have been chosen to insure data which is representative of the Site. USEPA-approved methods will be used to provide comparable data. Completeness of data will be assessed at the conclusion of the RI. Professional judgement is required to evaluate the acceptability of data for its intended purposes.

SECTION 2 - PROJECT ORGANIZATION AND RESPONSIBILITY

Blasland & Bouck Engineers, P.C. (Blasland & Bouck), maintains overall technical responsibility for conducting the site RI/FS. As such, Blasland & Bouck will perform the field investigations, prepare resulting data, provide QA/QC oversight, prepare the RI Report, assist in performing the baseline risk assessment, conduct the FS, and prepare the FS Report.

The direct management of the technical and administrative aspects of the RI/FS at the Site will be accomplished by representatives of the KRSG, Blasland & Bouck, MDNR, and USEPA Region V. To date, the following personnel have been assigned to this project:

Affiliation	Title	Name	Phone #
MDNR	Project Manager	Scott D. Cornelius	517-373-7367
MDNR	Assistant Project Manager	Mary B. Geitka	517-373-9832
USEPA Region V	Remedial Project Manager	Terese A. VanDonsel	312-353-6564
USEPA Region V	Quality Assurance Manager	Valerie J. Jones	312-353-2306
MDNR, Camp Dresser & McKee	Project Oversight Manager	Franci Barker	312-474-1313
Blasland & Bouck Engineers, P.C.	Project Coordinator	Mark P. Brown, Ph.D.	315-446-9120
Blasland & Bouck Engineers, P.C.	Project Managers	Scott T. Saroff, CPG Patrick N. McGuire	315-446-9120
Blasland & Bouck Engineers, P.C.	Field Manager	Richard P. DiFiore	315-446-9120
Blasland & Bouck Engineers, P.C.	Surveying Manager	Terry H. Young, L.S.	315-446-9120
Blasland & Bouck Engineers, P.C.	Hydrogeological Investigations Manager	William T. McCune	315-446-9120
Blasland & Bouck Engineers, P.C.	Geotechnical Investigation Manager	Raymond D. D'Hollander, P.E.	315-446-9120
Blasland & Bouck Engineers, P.C.	Air Investigation Manager	Robert J. Kricks, Ph.D.	908-225-8484

Affiliation	Title	Name	Phone #
Blasland & Bouck Engineers, P.C.	Quality Assurance Manager	Laurie A. Johnston	315-446-9120
Blasland & Bouck Engineers, P.C.	File Custodian	Mark A. Fountain	315-446-9120

The majority of the analytical laboratory services for this project will be provided by Aquatec, Inc. (Aquatec) of Colchester, Vermont. Wadsworth/ALERT (WAL) of North Canton, Ohio, will serve as a backup laboratory. Triangle Laboratories, Inc. (Triangle) of Durham, North Carolina will analyze selected soil/sediment/paper-making residuals samples for PCDDs/PCDFs. Teledyne, Inc. (Teledyne) of Westwood, New Jersey will analyze selected sediment samples for Cesium-137 (Cs-137) radioisotope. Geotechnical analyses will be performed by a laboratory to be specified at a later date. To date, the following personnel have been assigned to this project component:

Affiliation	Title	Name	Phone #
Aquatec, Inc.	Laboratory Project Manager	Pauline T. Malik	802-655-1203
Aquatec, Inc.	Quality Assurance Officer	Karen R. Chirgwin	802-655-1203
Triangle Laboratories, Inc.	Laboratory Project Manager	Lorri White	919-544-5729
Triangle Laboratories, Inc.	Quality Assurance Officer	Donald Harvan	919-544-5729
Teledyne, Inc.	Laboratory Project Manager	Hewitt W. Jeter	201-664-7070
Teledyne, Inc.	Quality Assurance Officer	Jeffrey Guenther	201-664-7070
Wadsworth/ALERT Laboratories	Laboratory Project Manager	Kimberly J. Laisy	216-497-9396
Wadsworth/ALERT Laboratories	Quality Assurance Officer	Kathleen R. Teuscher	216-497-9396

Detailed descriptions of the responsibilities of the project personnel including those identified above, as well as project staff of Blasland & Bouck

and the contracted laboratories are discussed below. Project organization is depicted on Figure 2-1.

2.1 Blasland & Bouck Engineers, P.C.

2.1.1 Project Coordinator

Mark P. Brown, Ph.D. is the RI/FS Project Coordinator for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. In this capacity he will work directly with the MDNR Project Manager to resolve problems encountered during the RI/FS and set the direction of future investigation activities.

Responsibilities and duties of the Project Coordinator include the following:

- Provide overall direction of Blasland & Bouck RI objectives/activities as defined in the Work Plans;
- Provide QA management of all aspects of the project within the responsibility scope of Blasland & Bouck; and
- Review RI Report, FS Report, and all other documents prepared by Blasland & Bouck.

Dawn S. Foster, P.E. and Robert K. Goldman, P.E. will serve as technical advisors to Dr. Brown. Mr. Goldman is a registered professional engineer in the state of Michigan. Gregory Peterson of Limno-Tech, Inc. will provide technical support to the Project Coordinator for the Remedial Investigations.

2.1.2 Project Manager

Responsibilities and duties of the Project Manager include the following:

- Provide overall management of RI/FS activities;

- Develop, establish, and maintain RI/FS files;
- Review data reductions;
- Perform final review of field data reductions and RI/FS activity reports;
- Assure corrective actions are taken for deficiencies cited during audits of RI/FS activities;
- Maintain overall QA/QC of the RI/FS;
- Instruct staff performing RI/FS activities; and
- Prepare the RI and FS Reports.

The Project Manager will be responsible for the production of the RI and FS Reports and for coordination of field work related to the Kalamazoo River and Portage Creek. The Project Manager will also have responsibility for overall coordination of analytical services, contractors, and data management, as well as overall coordination of hydrogeological investigations.

Scott T. Saroff, CPG, and Patrick N. McGuire are the co-managers for this project. Mr. McGuire and Mr. Saroff will receive hydrologic and statistical support from Charles R. Barnes. Dawn E. Penniman will provide engineering support.

2.1.3 Field Manager

Responsibilities and duties of the Field Manager include the following:

- Instruct field staff;
- Direct and participate in field work efforts;
- Coordinate field and laboratory schedules;
- Coordinate field activities with MDNR/USEPA and the oversight contractor;

- Work with MDNR/USEPA and the Oversight Manager to resolve problems encountered in the field during implementation of the FSPs and communicate field related problems to project management staff as appropriate;
- Review/approve the type of field equipment used and observe that procedures are followed to obtain the data quality objectives;
- Review the field instrumentation, calibration, and maintenance records to meet data quality objectives;
- Review field notebooks/logs with respect to completeness, consistency, and proper verification;
- Prepare draft field reports, including summary of field activities, with an evaluation of internal field audit results; and
- Maintain field files of sampling notebooks and any data reduction/ calculations, and transmit originals to the Blasland & Bouck File Custodian.

Richard P. DiFiore is the assigned Field Manager for the project.

2.1.3.1 Field Support Staff

Responsibilities and duties of the Field Support Staff include the following:

- Perform field procedures associated with the paper-making residuals, surface-water, groundwater, and sediment sampling;
- Perform field analyses and collect QA samples;
- Calibrate and maintain field equipment;
- Reduce field data;
- Maintain sample custody; and
- Prepare field records and logs.

Penelope T. Rabasco, Gregg A. Rabasco, and Todd P. Merrell will provide field services support during the RI. Staff of Geraghty & Miller, Inc., under the direction of James A. Hill, will provide field support during the 12th Street Landfill OU investigation. Staff of Limno-Tech, under the direction of Greg Peterson, will provide field support during the Allied Paper OU and River Investigations.

2.1.4 Surveying Manager

Responsibilities and duties of the Surveying Manager include the following:

- Manage the surveying program; and
- Coordinate final digital survey data transfer to the Blasland & Bouck File Custodian.

Terry H. Young, L.S. is the Surveying Manager for the project.

2.1.5 Hydrogeologic Investigations Manager

Responsibilities and duties of the Hydrogeologic Investigations Manager include the following:

- Manage the hydrogeologic investigations; and
- Interpret and report the results of the hydrogeologic investigations for the RI/FS.

William T. McCune is the Hydrogeologic Investigations Manager for this project. James A. Hill of Geraghty & Miller, Inc. will serve as Mr. McCune's counterpart for the hydrogeological investigation of the 12th Street Landfill Operable Unit.

2.1.6 Geotechnical Investigation Manager

Responsibilities and duties of the Geotechnical Investigation Manager include the following:

- Manage the geotechnical investigations; and
- Interpret and report the results of the geotechnical investigations for the RI/FS.

Raymond D. D'Hollander, P.E. is the Geotechnical Investigation Manager for this project.

2.1.7 Air Investigation Manager

Responsibilities and duties of the Air Investigation Manager include the following:

- Manage the air investigations; and
- Interpret and report the results of the air investigations for the RI/FS.

Robert J. Kricks, Ph.D. is the Air Investigation Manager for this project.

2.1.8 Quality Assurance Manager

Responsibilities and duties of the Quality Assurance Manager (QAM) include the following:

- Review laboratory data packages;
- Serve as primary communication link with the analytical laboratories to effect requests and to resolve problems;
- Coordinate field QA/QC activities with Field Manager, including audits of RI/FS activities, concentrating on field analytical measurements and practices to meet data quality objectives;
- Review field reports;
- Review audit reports;

- Prepare interim QA/QC compliance reports; and
- Prepare QA/QC Report which includes a data validation section for subsequent incorporation into the RI and FS Reports.

Laurie A. Johnston is the Blasland & Bouck project Quality Assurance Manager. The analytical laboratory subcontractors will report to Ms. Johnston.

2.1.9 File Custodian

Responsibilities and duties of the File Custodian include the following:

- Oversee the maintenance of field and laboratory files of notebooks and logs;
- Organize and maintain a computer data base of project data; and
- Maintain organized files of analytical reports and project documents.

Mark A. Fountain is the File Custodian for the project.

2.2 Analytical Laboratory

Responsibilities and duties of the analytical laboratory include the following:

- Perform analytical procedures;
- Supply sampling containers and shipping cartons;
- Maintain laboratory custody; and
- Strictly adhere to all protocols in the QAPP; contact the Blasland & Bouck QAM in advance of any protocol deviations.

The analytical laboratories that will perform work for this project are Aquatec (with WAL as a backup), Triangle, Teledyne, and a geotechnical laboratory to be chosen at a later date.

2.2.1 Laboratory Project Manager

Responsibilities and duties of the Laboratory Project Manager include the following:

- Serve as primary communication link between Blasland & Bouck and laboratory technical staff;
- Monitor work loads and ensure availability of resources;
- Oversee preparation of analytical reports; and
- Supervise in-house chain-of-custody.

The project managers for the laboratories are: Pauline T. Malik, Aquatec; Kimberly J. Laisy, WAL; Lorri White, Triangle; and Hewitt W. Jeter, Teledyne.

2.2.2 Laboratory Quality Assurance Officer (QAO)

Responsibilities and duties of the Laboratory QAO include the following:

- Supervise the group which reviews and inspects all project-related laboratory activities;
- Conduct audits of all laboratory activities; and
- Review all data prior to transmittal to Blasland & Bouck.

The QAO for the laboratories are: Karen R. Chirgwin, Aquatec; Kathleen R. Teuscher, WAL; Donald Harvan, Triangle; and Jeffrey Guenther, Teledyne.

2.3 Michigan Department of Natural Resources

2.3.1 Project Manager

Responsibilities and duties of the Project Manager include the following:

- Insure that the RI/FS is carried out consistent with the appropriate Federal and State laws and guidelines and the Administrative Order by Consent.

Scott D. Cornelius is MDNR's Project Manager for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site. MDNR's Assistant Project Manager is Mary B. Geitka.

2.3.2 Project Oversight Manager

Responsibilities and duties of the Project Oversight Manager include the following:

- Insure RI/FS activities are compliant with the QAPP; and
- Assist the Project Manager with field decisions.

Franci Barker of Camp Dresser & McKee is the Project Oversight Manager for the project.

2.4 Region V USEPA

The Region V USEPA Central Regional Laboratory (CRL) and Central District Office (CDO) have field audit responsibilities. In addition, the CRL has responsibilities for external auditing of the laboratories.

2.4.1 Remedial Project Manager

Responsibilities and duties of the Remedial Project Manager include the following:

- Insure that all RI/FS activities comply with Compensation Environmental Response, Compensation, and Liability Act (CERCLA), National Oil and Hazardous Substance Pollution Contingency Plan (NCP), and USEPA requirements; and
- Supply technical support to the MDNR Project Manager.

Terese A. VanDonsel is the Remedial Project Manager assigned by the USEPA for this project.

2.4.2 Quality Assurance Manager

Responsibilities and duties of the QAM include the following:

- Review all data for compliance with QAPP; and
- Review of QAPP.

Valerie J. Jones is the QAM assigned by the USEPA for this project.

SECTION 3 - QUALITY ASSURANCE OBJECTIVES

3.1 Quality Assurance Objectives

The primary QA objective is to develop and implement procedures for defensible sampling, chain-of-custody, laboratory and field analyses, instrument calibration, data reduction and reporting, internal quality control, audits, preventive maintenance, and corrective action. These procedures are presented or referenced in following sections of the QAPP.

The goals regarding QA for both field measurements and laboratory analyses are discussed below.

Laboratory duplicates (splits), laboratory blanks, standards, matrix spikes (MS), matrix spike duplicates (MSD), matrix spike blanks (MSB), field duplicates, trip blanks, and rinse blanks will be analyzed to provide the means for assessing data quality from both the laboratory and field. A brief explanation of each QC sample type is provided below:

- Laboratory duplicates will be used to measure analytical precision;
- Laboratory blanks will be used to assess reagent quality and background from analytical instruments;
- Reference standards/materials will be used to assess analytical accuracy;
- For PCB analyses, MSB analyses will be included to assess method performance in the absence of matrix interference;
- Field duplicates will be used to assess the overall precision of environmental sampling and laboratory analysis;

- Trip blanks will be used for volatile organic compound (VOC) and metals analyses to measure the effects of storage, field sampling, and transport on the samples; and
- Rinse blanks will be used to determine the effectiveness of equipment cleaning procedures.

Detailed descriptions of the QC checks for field and analytical data are provided in Section 9. A summary of the required laboratory analyses, including the frequency of these QC checks, is provided in Table 1-4.

3.2 Qualitative Quality Assurance Objectives

3.2.1 Representativeness

Representativeness is the degree to which sample data accurately and precisely represent site conditions, and is dependent on sampling and analytical variability.

All efforts in the planning and ultimate implementation of the RI/FS have been designed to describe the presence of site constituents at the time of sampling. The use of prescribed sampling and analytical methods along with method-specified holding times and preservation requirements is intended to provide representative data. The Work Plans provide details of the sampling and analysis rationale for the identification of constituents of concern at the project site.

3.2.2 Comparability

Comparability is the degree of confidence with which one set of data can be compared to another. Comparability throughout the RI/FS will be maintained through consistent sampling and analytical methodologies as set forth in this QAPP, the FSPs, and USEPA standard analytical methods.

At MDNR's or USEPA's request, split samples can be provided for independent analysis of parameters. Comparison of results would provide an assessment of sample and subsample handling techniques and analytical methods, as well as an assessment of laboratory procedures and performance.

Comparability of PCB data from previous studies with data generated by the RI/FS will be examined through a review of sampling, sample processing, and analytical methods from the key previous investigations to assess the potential for bias.

3.3 Quantitative Quality Assurance Objectives

3.3.1 Completeness

Completeness is defined as a measure of the amount of valid data obtained from an event or investigation compared to the amount that would be expected to be obtained under normal conditions. Completeness of laboratory tests is expected to be 95 percent or better, while overall project completeness is expected to be 90 percent or better.

3.3.2 Precision

Precision is the measure of reproducibility of sample results. Precision will be measured as the degree of mutual agreement of duplicate analyses. The goal is to maintain a level of analytical and measurable precision which is consistent with the objectives of the Work Plans. To maximize precision, consistent sampling and analytical procedures will be followed. All RI/FS activities will adhere to established protocols presented in the QAPP and FSPs. Specific field and laboratory precision QC checks are discussed in

Section 9. Control limits for field and laboratory analyses are presented in Table 3-1 and Tables 1-6, 1-7, and 1-8, respectively.

3.3.3 Accuracy

Accuracy is the degree to which a measured value agrees with the true or expected value of a quantity of concern. Reference standards, matrix spikes, blank spikes, and surrogates will be used to assess the accuracy of laboratory data. Specific field and laboratory accuracy QC checks are discussed in Section 9. Control limits for field and laboratory analyses are provided in Table 3-1 and Tables 1-6, 1-7, and 1-8, respectively.

3.3.4 Method Detection Limits

Method detection limits (MDL) and practical quantitation limits (PQL) are measures of analytical procedure sensitivity for the detection and quantification of analytes, respectively. The MDL is defined as the minimum concentration of a substance that can be measured and reported with 99% confidence that the value is above zero. The MDL achieved in a given analysis will vary depending on instrument sensitivity and matrix effects. The calculation of a MDL is addressed in Section 12.

MDL of field and laboratory measurements will follow method guidelines as discussed in Section 7. Quantitation limits are typically 2 to 5 times the MDL. Concentrations detected between the MDL and the PQL, when reported, are listed as estimated values only.

SECTION 4 - SITE SELECTION AND SAMPLING PROCEDURES

Site selection is addressed in the individual Work Plans. Sampling procedures will be as described below and in the Appendices. In addition, the Appendices contain the procedures for cleaning equipment; packing, handling, and shipping samples; and obtaining field measurements. A summary of the required sample containers and sample holding times is provided in Table 4-1.

4.1 Introduction

As part of the various field investigations, several standard field procedures will be performed. They include:

- Soil/Residuals Boring Installation and Sampling;
- Floodplain Soil Sampling;
- Groundwater Monitoring Well Installation;
- Piezometer Installation;
- Groundwater Sampling;
- In-Situ Hydraulic Conductivity Measurement;
- Air Monitoring;
- Surface Water Sampling;
- Sediment Sampling;
- Residuals Sampling from Mill Storm Water Systems; and
- Residuals Sampling from Test Pits.

This section introduces and references the appropriate detailed procedures in the appendices, including ancillary procedures for equipment cleaning, water

level measurements, well development, field measurements, and calibration and maintenance of field instruments. Sample handling, packing, and shipping procedures are described in Section 5 and Appendix A.

4.1.1 Sample Collection Precautions

Exposure of samples to air should be minimized by placing the samples in containers as soon as possible after collection. Samples will be introduced into containers gently, so as to minimize agitation which might enhance volatilization. Liquid will be poured into a container without producing air bubbles during filling (e.g., when sampling for VOCs no air bubbles should exist in the sample containers following collection). Samples will be re-collected if flow into container is turbulent.

No composite samples will be submitted for analysis of VOCs. This applies to all samples collected during the RI for VOC analysis. Presently, two types of composite samples for vertical integration are proposed for CLP TCL/TAL analysis (excluding VOCs):

- Composites of multiple spatially separate samples; and
- Composites of continuous samples over a specific interval (e.g., 0 to 1 foot).

From a practical standpoint, both types of samples require homogenization in the field prior to dispensing aliquots to sample containers. To avoid the production of questionable results for VOCs, which could result from sample homogenization, a different sample methodology will be used for VOCs; a relatively small aliquot from a discrete sample interval collected near the mid-depth of the total interval being composited, or from the middle of a continuous interval being composited will be analyzed. These aliquots, without any homogenization,

will be dispensed into the appropriate sample container, which will be sealed as quickly as possible.

Samples should not be collected or stored near running internal combustion engine or any type of exhaust system. Fumes from such devices could contaminate samples.

4.1.2 Sample Designation System

A concise and easily understandable sample designation system is an important part of the RI sampling activities. It provides a unique sample number that will facilitate both sample tracking and easy re-sampling of certain locations to evaluate temporal changes. The sample designation system to be employed during the sampling activities will be consistent, yet flexible enough to accommodate unforeseen sampling events/conditions. A combination of letters and numbers will be used to yield a unique sample number for each field sample collected. The sample designation system is described more fully in the Data Management Plan (Blasland & Bouck, 1993g).

4.1.3 Sample Containers and Preservation

The appropriate sample containers, preservation methods, holding times, and the particular analytical method for the specific matrices are presented in Table 4-1.

Preservation methods include the addition of parameter-specific chemical preservatives and refrigeration.

The analytical laboratory will supply appropriate containers for sample collection and preservation. The field sampling crew is responsible for properly collecting, labeling, and preserving the samples on ice (as needed)

in coolers, immediately after collection. Sample containers will be labeled in accordance to procedures in Appendix A.

4.2 Soil/Residuals Boring Installation and Sampling

Borings will be advanced with a drill rig (where possible) using either the hollow-stem auger method or the driven casing method, depending on the nature of the subsurface materials. The hollow-stem auger is the preferred method as it does not require the use of drilling fluids or additives other than water. The alternate method (driven casing) requires the use of a drilling fluid to lift the cuttings from the boring, but does not require the use of any additives other than water or bentonite. The drilling fluid to be used will be water with the addition of bentonite only when necessary. In situations where physical features limit the use of drill rigs, borings will be completed with either a hand-driven or a portable power-driven split-spoon sampler, depending on the required depth and material. The detailed procedures for drilling soil borings are provided in Appendix B.

Pre-field cleaning procedures, post-field cleaning procedures, and cleaning procedures between borings are provided in Appendix C. While drilling the borings, soil/residuals samples will be obtained as described in Appendix B. Samples of the subsurface material encountered during soil boring installation will be collected continuously (every 2 feet) until the required depth of the borehole is reached.

Representative portions of all soil samples will be retained in appropriate containers for 1) visual classification by the supervising geologist and 2) laboratory analyses, where appropriate. A representative portion of each sample will be placed in a clear jar and the headspace screened with a photoionization

detector (PID). The results will be recorded on the boring log. The number, location, and laboratory analysis required for the samples obtained via borings are identified in the Work Plans. Representative samples as directed in the Work Plans will be analyzed for PCBs, CLP TCL/TAL, PCDD/PCDF, or geotechnical parameters. The procedures for handling, packing, and shipping the samples are provided in Appendix A.

Split-spoon (ASTM D1586) or thin-walled piston samplers (ASTM D4700) will be used to obtain samples on a continuous basis. Split-spoon samplers will be the preferred method of sampling with the piston samplers being used in conditions where the materials cannot be recovered using split-spoon sampling methods or where undisturbed samples are required for geotechnical testing. Materials such as paper residuals or very fine, saturated sands may require use of the piston sampling method.

Disturbed and relatively undisturbed samples will be collected in selected borings for geotechnical evaluation. The samples will be collected using a Shelby tube (ASTM D1587) or thin-walled piston sampler (ASTM D4700). Field vane shear testing (ASTM D2573) will be performed in selected borings if field conditions are appropriate.

4.3 Floodplain Soil Sampling

The procedures used to perform floodplain soil sampling, including floodplain soils of the former impoundments, are included in Appendix B. Floodplain soils will be collected using a manual split-spoon sampler or a stainless steel bucket auger. The number and location of samples are provided in the Work Plans. Samples will be analyzed for PCBs or CLP TCL/TAL

constituents. The procedures for cleaning the equipment between each floodplain soil sample are provided in Appendix C.

4.4 Groundwater Monitoring Well Installation

The monitoring wells will be installed in completed soil borings, as described in Appendix D. Monitoring well boreholes will be installed utilizing the same drilling and sampling methods described in Appendix B. As directed by MDNR, the wells will be constructed with a stainless steel well screen and riser. At most locations, 5 feet of well screen will be used, with the exception that shallow wells installed under water table conditions will have a 10 foot screen with a maximum of seven feet of the screened interval extending below the water table. The screen lengths for each well are detailed in the Work Plans.

A filter pack consisting of appropriately sized silica sand will be installed in the annular space around the screen and extending to approximately two feet above the top of the screen, except where a well is installed immediately below the base of residuals. At these locations, the filter pack will extend only six inches above the screened interval. The purpose of the filter pack is to: filter out particles from the adjacent formation; stabilize aquifer materials to reduce settlement of materials above the well intake during well development; and, increase the well's effective diameter and thereby increase water flow into the well. A bentonite seal, at least 2 feet thick, will be installed in the annular space above the sand filter pack. In the annular space above the bentonite seal, a cement/bentonite grout (up to four percent bentonite) will be placed by tremie pipe to the surface. Descriptions of monitoring well installation procedures and methods are presented in Appendix D.

All monitoring well casings and screens will be cleaned prior to installation, using the procedures in Appendix C.

Upon completion, each monitoring well will be developed to remove fine-grained materials that have settled in or around the well during installation, and to improve the hydraulic connection between the monitoring well and the surrounding formation. The procedures used for developing monitoring wells are provided in Appendix E. Wells screened in residuals will not be developed. After the monitoring wells are developed, water levels will be measured following procedures provided in Appendix G.

Gamma-ray logging will be performed at the deep well of each well cluster and at selected boreholes at the Allied Paper, Inc. Operable Unit. The purpose of recording the natural gamma radiation of the subsurface units will be to better correlate the subsurface units underlying the site. This is especially important in areas where several clay layers may underlie a site and the continuity of these clays needs better definition. The procedure for logging is described in Appendix H.

The physical condition of all existing monitoring wells will be ascertained using the procedures in Appendix I. Existing groundwater monitoring wells will be redeveloped, as necessary, following the method provided in Appendix E. If during the well inspection or redevelopment of the existing wells, it is determined that the well needs to be decommissioned, the procedures provided in Appendix J will be followed.

Upon completion of each monitoring well, a designated measuring point will be marked on the well and surveyed to an existing bench mark. Vertical and horizontal control will be established using standard, accepted surveying by a licensed surveyor.

4.5 Piezometer Installation

Piezometers (well points) will be installed for water level measurements and will be installed utilizing the same drilling methods described in Appendix B. These piezometers will be constructed of 2-inch diameter polyvinyl chloride (PVC). Descriptions of piezometer installation procedures are presented in Appendix D.

Upon completion, piezometers that yield water will be developed to provide a good hydraulic connection between the screened zone and the formation. The piezometer development procedures are described in Appendix E.

4.6 Groundwater Sampling

As directed by MDNR, one round of groundwater sampling from the monitoring wells will be conducted. However, MDNR may determine a second round of sampling may be necessary to sufficiently characterize the groundwater based upon the results of the first round.

Prior to groundwater sampling, the water level measurement of all wells to be sampled will be taken following the procedures in Appendix G. Groundwater samples will be obtained from monitoring wells in accordance with the procedures in Appendix F. The pre-field cleaning procedures, and the cleaning procedures during and after groundwater sampling are provided in Appendix C.

Groundwater samples will be collected and analyzed in the field for temperature, conductivity, and pH prior to sampling, during well evacuation, and at the time of collection. Turbidity will also be assessed at the time of collection. The procedures for measuring these parameters in the field are provided in Appendix O. The temperature/pH/conductivity and turbidity meters

will be calibrated and maintained on a daily basis, according to the manufacturer's instructions.

4.7 In-Situ Hydraulic Conductivity Measurement

In-situ hydraulic conductivity measurements using slug tests will be obtained at all newly installed wells identified in the Work Plans, using the procedures in Appendix K. Slug tests will be performed after the first round of samples have been collected. Slug tests can be performed by two different techniques: 1) by introducing a solid cylinder of known volume (falling head test); or 2) by withdrawal of a solid cylinder of known volume from the well after the well has returned to its static level (rising head test). By monitoring the rate of changing water levels, hydraulic conductivity estimates can be calculated. However, as the use of data from a rising head test is typically more representative of the aquifer, rising head test data will be used to calculate estimates of the hydraulic conductivity at the Site. The formula of Hvorslev or Bouwer-Rice will be used to calculate a value for the hydraulic conductivity. Calculations may be performed using computer programs.

4.8 Air Monitoring

The air sampling to be performed during the sampling activities at the various study areas will consist of work-area air monitoring (Appendix L) and ambient air monitoring (Appendix M).

The work-area monitoring is intended to protect site workers. Field personnel will monitor VOCs in certain situations as detailed in the Health and Safety Plan (Blasland & Bouck, 1993e) by using a hand-held monitoring instrument (Appendix L). Action levels and levels of protection will be

implemented as described in the Health and Safety Plan, presented under separate cover. .

In addition, monitoring of PCBs in ambient air will be conducted for several months at the Allied Paper, Inc. and Willow Boulevard/A-Site Operable Units as well as an urban background location. The details of the program are presented in the Work Plans.

The ambient air PCB monitoring program will include meteorological monitoring to facilitate the interpretation of air data with respect to possible sources of ambient air PCB concentrations.

4.9 Surface Water Sampling

Collection of surface water samples will be performed during both base-flow and storm-event conditions. The surface water sampling procedures are provided in Appendix N. Velocity profiles may be developed for select river/creek cross-sections. Procedures for obtaining the velocity profile measurements are included in Appendix N.

A duplicate of each surface-water sample will be collected and measured in the field for temperature, pH, conductivity, DO, and turbidity at the time of collection. The procedures for measuring these parameters are provided in Appendix O.

4.10 Sediment Sampling

Sediment samples will be obtained following the procedures described in Appendix P. The locations and number of samples to be collected are given in the Work Plans. Select sediment samples may be archived at the field office for possible future analysis of physical characteristics.

4.11 Residuals Sampling from Mill Storm-Water Systems

Residuals samples will be obtained from mill stormwater conveyance systems at the former King Mill, Portage Paper, Inc. Mill, Simpson Plainwell Paper Company Mill, and Georgia-Pacific Corporation Kalamazoo Mill.

In addition, lagoons will be sampled at the former King, Georgia-Pacific, and Simpson Plainwell mills. Residuals sampling will employ the use of sediment and soil sampling procedures presented in Appendices P and B, respectively.

4.12 Residuals Sampling from Test Pits

Test pit excavation will be conducted with a backhoe, as described in Appendix Y. Test pits will extend to two feet above the anticipated bottom of the residuals or to the limit of the reach of the backhoe (approximately 16 to 18 feet), whichever is reached first.

If drums are encountered during excavation or if liquids accumulate in the excavation, excavation will be terminated. Any drums which are removed from the test pits will be handled in a manner consistent with current regulations. Samples of the material in the removed drums will be obtained and the drums disposed of as appropriate with its contents.

Two samples per excavation will be collected for laboratory analysis form the side walls of the test pit using the backhoe bucket. One of the samples will be collected from the bottom two feet of the test pit and the other from the area which appears to have the greatest potential for containing PCBs or VOCs (as determined by field screening and observations). As the backhoe bucket is removed from the test pit, the contents will be immediately sampled and screened for VOCs using a PID. The uppermost two inches of the residuals in

the backhoe bucket will be scraped away and the sample container for VOCs filled directly from bucket using a stainless steel spoon or spatula. Samples for non-volatile analytes will be removed from the bucket with a stainless steel spoon and composited in a stainless steel bowl prior to being placed into sample containers.

The sample will be described using the remaining portion of the recovered material. The visual description will include major and minor components, consistency, relative moisture content, and other pertinent observations.

SECTION 5 - SAMPLE AND DOCUMENT CUSTODY

5.1 Field Sample Custody

The objective of field sample custody is to assure that samples are not tampered with from the time of sample collection through time of transport to the analytical laboratory. Persons will have custody of the sample when the samples are in their physical possession, in their view after being in their possession, or in their personal possession and secured so that they cannot be tampered with. When samples are secured in a restricted area accessible only to authorized personnel, they will be deemed in the custody of such authorized personnel. Field custody documentation consist of both field log books and chain-of-custody forms.

5.1.1 Field Log Books

Field log books serve as a daily record of events, observations, and measurements during field activities. All information pertinent to sampling activities is recorded in the log books. The log books are bound with the pages sequentially numbered. Entries in the log book will include but are not limited to:

- Name and title of author
- Name(s) of field crew
- Location of sampling activity
- Number and volume of samples taken
- Date and time of collection
- Preservatives used
- Field measurements (pH, etc.)
- Date and time of shipment
- Date and time of entry
- Name(s) of site visitors
- Description of sample location
- Sampling method
- Sample identification numbers
- Field observations
- Shipment method

Data will be entered in ink along with the date and signature of the individual responsible for data entry. Blank pages will be noted as being intentionally blank.

The exact readings from site testing and sampling will also be recorded on separate documentation sheets (e.g., subsurface logs). Separate documentation sheets are to be used to allow comprehensive documentation of daily site conditions by field personnel. These logs will be placed in a three-ring binder at the end of the day and numbered sequentially.

5.1.2 Geological Investigation Records

Subsurface logs, sediment sampling forms, in-situ hydraulic conductivity test logs, well inspection forms, and gamma-ray logging records will be completed on site. The subsurface logs will provide a record of information needed to describe the subsurface strata, geotechnical characteristics, and groundwater conditions observed during drilling. Information from sediment sampling will describe lithographic details. In-situ hydraulic conductivity test logs will be maintained in order to document the time and water level readings taken during slug testing at the monitoring wells. The gamma-ray logging records will include the depth, time, and reading observed.

After returning to the office, a gamma-ray log will be constructed from the gamma-ray logging record for a borehole or wellhole. The log is a graphic representation of the radiation measured.

5.1.3 Water Sampling Records

Groundwater and surface water field sampling records will be completed for each sample location and will contain water levels, physical appearance of the water, and field meter readings (temperature, pH, DO, turbidity, and specific conductance), where applicable. Water level readings will be measured to surveyed reference points (e.g., top of outer casing, top of inner casing, ground surface, or a surveyed stake, as appropriate) and recorded on a water level record.

Before going out to the site, an existing monitoring well evaluation form must be completed for the wells to be inspected that day. The form contains information derived from historical records. Well inspection forms will also be partially completed off site with respect to existing information such as completed well depth and other previously measured data. After the wells are inspected and information compared with the existing data, a recommendation regarding the well will be made.

Meters (pH, temperature, DO, turbidity, and conductivity) will be calibrated daily in accordance with the manufacturer's recommendations. Standards, solutions used, concentrations, and readings taken will be recorded daily in field calibration logs (Appendix O).

5.1.4 Air Monitoring and Sampling Records

The PID will be calibrated as per the manufacturer's recommendations once after every 10 monitoring wells or borings that are field screened, or daily (whichever occurs first). The PID calibration will be recorded on a field calibration log (Appendix L).

During ambient air sampling, data obtained while the sampler is running will be recorded on an air sampling log. Calibrations will be recorded on a High Volume Sampler Field Calibration Log (Appendix M).

5.1.5 Chain-of-Custody Forms

Completed chain-of-custody forms will be required for all samples to be analyzed. Chain-of-custody forms will be initiated by the sampling crew in the field during the sample collection events. The chain-of-custody form will contain the sample's unique identification number, sample date and time, sample description, sample type, sample preservation (if any), and analyses required. The original chain-of-custody form will accompany the

samples to the laboratory. Copies will be made prior to shipment (or multiple copy forms used) for separate field documentation. A chain-of-custody form is included in Appendix A. The chain-of-custody forms will remain with the samples at all times. The samples and signed chain-of-custody form will remain in the possession of the sampling crew until the samples are delivered to the express carrier (e.g., Federal Express).

5.1.6 Sample Packing and Shipping Requirements

Sample packaging and shipping procedures are designed to ensure that the samples will arrive at the laboratory intact, with the chain-of-custody forms.

Samples will be properly packaged for shipment as outlined in Appendix A and dispatched to the appropriate laboratory for analysis, with a separate signed custody record enclosed in each sample box or cooler. Shipping containers will be locked and secured with strapping tape and custody record enclosed in each sample box or cooler. Shipping containers will be locked and secured with strapping tape and custody seals for shipment to the laboratory. The preferred procedure includes use of a custody seal attached to the front right and back left of the cooler. The custody seals are covered with clear plastic tape. The cooler is strapped shut with strapping tape in at least two locations.

All shipments will be accompanied by the chain-of-custody form identifying the contents. The original form will accompany the shipment; copies will be retained by the sampler for the sampling office records.

If the samples are sent by common carrier, a bill of lading should be used. Receipts of bills of lading will be retained as part of the permanent project documentation. If sent by mail, the package will be registered with

return receipt requested. Commercial carriers are not required to sign off on the custody forms as long as the forms are sealed inside the sample cooler and the custody seals remain intact.

Standard operating procedures for handling, packing, and shipping the samples are included in Appendix A.

5.2 Laboratory Sample Custody

5.2.1 General

All persons having samples in their possession will be responsible for maintaining sample integrity. Persons will have custody of samples when the samples are in their physical possession, in their view after being in their possession, or in their physical possession and secured so they cannot be tampered with. In addition, when samples are secured in a restricted area accessible only to authorized personnel, they will be deemed to be in the custody of such authorized personnel. A chain-of-custody form will accompany all samples requiring laboratory analysis.

The laboratory will use chain-of-custody guidelines described in the CLP Statement of Work (SOW) for Organics Analysis Exhibit F (USEPA, 1991c). Requirements which are specific to USEPA contracts (e.g., USEPA Traffic Reports) are not relevant to this project.

5.2.2 Sample Receipt

Upon receipt at the laboratory, the sample custodian inspects the samples for integrity and checks the shipment against the chain-of-custody. Any discrepancies are documented on the chain-of-custody form.

The Blasland & Bouck QAM is contacted in the event of any discrepancies between the sample containers and the chain-of-custody.

When the shipment and the chain-of-custody are in agreement, the laboratory sample custodian logs the samples in and assigns each a unique laboratory sample identification number, which is placed on each sample bottle. A laboratory internal chain-of-custody is initiated at this time. Recorded into the laboratory information system is the project name, sampling location, date sampled, date received, analyses required, storage location and action for final disposal. The samples are then placed in secure storage.

A work order is created which includes a summary of the sample analyses to be completed. Worksheets are generated and distributed to the appropriate analytical group managers.

5.2.3 Sample Storage

After the samples are logged and labeled, they are moved to locked refrigerators where they are maintained at 4°C. Biota samples may be stored frozen at -10°C. Samples to be analyzed for VOCs are stored separately to minimize the risk of contamination. Access to the refrigerators is limited to members of the sample management department.

When samples are required, the analyst presents a worksheet to the sample custodian who locates the samples. The analyst signs and dates the chain-of-custody to accept custody of the sample. When the analyst is finished with the sample, the unused portion is returned to the sample custodian. The analyst signs and dates the chain-of-custody and the sample is returned to secure storage. In the event that the entire sample is depleted during analysis, a notation of "sample depleted" or "entire sample used" is made on the chain-of-custody.

Samples and sample extracts are maintained in secure storage until disposal. All samples are held for a minimum of 30 days after data submission and extracts for 6 months after data submission.

5.2.4 Sample Tracking

Identifying information which describes the sample, procedures performed, and results of the testing will be recorded in a laboratory notebook by the analyst. These notes will be dated and will indicate who performed the analysis, the instrument used, and the instrument conditions.

Workbooks, bench sheets, instrument logbooks, and instrument printouts are used to trace the history of samples through the analytical process and to document and relate important aspects of the work, including the associated quality controls. All logbooks, bench sheets, instrument logs, and instrument printouts are part of the permanent laboratory record.

Each page or, as required, each entry is to be dated and initialed by the analyst at the time the record is made. Errors in entry are to be crossed out in indelible ink with a single stroke and corrected without the use of white-out, or by obliterating or writing directly over the erroneous entry. All corrections are to be initialed and dated by the individual making the correction. Pages inserted into logbooks are to be stapled to a clean, bound page. The analyst's initials are to be recorded in such a manner that the initials overlap the inserted page and the bound page. A piece of non-removable transparent tape is then to be placed over the initials as a seal. Pages of logbooks that are not completed as part of normal record-keeping procedures should be completed by lining out unused portions.

5.3 Document Custody

5.3.1 Laboratory Document Control

The goal of the Document Control Program is to assure that all documents for a specified project will be accounted for when that project is complete.

Laboratory documents control begins with the initial request for proposal and continues throughout the project to include all correspondence, faxed information, and phone logs. This information is kept by the Laboratory Project Manager for the duration of the project. When the project is complete, the information is filed in the project case filed by the Document Control Officer.

The original work order, chain of custody, and airbills are kept by the Document Control Officer in the case file.

5.3.2 Project File

At the conclusion of its involvement with this project, the laboratory will transfer their project files to the Blasland & Bouck office in Syracuse, New York. These files, together with field notebooks and other pertinent information, will be retained for the duration of the project and six years thereafter. Records from the RI will be placed in a single project file which will consist of the following components:

- Agreements (filed chronologically);
- Correspondence (filed chronologically);
- Memos (filed chronologically);
- Notes and Data (filed by topic); and
- News Clippings (filed chronologically).

Reports (including QA reports) will be filed with correspondence. Analytical laboratory documentation (when received) and field data will be filed with notes and data. The File Custodian (identified in Section 2) will maintain the files and will be responsible for adding new materials, as necessary. Filed materials may be removed by project personnel on a temporary basis only. The file custodian is responsible for refiling materials in a timely fashion.

SECTION 6 - CALIBRATION PROCEDURES AND FREQUENCY

6.1 Field Procedures

Field analytical equipment to be used in this project include a PID; a nephelometer (turbidity measurement); a thermometer; and conductivity, pH, dissolved oxygen, and water velocity meters. Calibration procedures for the equipment will follow manufacturer's instructions. In order to insure field precision and accuracy, all water quality meters, PIDs, and high volume air samplers will be calibrated to known standards. Field analysis and operation procedures, including calibration and sample analysis, are provided in Appendices O (thermometer, DO, turbidity, conductivity, and pH meters), L (PID), and M (air). Preventive maintenance procedures are also included in these appendices.

The frequencies of required calibrations for field instruments are provided in Table 6-1.

Field screening of samples for PCBs will use immunoassay tests or field GC methods. Calibration of the Millipore Corporation's EnviroGard™ and EnSys Inc.'s PCBRisc™ immunoassay test kits will follow the manufacturers guidelines presented in Appendix Q. Calibration of the field GC method will follow the guidelines in Appendix R.

6.2 Laboratory Procedures

Instrument calibration for selected parameters will follow accepted analytical methods as discussed below. A summary of the analytical methods proposed for possible use in the RI is presented in Table 1-5.

6.2.1 Target Constituents

PCBs

Calibration procedures will follow guidelines provided in USEPA SW-846 Method 8081 (USEPA, 1990) modified for PCB analysis as provided in Appendix S.

PCBs - Congener Specific

Calibration procedures will follow those outlined in the Standard Operating Procedure (SOP) found in Appendix T.

CLP TCL

Calibration procedures will follow guidelines provided in the current CLP SOW for Organic Analysis (USEPA, 1991c).

CLP TAL

Calibration procedures will follow guidelines provided in the current CLP SOW for Inorganic Analysis (USEPA, 1991d).

PCDD/PCDF

Calibration procedures will follow guideline provided in USEPA Method 8290 (USEPA, 1990) as provided in Appendix U.

PCBs - Air

Calibration procedure will follow guidelines provided in USEPA Method TO-4 (USEPA, 1988) and those provided in the SOP found in Appendix V.

6.2.2 Supplemental Parameters

Radioisotopic Analyses

Calibration procedures will follow those outlined in the SOP for Cs-137 found in Appendix W.

Total Organic Carbon

Calibration procedures will follow those outlined in the Lloyd Kahn Method (USEPA, 1986) found in Appendix X for soils/sediments/residuals and USEPA Method 451.1 (USEPA, 1983) for waters. .

Total Suspended Solids

Calibration procedures will follow those outlined in USEPA Method 160.2 (USEPA, 1983).

Oil and Grease

Calibration procedures will follow those outlined in USEPA SW-846 Method 9070 (USEPA, 1990).

Chemical Oxygen Demand

Calibration procedures will follow those outlined in USEPA Method 410.1 or 410.4 (USEPA, 1983).

Chloride

Calibration procedures will follow those outlined in USEPA Method 325.2 (USEPA, 1983).

Sulfate

Calibration procedures will follow those outlined in USEPA Method 375.2 (USEPA, 1983).

pH

Calibration procedures will follow those outlined in USEPA Method 150.1 (USEPA, 1983).

Specific Conductance

Calibration procedures will follow those outlined in USEPA Method 120.1 (USEPA, 1983).

Nitrate

Calibration procedures will follow those outlined in USEPA Method 353.2 (USEPA, 1983).

Turbidity

Calibration procedures will follow those outlined in USEPA Method 180.1 (USEPA, 1983).

Alkalinity

Calibration procedures will follow those outlined in USEPA Method 310.1 (USEPA, 1983).

6.2.3 Physical Parameters

Particle Size Distribution

Calibration procedures will follow those outlined in ASTM method D422 (ASTM, 1992).

Consolidation Test

Calibration procedures will follow those outlined in ASTM method D2435 (ASTM, 1992).

Atterberg Limits

Calibration procedures will follow those outlined in ASTM method D4318 (ASTM, 1992).

Hydraulic Conductivity

Calibration procedures will follow those outlined in ASTM method D5084 (ASTM, 1992).

Additional physical parameters will follow the guidelines in the methods listed in Table 1-5.

SECTION 7 - ANALYTICAL PROCEDURES

7.1 Field Procedures

Field analytical procedures will be performed on water, sediment, soil, and residuals samples. The following table lists the parameters to be measured and the appendices which contain the SOPs which outline the field procedures.

Field Parameter	Matrix	Appendix
Temperature	water, air	O
pH	water	O
Specific Conductivity	water	O
Turbidity	water	O
Dissolved Oxygen	water	O
Velocity	water	N
PCBs - Immunoassay	soil, sediment, residuals	Q
PCBs - Field GC	water, soil, sediment, residuals	R

In addition, soil/residuals headspace screening and ambient air monitoring for total VOCs will be performed as outlined in Appendix L.

7.2 Laboratory Procedures

As described in the Work Plans, groundwater, surface water, sediment, soil, paper-making residuals, and air samples will be analyzed. The following tables provide a summary of laboratory requirements for this project:

Title	Table
Required Quality Control Analyses	1-4
Laboratory Samples Preparation and Analytical Procedures	1-5
Required Containers, Preservation Techniques, and Holding Times	4-1

Soil/sediment/paper-making residuals samples will be prepared for PCB and CLP TCL/TAL analyses in their "as received" (wet-weight) condition, as identified in Table 1-5. Soil and sediment results will be reported on a dry weight basis in milligrams per kilogram (mg/kg). Percent solids will be reported separately. Air samples will be prepared for analysis utilizing methods presented in Appendix V.

7.2.1 PCBs

PCBs will be analyzed following the SOP provided in Appendix S which is based on USEPA SW-846 Method 8081 (USEPA, 1990), modified for PCBs only. PCB results will be reported using a format similar to CLP (USEPA, 1991c) documentation guidelines. Detection limits for PCB analyses are specified below:

Matrix	Detection Limit
Soil/Sediment	0.05 mg/kg
Paper-making residuals	0.15 mg/kg
Water[1]	0.05 ug/L
Air	50 ng/PUF plug[2]

1 A matrix-specific method detection limit study is to be conducted to determine the MDL for groundwater.

2 Quantitation limit

Sample media for air samples will consist of a polyurethane foam (PUF) cartridge and glass fiber filter as per MDNR requirements.

Detection limits may be higher if interferences are present that can not be removed with appropriate cleanup procedures.

Field screening of samples for PCBs will use the Millipore EnviroGard™, EnSys PCBRisc™ (Appendix Q), or modified Spittler (Appendix R) Method.

7.2.2 CLP TCL/TAL

CLP TCL/TAL constituents will be analyzed using USEPA CLP Methods which are described in the CLP-SOW for organics (Document OLM01.0 and its revisions, USEPA 1991c) and inorganics (Document ILM02.0 and its revisions, USEPA 1991d). Reporting limits for TCL and TAL laboratory analyses will follow CLP-SOW quantitation limits summarized in Appendix Z.

Cleanup procedures may be required for the removal of interferences. Quantitation limits may be higher if interferences are present that can not be removed with appropriate cleanup procedures.

TCL-pesticide/PCB analyses will include PCB analyses as described in Section 9.2.5.

7.2.3 PCDDs/PCDFs

The laboratory analyzing dioxin samples will be Triangle. Dioxins will be analyzed using USEPA SW-846 Method 8290 (USEPA, 1990). Quantitation limits for PCDD/PCDF analytes in soil are as follows:

Analytes	Method Calibration Limit
TCDD/TCDF	1 ng/kg
PeCDD/PeCDF	5 ng/kg
HxCDD/HxCDF	5 ng/kg
HpCDD/HpCDF	5 ng/kg
OCDD/OCDF	10 ng/kg

Total PCDD/PCDF concentrations will also be reported.

7.2.4 Supplemental Parameters

Table 1.5 presents a summary of the methods that will be used to analyze the supplemental parameters identified below:

Soil/Sediment/Residuals Analyses	Reference
Radioisotope Analysis	Appendix V
TOC	Appendix W
Oil and Grease	USEPA SW-846 Method 9070
Water Analyses	**Reference**
Total Suspended Solids	USEPA 160.2
Chemical Oxygen Demand	USEPA 410.1/410.3
Chloride	USEPA 325.2/325.3
Sulfate	USEPA 375.2
pH	USEPA 150.1
Specific Conductance	USEPA 120.1
Alkalinity	USEPA 310.1
TOC	USEPA 415.1
Nitrate	USEPA 353.2
Turbidity	USEPA 180.1

Detection limits and precision, and accuracy requirements for these analyses are presented in Table 1-7.

7.2.5 Physical Parameters

Table 1-5 presents a summary of the methods that will be used to analyze the physical parameters identified below:

Soil/Sediment/Residuals Analysis	Reference
Moisture Content	ASTM D2216
Moisture Content by Microwave	ASTM D4643
Organic Content (Loss on Ignition)	ASTM D2974
Particle Size Analysis	ASTM D422
Specific Gravity	ASTM D854
Consolidation Test (One-Dimensional)	ASTM D2435
Atterberg Limits	ASTM D4318
Hydraulic Conductivity	ASTM D5084
Hydraulic Conductivity of Saturated Peat	ASTM D4511
Consolidated-Undrained Triaxial Compression	ASTM D4767
Unconsolidated-Undrained Triaxial Compression	ASTM D2850
Unconfined Compressive Strength	ASTM D2166
Direct Shear Test	ASTM D3080
Bulk Density of Peat Materials	ASTM D4531
Miniature Vane Shear Test	ASTM D4648
Shrinkage Factors of Soils	ASTM D427
Bulk Density of Soils	ASTM D2937

SECTION 8 - DATA REDUCTION, VALIDATION, AND REPORTING

8.1 Field Procedures

After field data are obtained, they will be subject to the following procedures:

- Reduction or manipulation of the data mathematically or otherwise into meaningful and useful forms;
- Validation or verification that the data are sound; and
- Reporting or organization of the data for presentation.

A field notebook will be prepared to provide a log of relevant information for each sample location and a data summary of field analytical results. Table 3-1 specifies the units used for reporting. The Field Manager will verify reduced field data by reviewing field calculations. Suspect data will be reviewed and discussed with the sampler.

Field reports will be periodically submitted to the Blasland & Bouck Project Managers and QAM. Field data, records, and other documents prepared by the field staff will be reviewed by the QAM for adherence to the Work Plans and FSPs. The communication network is outlined on Figure 2-1. Consistency of data (i.e., significant figures, reporting units, and unexpected data) will also be reviewed. All field notes and other field documents will be checked for the following criteria:

- General completeness;
- Readability;
- Use of appropriate standard procedures;
- Calibration completeness; and
- Proper instrument maintenance.

Where appropriate, field data forms and calculations will be processed and included in appendices to the RI Report. The original field notebooks, documents, and data reduction summaries will be kept on file at the Blasland & Bouck office in Syracuse, New York.

8.2 Laboratory Procedures

After laboratory data are obtained, they will be subject to the following:

- Reduction or manipulation of the data mathematically or otherwise into meaningful and useful forms;
- Validation or verification that the data are sound; and
- Reporting or organization of the data for presentation.

8.2.1 Laboratory Data Reduction

The calculations used for data reduction are specified in each of the analysis methods referenced previously. Whenever possible, analytical data is transferred directly from the instrument to a computerized data system. Non-computerized raw data is entered into permanently bound laboratory notebooks. The data entered are sufficient to document all factors used to arrive at the reported value.

Concentration calculations for chromatographic analyses such as PCBs and VOCs are based on response factors. Quantitation is performed using either internal or external standards.

Inorganics analyses are based on regression analysis. Regression analysis is used to fit a curve through the calibration standard data. The sample concentrations are calculated using the resulting regression equations.

Standard data are fitted to an equation in the form:

$$y = a + bx$$

Where:

y = instrument response

x = concentration of amount of analyte

a = y-intercept

b = slope of the line (sensitivity)

After the regression equation has been computed, the sample concentration (x) can be calculated by rearranging the regression equation to read:

$$x = (y-a)/b$$

Soil and sediment values are reported on a dry-weight basis. Unless otherwise specified all values are reported uncorrected for blank contamination.

8.2.2 Laboratory Data Review

Raw data is examined to assess compliance with quality control guidelines. Surrogate, matrix spike, and QC check sample recoveries are checked. Samples are checked for possible contamination or interferences. Concentrations are checked to insure the systems are not saturated. If dilutions are necessary, they are performed. Any deviations from the guidelines call for corrective action. Those deviations which are determined to be caused by factors outside the laboratory's control, such as matrix interference, are noted with an explanation in the report narrative. Calculations are checked and the report reviewed for errors and oversights.

Once a report section is assembled, it is reviewed for any discrepancies, errors, or omissions. A preliminary narrative is produced at

this time outlining QC compliance and details specific to the analysis of the samples.

The individual sections are assembled into a data package. Added to the package are the Laboratory Analytical Request Forms, the chain-of-custodies, air bills, and other control forms. The package is then given to the Laboratory Project Manager for review.

The Laboratory Project Manager reviews the package for completeness and compliance, sees that any necessary corrections are made and creates a final report narrative. The package is then paginated and copies made. The original package is placed in the case file and stored. A copy of the data package is sent to the client.

8.2.3 Laboratory Data Reporting

Data packages include, at a minimum, the following items:

Narrative

The narrative serves as a summary of activities which took place during the course of sample analysis. Information in the narrative includes:

- Laboratory name and address;
- Date of sample receipt;
- Cross reference of laboratory identification number to client sample identification;
- Analytical methods used;
- Deviations from specified protocol; and
- Corrective actions taken.

Included with the narrative are any sample handling documents including field and internal chain-of-custodies, air bills and shipping tags.

Analytical Results

The analytical results reported are specific to analysis type. The following information is included, as applicable:

- Sample target compound results;
- Tentatively identified compounds;
- Surrogate spike recoveries;
- MS/MSD/MSB recoveries;
- QC check sample recoveries;
- Duplicate sample results;
- Blank target compound results; and
- Internal standard area data.

All results on the report forms are corrected for sample dilutions. All soil and sediment samples are reported on a dry-weight basis. Unless otherwise specified all results are reported uncorrected for blank contamination.

Supporting Documentation

Reports include all raw data required to recalculate any results including printouts, chromatograms, and quantitation reports. Also included are all standards used in calibration and calculation of analytical results.

Sample extraction, digestion, and other preparation logs, standard preparation logs, instrument run logs, and moisture content calculations are also included in the report.

Correspondence

Included in this section are all telephone logs and faxed information as well as any written correspondence.

8.2.4 Data Validation

Upon receipt at Blasland & Bouck, the data packages will be validated as follows:

- Evaluate completeness of data.
- Verify that field chain-of-custody forms were completed and that samples were logged in properly.
- Review QA/QC data (i.e., make sure duplicates, blanks, and spikes were analyzed on the minimum number of samples as specified in this QAPP; verify that duplicate and MS recoveries are acceptable).
- Investigate anomalies identified during review. Anomalies will be discussed with the Laboratory Project Manager, and internal QA/QC data reviewed as appropriate.
- Verify that holding times were met for each parameter. Holding time exceedances, should they occur, will be documented. Data for all samples exceeding holding time requirements will be flagged as either estimated or rejected. The decision as to which qualifier is more appropriate will be made on a case by case basis.
- Verify that parameters were analyzed by the methods identified in this QAPP.
- If data appears suspect, the specific data of concern will be investigated. Calculations will be traced back to the raw data;

If the calculations do not agree with the prescribed limits, the cause will be determined and corrected.

Deficiencies discovered as a result of data validation, as well as the corrective actions to be implemented in response, will be documented in the Corrective Action Request (Appendix AA).

The following USEPA documents will be referred to for guidance on data validation procedures for organics and inorganics analyses:

Analyses	Guidance Documents
Organics	National Functional Guidelines for Organic Data Review (Draft), USEPA Contract Laboratory Program (December 1990, revised June 1991).
Inorganics	Laboratory Data Validation: Functional Guidelines for Evaluating Inorganic Analyses (Draft), USEPA Hazardous Site Evaluation Division (October, 1989).

SECTION 9 - INTERNAL QUALITY CONTROL CHECKS

9.1 Field Procedures

9.1.1 Field Measurements

Field duplicates will be included to verify the quality of field measurements and collected samples. Reproducibility of each type of meter reading will be evaluated through duplicate analyses at a frequency of 10 percent. Precision and accuracy requirements for field measurements are provided in Table 3-1.

Field accuracy will be maintained through calibration of field meters according to operation procedures as provided in the Appendices. The precision and accuracy objectives for field measurements presented in Table 3-1 will be used as guidelines.

9.1.2 Field Duplicates

Blind field duplicates will be collected to check the reproducibility or bias of the sampling methods and analytical procedures. Blind field duplicates are defined as two separate samples collected at a single location, and labeled with separate identifications so that the laboratory will not be able to identify them as duplicates. The parameters which will require field duplicates, and the frequency with which those duplicates will be analyzed, are presented in Table 1-4.

9.1.3 Rinse Blanks

A rinse blank will be prepared by filling a sample container with analyte-free water which has been passed over a cleaned sampling and/or mixing device. The rinse blank analytical results will be reviewed to evaluate the effectiveness of the cleaning procedures. The parameters

which require rinse blanks and their required frequencies, are specified in Table 1-4.

9.1.4 Trip Blanks

Trip blanks consist of containers of analyte-free water that remain unopened in the sample coolers throughout the sampling event. Trip blanks which will be analyzed for volatile organics and inorganics. Trip blank data will be used to assess potential sample exposure to non-site-related constituents during storage and transport. Trip blanks will be analyzed at a frequency specified in Table 1-4.

9.1.5 Background Samples

Water-column and sediment background samples will be obtained as specified in the Work Plans.

9.2 General Laboratory Procedures

Internal QC checks will be used to monitor data integrity. Control checks will include analyses of MS (and MSD), laboratory duplicates, laboratory blanks, QC samples, surrogates, and calibration standards.

Checks for analytical precision will include the calculation of relative percent difference (RPD) from the analysis of laboratory duplicate samples and matrix spike duplicates. Precision results will be compared to CLP guidelines.

Analytical accuracy will be monitored in the laboratory through the use of reference standards and matrix spikes. Matrix spikes are used measure the recovery of a known concentration spiked analyte. Spike recovery limits for TCL/TAL constituents, PCBs, and PCDDs/PCDFs are presented in Table 1-6.

A summary of the analytical program, including QC analyses for the RI, is provided in Table 1-4. As outlined in the CLP-SOWs (USEPA, 1991c; USEPA,

1991d), organic TCL QC samples will include matrix spikes and matrix spike duplicates for organic compounds. Inorganic TAL QC samples for inorganic compounds will include laboratory duplicates and matrix spike samples.

9.2.1 Laboratory Duplicates

To account for analytical variability, samples will be split in the laboratory (laboratory duplicates) and analyzed at the frequency specified in Table 1-4. Reproducibility requirements for inorganic analyses are as specified in the CLP-SOW (USEPA, 1991d).

9.2.2 Laboratory Blanks

Laboratory blanks will be used to measure solvent or reagent quality, glassware cleaning effectiveness, and instrument background. Laboratory blanks will be prepared at a frequency consistent with CLP guidelines (USEPA, 1991c; USEPA, 1991d).

9.2.3 Method Blanks

Sources of contamination in the analytical process, whether specific measurable analytes or a source of interference, need to be identified, isolated, and corrected. The intent of the method blank is to identify possible sources of contamination within the analytical process. For this reason, it is necessary that the method blank be initiated at the beginning of the process and encompass all aspects of the analytical method. The blanks will be used to assess glassware, reagents, instrumentation, or other potential sources of contamination affecting sample analysis. Analytical methods define the frequency of method blank analysis. In the absence of a specified frequency, a method blank is analyzed at a frequency of one per analytical batch or one for every 20 samples, whichever comes first.

9.2.4 Clean Bottle/Container Certification

Sample bottles will be supplied by the laboratory as certified-clean (I-Chem 300 series containers or equivalent). Certificates of analysis will be stored in the final evidence file.

9.2.5 Matrix Spikes/Matrix Spike Duplicates

The frequency of MS and MSD analyses for each medium to be analyzed is identified in Table 1-4. Samples analyzed for PCBs using USEPA SW-846 Method 8081 will be spiked according to specifications presented in Appendix S. Samples for TCL analyses will be spiked according to CLP protocols (USEPA, 1991c). Recoveries for TCL MS/MSD analyses will be expected to follow CLP guidelines (USEPA, 1991c). For CLP TCL pesticide/PCB analyses, PCBs will be analyzed in addition to standard CLP spiking compounds. Aroclor 1242 or 1254 will be added to the PCB-spiking solution at concentrations of 5 mg/kg and 0.5 micrograms per liter (ug/l) for solid matrices (soil, sediment, and paper-making residuals) and water samples, respectively. Recovery limits for matrix spike analyses are specified in Table 1-6.

Matrix spike data will be examined in conjunction with other indicators of accuracy such as surrogate spike (organic analyses) and MSB (PCB analyses) recovery data to assess the accuracy of the analytical method. Results outside of the specified range will require review and, if necessary, re-extraction and reanalyses. In the event that PCB MS recoveries are masked by interferences an assessment of accuracy based on PCB MSB and surrogate spike recoveries will be made. For example, the presence of PCBs in a sample may be sufficient to cause interferences and mask the

recovery of a MS; however, MSB recoveries can provide the necessary data to assess the accuracy of method performance.

9.2.6 PCB Matrix Spike Blanks

MSBs will be included with water and soil/sediment/paper-making residuals PCB analyses to allow an additional assessment of the accuracy of the data. The MSBs provide an assessment of method performance without interferences which may be present in environmental samples.

In MSB analyses, clean matrix is spiked and recoveries are calculated. The clean matrix will consist of laboratory reagent water for water analyses. Clean dried sand will be employed for soil/sediment/paper-making residuals analyses. MSB data will be assessed in conjunction with MS data, as discussed in Section 9.2.5 above.

9.2.7 Surrogate Spikes

Surrogates are compounds that are unlikely to be found in nature but which have properties similar to the analytes of interest. This type of control is used primarily in the GC/MS and GC laboratories. The intent of a surrogate spike is to provide insight into the efficiency of an analytical method on a sample-specific basis. This control reflects analytical conditions which may or may not be attributable to sample matrix. If results of surrogate spike analysis are outside specified control limits, the analytical results are evaluated in conjunction with other control measures. In the absence of other control measures, the integrity of the data cannot be verified. Reanalysis of the sample with additional controls may be necessary to assess the source of deviation.

Analytical methods described in Section 7.2 will be utilized for guidance on the use and quality control of surrogate spikes.

9.2.8 Internal Standards

Internal standard area response is monitored in the GC/MS laboratory. The tolerance ranges of these standards are as specified in the CLP-SOW (USEPA, 1991c). The following criteria is applied: the area response of any internal standard cannot fall below 50 percent of its corresponding value in the preceding calibration check standard, nor can it rise above 100 percent of its value. If internal standard areas in any sample exceeds the specified tolerances, the sample is reanalyzed to determine if the deviation is due to laboratory error or matrix interference.

9.2.9 Quality Control Check Samples

Analytical methods described in Section 7.2 will be utilized for guidance on the use of QC check samples.

9.2.10 Calibration Standards

Analytical methods described in Section 7.2 will be utilized for guidance on the use of laboratory instrument calibration standards.

An initial calibration will be run following method specified guidelines. Continuing calibration check standards will be run throughout the analytical sequence at a frequency specified by the method.

In the absence of a specified frequency, calibration check standards should be analyzed after every 10 samples. In analyses where internal standards are used, a calibration check standard need only be run at the beginning of an analytical series.

9.2.11 Reference Standards

Reference standards are standards of known concentration that are prepared from a source independent of the calibration standards. These reference standards are generally available through the USEPA and the

National Bureau of Standards, or as specified in the analytical method. Reference standards are included in the analytical process as specified in the appropriate analytical method. The intent of reference standard analysis is to provide insight into the proficiency demonstrated within an analytical series. This includes the preparation of calibration standards, the validity of the calibration, sample preparation, instrument configuration, and analyte identification and quantitation. A reference standard analysis which exceeds specified tolerances may indicate that all associated samples be reanalyzed. The representativeness of the standard analysis in relation to the individual samples must be considered in evaluating the results.

SECTION 10 - PERFORMANCE AND SYSTEMS AUDITS

10.1 Field Procedures

Performance and system audits will be completed during this project to ensure that quality data are obtained.

10.1.1 Internal Systems Audits

A field internal systems audit is a qualitative evaluation of all components of field QA/QC. The systems audit compares scheduled QA/QC activities presented in this document with actual QA/QC activities completed.

The Blasland & Bouck Field Manager and QAM will periodically confirm that work is being performed consistent with the Work Plans, QAPP, and FSPs.

10.1.2 Performance Audits

The Blasland & Bouck Field Manager will monitor field performance. Performance audit summaries will be included in monthly field reports during periods of field activity and will contain an evaluation of field measurements and field meter calibrations to verify that measurements are taken according to established protocols. The Blasland & Bouck QAM will review all field reports and will communicate any related concerns to the Blasland & Bouck Project Manager or Field Manager as appropriate. In addition, the Blasland & Bouck QAM will review the rinse and trip blank data to identify potential deficiencies in field sampling and cleaning procedures.

10.1.3 External Audits

The MDNR, USEPA, and MDNR's oversight contractor may conduct audits of both field and laboratory operations, if required.

10.2 Laboratory Procedures

Performance and systems audits will be completed during this project to ensure high quality data.

10.2.1 Internal Systems Audits

The internal QC program for the laboratory should consist of two key segments:

- Documented procedures for daily operation of the laboratory; and
- Inspection and review of laboratory procedures by the laboratory QAO.

Examples of laboratory procedures that are required for daily operation include:

Instruments and Equipment

All instruments and equipment are operated according to laboratory SOPs, which include details of calibration, use, and maintenance. The laboratory QAO inspects the use of instruments and the adherence to SOPs as part of regular inspection activities.

Reagents

All reagents are labeled according to laboratory SOPs. This procedure requires labeling of name, concentration, expiration date, storage condition, date of preparation, and name of person who prepared the reagent. The laboratory QAO includes reagents in the regular inspection program.

The assessment of laboratory analytical data is initiated at the bench level. The analyst directly responsible for the test understands the current operating acceptance limits. The analyst can directly accept or reject the data generated and consult with the laboratory supervisor for any corrective action. Data reported by the scientist or technician is entered into a

central data retrieval system. All data is subject to review by the Laboratory Project Manager, who is also responsible for monitoring QC and analytical procedures.

Audit Procedures

A comprehensive QA/QC program is coordinated by the laboratory QAO, who is independent of all operating departments and reports directly to management. The laboratory QAO reviews, approves, and distributes all technical and administrative methods and procedures used in project and assay work. These written methods and SOPs, including an updated project file, are part of the official records.

The laboratory QAO conducts semi-annual inspections. The following items are typically inspected:

- Sample handling;
- Chemical assay procedures and validation;
- Reagent preparation and labeling;
- Analytical controls and standards;
- Instrument calibration and maintenance;
- Results of analyses;
- Data recording and analysis;
- Data archiving procedures;
- Preventative maintenance procedures for laboratory instruments; and
- Training, documentation, and personnel qualifications.

Inspection reports are issued to management for all inspections and are kept on file by the laboratory QAO. Adverse findings must be addressed to the Laboratory Director, and any such findings, and the steps

taken to correct deficiencies, will be documented in the Corrective Action Request (Appendix AA). The laboratory QAO inspection records will be available to the Laboratory Director and Blasland & Bouck.

10.2.2 Performance Audits

The laboratory QAO will evaluate laboratory precision and accuracy through comparison of results of duplicate samples and analyses, and through review of QC samples, spikes, and blanks.

10.2.3 External Audits

The USEPA, MDNR, and other applicable regulatory agencies may conduct audits of both field and laboratory operations, if required.

As a participant in state and federal certification programs, the laboratory is audited by representatives of the various regulatory agencies issuing certification. Audits are usually conducted on an annual basis and focus on laboratory conformance to the specific program protocols for which the lab is seeking certification. The auditor reviews sample handling and tracking documentation, analytical methodologies, analytical supportive documentation, and final reports. The audit findings are formally documented and submitted to the laboratory, with corrective action requirements indicated as necessary.

SECTION 11 - PREVENTIVE MAINTENANCE

11.1 Field Procedures

Field analytical equipment to be used in this project include a PID; a nephelometer (turbidity measurement); a thermometer; and conductivity, DO, water velocity, and pH meters. Preventive maintenance procedures for the equipment will follow manufacturer's instructions. Details of equipment operation procedures are provided in the Appendices. A summary of field instrument preventative maintenance procedures, including frequency requirements, is provided in Table 6-1.

11.2 Laboratory Procedures

11.2.1 General

Laboratory instrument and equipment documentation procedures are provided in the laboratory SOPs. Documentation will include details of any observed problem(s), measures taken to correct the problem(s), routine maintenance, and instrument repair (which will include information regarding the repair and identification of the individual who performed the repair). The laboratory staff is familiar with the instrumentation and its required maintenance.

Laboratory equipment maintenance will generally follow the guidelines recommended by the manufacturer. Analytical balances will be checked and adjusted at regularly scheduled intervals. A malfunctioning instrument will be repaired immediately by in-house staff or through a service call to the manufacturer.

11.2.2 Instrument Maintenance

Analytical instrumentation is maintained and serviced according to manufacturer specifications. Each analytical instrument has a specific maintenance logbook; all routine maintenance and repair work is recorded with the date and the initials of the individual performing the maintenance task. Reports from outside service work are incorporated into the instrument logbooks. For GC/MS instrumentation, all performance checks (decafluorotriphenylphosphine and p-bromofluorobenzene) associated with instrument tuning for an instrument are maintained in a separate loose-leaf notebook (Aquatec, 1993).

11.2.3 Equipment Monitoring

On a daily basis, the operation of balances, incubators, refrigerators, the high-purity water system, furnaces, ovens, air conditioning, and building facilities are documented on Aquatec worksheets. Any discrepancies are immediately reported to the appropriate laboratory or technical services personnel for resolution. All analytical balances are checked with Class "S" weights, and a thermometer is resident in each refrigerator/freezer.

A computer-based system designed to continuously monitor the temperatures inside the refrigerator/freezer units is used in addition to the daily manual check. The thermometer probe is packed in sand and is connected to the computer system which records the temperatures. Acceptable temperature excursion limits have been established and set within the computer program. Each temperature reading is immediately compared to the limits, and if a value falls outside of the established limits, a buzzer will sound and corrective action will be initiated immediately. Provisions have been made to contact technical services

personnel at home during "off hours" to insure that the refrigeration systems are not out of control for more than 20 minutes (Aquatec, 1993).

Maintenance Control Charts

In addition to routine and preventative maintenance, control charts are maintained for several instruments as indicators of when maintenance may be necessary. In the GC/MS laboratory, instrument sensitivity is monitored using internal standards. The internal standard solution is injected into every standard, blank, and sample acquired on the GC/MS. The recovery of internal standards serve as an indicator of the overall condition of the instrument. Instrumentation problems can be diagnosed by tracking the response patterns on the control charts. The control charts are updated following each analysis (Aquatec, 1993).

SECTION 12 - CALCULATION OF DATA QUALITY INDICATORS

12.1 General

Overall data assessment is a cooperative effort of project personnel. Both laboratory and field personnel are responsible for reviewing data prior to submittal. Data is also assessed for accuracy, precision, and completeness by Blasland & Bouck, MDNR, and USEPA Region V QAOs.

12.2 Field Measurements

Field data will be assessed by the Field Manager and QAC. The field results will be reviewed for compliance with the established QC criteria that are specified in the QAPP and FSPs. Accuracy of the field measurements will be assessed using daily instrument calibration, calibration check, and analysis of blanks. Precision will be assessed through multiple readings of single samples.

12.3 Laboratory Data

Laboratory results will be assessed by the QAM for compliance with required precision, accuracy, completeness and sensitivity as presented below.

Precision: Precision of laboratory analysis will be assessed by comparing the analytical results between MS/MSD analyses for organic analysis, and laboratory duplicate analyses for inorganic analysis. Precision of field measures will be assessed using field duplicates. The RPD will be calculated for each pair of duplicate analysis as follows:

$$RPD = \frac{S - D}{(S + D)/2} \times 100$$

Where:

S = First sample value (initial or MS value)
D = Second sample value (duplicate or MSD value)

Accuracy: Accuracy of laboratory results will be assessed for compliance with the established QC criteria that are described in this QAPP using the analytical results of MS/MSD samples, surrogates, and blanks. The percent recovery (%R) of matrix spike samples will be calculated using the equation below:

$$\%R = \frac{A - B}{C} \times 100$$

Where:

A = The analyte concentration determined experimentally from the spiked sample.
B = The background level determined by a separate analysis of the unspiked sample.
C = The amount of the spike added.

Completeness: The data completeness of analytical results will be assessed for compliance with the amount of data required for decision making. The completeness is calculated using the equation below:

$$\text{Completeness} = \frac{\text{Valid Data Obtained}}{\text{Total Data Planned}} \times 100$$

Sensitivity: The achievement of MDLs depends on instrumental sensitivity and matrix effects. Therefore, it is important to monitor the instrumental sensitivity to ensure good data quality through constant checks on instrument performance. The method detection limits is defined as the

minimum concentration of a substance that can be measured with 99 percent confidence that the concentration is above zero. The MDL is calculated as follows:

$$MDL = t_{(n-1,\ 1-\alpha=0.99)} \times s$$

Where:

s	=	standard deviation of replicate analyses
$t_{(n-1,\ 1-\alpha=0.99)}$	=	student's t-value for a one-sided 99% confidence level and a standard deviation estimate with n-1 degrees of freedom

SECTION 13 - CORRECTIVE ACTION

13.1 Field Procedures

Corrective action procedures are followed to assure that data quality is maintained during the RI/FS. Corrective actions include procedures to promptly investigate, document, evaluate, and correct any deficiencies in data quality.

If a condition is noted to have an adverse effect on data quality, corrective action will be taken so as not to repeat this condition. Condition identification, cause, and corrective action implemented will be documented and reported to the Blasland & Bouck RI/FS Project Manager and QAM.

Examples of situations which would require corrective action include the following:

- Protocols, as defined by the QAPP and FSP, have not been followed;
- Pre-determined data acceptance standards are not obtained;
- Procedures are not properly performed;
- Equipment is not in proper working order or properly calibrated;
- Sample and test results are not traceable;
- QC requirements have not been met;
- Improper approvals; or
- Issues resulting from systems or performance audits need to be addressed.

Project personnel will monitor ongoing work performance in the normal course of daily responsibilities.

13.2 Laboratory Procedures

From the results of the routine data assessment procedures, it is often possible to identify the source of analytical variability (i.e., solvent, changing analytical conditions, incomplete extraction or recovery). Once the source of the variability is identified, corrective action can be initiated. Such action could include increased analysis of duplicates, more frequent instrument calibration, changing solvents, or reducing sample holding times.

When a condition is noted to have an adverse effect on data quality, corrective action will be taken so as not to repeat this condition. Condition identification, cause, and proposed corrective action will be documented and reported to the Laboratory Project Manager and Laboratory QAO. Implementation of any corrective action(s) will be verified by documented follow-up action.

Corrective action may be initiated, at a minimum, under the following conditions:

- Protocols as defined by this QAPP are not followed;
- Pre-determined data acceptance standards are not obtained;
- Procedures are not properly performed;
- Equipment is not in proper working order or calibrated;
- Sample and test results are not completely traceable;
- QC requirements are not met;
- Improper approvals; or
- Issues resulting from systems or performance audits need to be addressed.

Laboratory personnel will continuously monitor ongoing work performance in the normal course of daily responsibilities. Additional details of corrective action procedures used by Aquatec are provided below.

Corrective action procedures are often handled at the bench level by the analyst, who reviews the preparation or extraction procedure for possible errors, checks the instrument calibration, spike and calibration mixes, instrument sensitivity, etc. If the problem persists or cannot be identified, the matter is referred to the laboratory supervisor, manager, or QA department for further investigation. Once resolved, full documentation of the corrective action procedure is filed with the QA department. Corrective action may include:

- Reanalyzing the samples, if holding time criteria permits;
- Resampling and analyzing;
- Evaluating and amending sampling procedures;
- Evaluating and amending analytical procedures; or
- Accepting data and acknowledging the level of uncertainty.

SECTION 14 - QUALITY ASSURANCE REPORTS TO MANAGEMENT

14.1 Interim QA/QC Reports

The Blasland & Bouck QAM will review all validated field and laboratory data for conformance to the FSP and QAPP directives. A complete field data package consists of:

- All sample chain-of-custody forms; and
- Field reports, including documentation of field activities, QA/QC summaries, and all relevant instrument calibration and performance data.

A complete laboratory data package consists of:

- All laboratory-completed chain-of-custody forms reconciled with field-initiated chain-of-custody forms;
- Case narrative(s), including all sample/analysis summary forms;
- QA/QC summaries, including all supporting documentation;
- All relevant CLP-required supporting documentation (USEPA, 1991c; USEPA, 1991d); and
- Documentation showing the laboratory's ability to attain the specified method detection limits for all target constituents in all required matrices.

To be considered compliant a data package must have the following characteristics:

- The package is complete as defined above;
- The data has been produced and reported in a manner consistent with the requirements of the QAPP;
- All holding times have been met for each parameter;

- All protocol-required QA/QC criteria have been met;
- All instrument tune and calibration requirements have been met;
- All data reporting forms are complete for all samples submitted; and
- All problems encountered during the analytical process have been reported in the case narrative(s), along with any and all actions taken by the laboratory to correct these problems.

An interim QA/QC compliance report form (Appendix BB) will be completed for each data package received. Non-compliance will be documented in the interim QA/QC compliance report. Elements of a program determined to be in non-compliance will be discussed with the involved parties. These findings will be presented to the Project Manager for corrective action.

A discussion of quality assurance issues will be provided in the monthly progress report submitted to the MDNR Project Manager. In addition, supplementary interim QA reports will be provided to management as necessary to discuss project concerns which may require corrective action.

The Project Manager is responsible for ensuring that all corrective actions are resolved promptly and satisfactorily by project personnel.

14.2 RI Reporting

The RI Report prepared by Blasland & Bouck will contain a separate QA/QC section(s) summarizing the quality of data collected and/or used as appropriate to the project. The Blasland & Bouck QAM maintains responsibility for these summaries and will rely on written reports/memoranda documenting the data assessment and validation activities.

In addition, records will be maintained to provide evidence of the QA activities. A quality assurance records index will be initiated at the beginning

of the project, and all information received from outside sources or developed during the project will be retained by Blasland & Bouck. Upon termination of an individual task or work assignment, working files will be processed for storage as QA records.

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TABLE 1-2

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

Sediment/Soil/Paper Making Residuals
Data Quality Objectives

Data Type	Investigation Objectives	Data Quality Level[1]	Data Use(s)[2]
TARGET CONSTITUENTS			
PCBs	- Define extent of PCBs - Determine boundaries of affected areas - Identify concentration ranges present - Estimate mass of PCBs at site - Evaluate human health risks - High resolution chromatograms will be used to address variations in PCB sources and environmental alterations	IV equiv. III II I	RA, SC, EA, ED RA, SC, EA, ED RA, SC, EA, ED RA, SC
CLP TCL	- Determine the presence of organic analytes of concern other than PCBs in soils/sediments, and residuals	IV	SC
CLP TAL	- Determine the presence of inorganic analytes of concern	IV	SC
PCDDs/PCDFs	- Determine the presence of PCDDs/PCDFs	IV equiv.	SC

(See Notes on Page 5)

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TABLE 1-2
(cont'd)

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

Sediment/Soil/Paper Making Residuals Data Quality Objectives

Data Type	Investigation Objectives	Data Quality Level[1]	Data Use(s)[2]
SUPPLEMENTAL PARAMETERS			
Total Organic Carbon	- Aid in the "normalization" of PCB concentration and the assessment of gradients in bioavailable PCB concentrations	III	SC, ED
Oil and Grease	- Determine non-volatile hydrocarbon content	III	SC, ED
Radioisotopes	- Use as a chronostratigraphic marker - Identify historic and current sediment deposition trends (1954 to present) - Infer historic and current chemical deposition trends	III	SC
PHYSICAL PARAMETERS			
One-Dimensional Consolidation Test	- Estimate deformation characteristics of media - Determine stability of dikes	III	EA, ED
Particle Size Analysis	- Characterize depositional environments - Evaluate physical characteristics of media - Investigate possible correlation of particle size with chemical concentrations. (Fine particles are generally associated with low flow/deposition and are considered likely media for chemicals which tend to sorb to these materials)	III	EA, ED, SC

(See Notes on Page 5)

TABLE 1-2
(cont'd)

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

Sediment/Soil/Paper Making Residuals
Data Quality Objectives

Data Type	Investigation Objectives	Data Quality Level[1]	Data Use(s)[2]
PHYSICAL PARAMETERS (cont'd)			
Moisture Content	- Evaluate physical characteristics of media	III	EA, ED, SC
Atterberg Limits	- Assist the analysis of dike stability and deformation - Evaluate physical characteristics of media	III	EA, ED
Hydraulic Conductivity	- Assist the analysis of media permeability - Evaluate physical characteristics of media	III	EA, ED
Organic Content (Loss on Ignition)	- Evaluate physical characteristics of media	III	EA, ED
Specific Gravity	- Evaluate physical characteristics of media	III	EA, ED
Triaxial Compression	- Evaluate strength characteristics of media - Assist the analysis of dike stability	III	EA, ED
Unconfined Compression Strength	- Evaluate strength characteristics of media - Assist the analysis of dike stability	III	EA, ED
Direct Shear Test	- Evaluate strength characteristics of media - Assist the analysis of dike stability	III	EA, ED
Bulk Density	- Evaluate physical characteristics of media	III	EA, ED

(See Notes on Page 5)

TABLE 1-2
(cont'd)

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

Sediment/Soil/Paper Making Residuals
Data Quality Objectives

Data Type	Investigation Objectives	Data Quality Level[1]	Data Use(s)[2]
PHYSICAL PARAMETERS (cont'd)			
Vane Shear Test	- Evaluate strength characteristics of media - Assist the analysis of dike stability	III	EA, ED
Pressure Meter Testing	- Evaluate deformation characteristics of media	III	EA, ED
Cone Penetration Test	- Evaluate strength characteristics of media - Assist the analysis of dike stability	III	EA, ED

(See Notes on Page 5)

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TABLE 1-2
(cont'd)

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

Sediment/Soil/Paper Making Residuals Data Quality Objectives

Notes:

1 Data Quality Levels

IV	CLP Routine Analytical Services
IV equiv.	Analysis using USEPA SW-846 methods, with CLP type documentation
III	Laboratory analysis using methods other than CLP, without CLP documentation
II	Field analysis
I	Field screening

2 Data Uses

SC	Site Characterization
HS	Health and Safety
RA	Risk assessment
EA	Evaluation of remedial alternatives
ED	Engineering design of alternative

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ALLIED PAPER, INC. OPERABLE UNIT REMEDIAL INVESTIGATION/ FOCUSED FEASIBILITY STUDY

FIELD SAMPLING PLAN

Kalamazoo River Study Group

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

July 1993

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

SA 092629 KZ-KRSG-0164443

Allied Paper, Inc. Operable Unit Remedial Investigation/ Focused Feasibility Study

Field Sampling Plan

Kalamazoo River Study Group

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

July 1993

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DISCLAIMER

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PREFACE

This Field Sampling Plan (FSP) supports the Remedial Investigation/Focused Feasibility Study (RI/FFS) Work Plan for the Allied Paper, Inc. Operable Unit (OU) prepared on behalf of the Kalamazoo River Study Group (KRSG) by Blasland & Bouck Engineers, P.C. (Blasland & Bouck). The FSP sets forth the methods to be used in the RI/FFS field investigations.

A Quality Assurance Project Plan (QAPP) has been developed for the RI/FFS investigations. The QAPP is comprehensive for all Operable Units and the Kalamazoo River and Portage Creek field activities. The FSPs have been developed specifically for the individual operable units.

ALLIED PAPER, INC./PORTAGE CREEK/KALAMAZOO RIVER
SUPERFUND SITE
ALLIED PAPER, INC. OPERABLE UNIT
FIELD SAMPLING PLAN

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SECTION 1 - INTRODUCTION

1.1 General

This Field Sampling Plan (FSP) was prepared to document field sampling procedures in support of the Remedial Investigation/Focused Feasibility Study (RI/FFS) for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, Allied Paper, Inc. Operable Unit (OU) shown on Figure 2 of the OU Work Plan (Blasland & Bouck, 1993a). This Operable Unit includes the Bryant and Monarch historic residual dewatering lagoons (HRDLs), the former residuals decant lagoons (FRDLs), the former Type III landfill, the western area, and the former Bryant Mill Pond area. This FSP provides details on sampling objectives, locations and frequency of sampling, sampling and field procedures for each matrix of concern, sample handling and documentation, and field quality assurance/quality control (QA/QC) procedures.

The procedures specified herein will be used for sampling soil, paper-making residuals, sediment (in-stream and floodplain), groundwater, air, surface water, and biota. Laboratory and applicable QA/QC procedures for the collected samples are discussed in a separate document entitled the Quality Assurance Project Plan (QAPP) (Blasland & Bouck, 1993b). The field procedure(s) used in obtaining a given sample may have a significant effect on analytical data generated from that sample. Therefore, it is imperative that standardized protocols be utilized and that sample integrity and quality assurance standards be maintained during site investigations and environmental sampling events.

This FSP fulfills a requirement of the Administrative Order by Consent (AOC), which became effective on December 28, 1990, between the Michigan

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Department of Natural Resources (MDNR) and the members of the Kalamazoo River Study Group (KRSG). This plan is intended to complement the QAPP, which together comprise the Sampling and Analysis Plan, and dictate the QA/QC and field sampling procedures that will be followed during the RI/FFS. This FSP contains a compilation of sampling methods which provides practical, state-of-the-art field methods. It is subject to modifications where unforeseen sampling difficulties present themselves, and will be updated to reflect collection of any additional samples/data not covered by the current version of this plan.

1.2 Sampling Objectives

The objectives of the field sampling activities are to collect samples that can be used to characterize the site. The results of the Site Investigation portion of the RI will ultimately provide data to be used in the assessment of preliminary remedial alternatives during the FFS.

The goals of the RI, as stated in the AOC, are to:

- Fully characterize the nature of the residuals at the OU;
- Define any identifiable regulated constituent sources at the OU;
- Determine the vertical and horizontal extent of regulated constituents originating at the OU;
- Spatially quantify regulated constituents to the extent necessary to enable preparation of an Endangerment Assessment and a FFS, and to the extent that such constituents may be attributable to the OU;
- Identify potential migration pathways and movement; and
- Quantify public health and environmental risk.

This FSP provides the information necessary for field sampling personnel to attain these goals for fulfillment of the overall Site Investigation objectives.

SECTION 2 - SAMPLING AND FIELD PROCEDURES

2.1 Introduction

As part of the various field investigations, several standard field procedures will be performed. They include:

- Soil/Residual Boring Drilling and Sampling;
- Floodplain Soil Sampling;
- Groundwater Monitoring Well Installation;
- Piezometer Installation;
- Groundwater Sampling;
- In-Situ Hydraulic Conductivity Measurement;
- Gamma-Ray Logging;
- Air Monitoring and Sampling;
- Clarifier Sampling;
- Sediment Sampling;
- Surface Water Sampling; and
- Biota Sampling

This section of the FSP introduces and references the appropriate detailed procedures in the appendices, including ancillary procedures for equipment cleaning, water level measurements, well development, field measurements, and calibration and maintenance of field instruments. Sample handling, packing, and shipping procedures together with field QA/QC requirements are described in Section 3. All sample locations, analytical parameters, and geotechnical analyses for the following sections are summarized in Table 2-1.

2.2 Soil/Residual Boring Drilling and Sampling

The borings at the Allied Paper Inc. OU will include: five hand borings around the perimeter of the Bryant HRDL and Monarch HRDL (BLHB-1 through BLHB-3 and MLHB-1 through MLHB-2); six borings within the FRDLs (DLHB-1 through DLHB-6); five borings within the Monarch HRDL (MLSS-1 through MLSS-5); five borings near the former Type-III Landfill (MA-1 through MA-5); eight borings west of the Bryant HRDL and the former Type-III landfill (WA-1 through WA-8); three soil borings south of the former Type III Landfill (FLF-1 through FLF-3) and four deep borings through the dikes of the Bryant HRDL to obtain geotechnical samples (GEO-1, GEO-2, MW22B, and MW123B). The locations of these borings are shown on Figure 5 of the OU Work Plan. Borings in the former Bryant Mill Pond area and Portage Creek sediment samples are described in Section 2.3.

Split-spoon (ASTM D1586), thin-walled piston samplers (ASTM D4700), or Shelby tubes (ASTM D1587) will be used to obtain samples on a continuous basis. Split-spoon samplers will be the preferred method of sampling with the piston samplers being used in conditions where the materials cannot be recovered using split-spoon sampling methods. Shelby tubes will be used to collect undisturbed samples for geotechnical testing. Materials such as paper-making residuals or very fine, saturated sands may require the use of the piston sampling method.

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Borings will be advanced with a drill rig, where possible, using either the hollow-stem auger method or the driven casing method, depending on the nature of the subsurface materials. The hollow-stem auger is the preferred method as it does not require the use of drilling fluids or additives other than water. The

alternate method (driven casing) requires the use of a drilling fluid to lift the cuttings from the boring, but does not require the use of any additives other than water or bentonite. The drilling fluid to be used will be water with the addition of bentonite only when necessary. In situations where physical features limit the use of drill rigs, borings will be completed with either a hand-driven or a portable power-driven split-spoon sampler, depending on the required depth and material. The detailed procedures for drilling soil borings are provided in Appendix A.

The disturbed samples will be obtained by split-spoon sampling (ASTM D1586) at the following boring locations: GEO-1, GEO-2, P-1, P-2, P-3, MW123B, MW12R, MW122B, MW2A, MW20B, MW19BR, MW7B, MW8A, DLHB-2, MW121B, MW125B, MLHB-1, and MLSS-4. Other locations may be substituted if site access or other logistical reasons make these locations unavailable. The GEO-1 and GEO-2 borings will be advanced to a depth of at least 50 feet. The borings will be sampled continuously with split-spoons (ASTM D1586) to 10 feet into native soils and at 5-foot intervals after that to boring completion. If the split-spoon method is not sufficient, then a thin-walled piston sampler or coring device will be used.

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The relatively undisturbed samples will be obtained at the following locations: MW121B, MW19BR, MW2A, MW20B, MW7B, MW8A, DLHB-2, MLSS-4, MW123B, GEO-1, and GEO-2. The samples will be collected using a Shelby tube (ASTM D1587) or thin-walled piston sampler (ASTM D4700). The depth of the samples collected using Shelby tubes or thin-walled piston samplers will be determined in the field. The goal is to obtain six samples of residual soils, native peats (if present), and soft to medium stiff clays (if present). More

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samples may be obtained or samples may be obtained at other borings if peats or soft clays are present. Thin-walled samples with less than a foot of recovery may be discarded and resampled.

Field vane shear testing (ASTM D2573) will be performed in selected borings if field conditions are appropriate. The vane shear testing is useful in measuring shear strength. Vane shear testing is generally only appropriate in materials such as the residuals, relatively non-fibrous peats, and soft to stiff clays. Vane shear testing will be performed at one to two depths (if appropriate) in borings MW121A, MW19BR, MW2A, MW20B, MW7B, MW8A, DLHB-2, MLSS-4, MW123, GEO-1, and GEO-2. A sample of the soil at or close to the test depth for index and/or strength testing will be collected.

Pre-field cleaning procedures, post-field cleaning procedures, and cleaning procedures between borings are provided in Appendix B. While drilling the borings, soil/residual samples will be obtained as described in Appendix A. Samples of the subsurface material encountered during soil boring installation will be collected continuously (every 2 feet) until the required depth of the borehole is reached.

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Representative portions of all split-spoon samples will be retained in appropriate containers for: 1) visual classification by the supervising geologist and 2) laboratory analyses, where appropriate. A representative portion of each sample will be placed in a clean jar and the headspace screened with a PID. The results will be recorded on the boring log. The number, location, and laboratory analysis required for the samples obtained at the borings are identified in the Allied Paper, Inc. OU Work Plan (Work Plan). Representative samples, as directed in the Work Plan, will be analyzed for polychlorinated

biphenyls (PCBs), Contract Laboratory Program Target Compound List/Target Analyte List (CLP TCL/TAL) constituents, polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), or geotechnical parameters. The procedures for handling, packing, and shipping the samples are provided in Appendix C.

2.3 Floodplain Soil Sampling

A total of 12 soil borings will be drilled in the floodplain area associated with the former Bryant Mill Pond area (BMP-1 through BMP-12). The locations of these borings are shown on Figure 6 of the OU Work Plan. Surface samples BMSS-1 and BMSS-2 in the backyard along North Drive, and BMSS-3 and BMSS-4 below the bluff on the east side of the fence will be collected to assess the presence of PCBs in these areas. The procedures used to perform floodplain soil sampling, including floodplain soils of the former impoundments, are included in Appendix A (Part I). The borings at BMP-1 through BMP-5 will be collected by drill rig split spoon sampler, hand-operated split spoon sampler, or Lexan[R] tube, depending on conditions. If a split-spoon method is not sufficient then a thin-walled piston sampler or coring device will be used. Floodplain soils samples BMP-6 through BMP-12, will be collected using a hand-operated split-spoon sampler, Lexan[R] Tube, or a stainless steel bucket auger depending on field conditions. The sampling and analysis plan is provided in Table 2-1. Samples will be analyzed for PCBs or CLP TCL/TAL constituents as described in the Work Plan. The procedures for cleaning the equipment between each floodplain soil sample are provided in Appendix B. The sample intervals are shown on Table 2-2.

2.4 Groundwater Monitoring Well Installation

A total of 25 new groundwater monitoring wells will be installed. Of these, 13 will be shallow monitoring wells (MW2A, MW2P, MW8A, MW22A, MW120A, MW121A, MW122A, MW123A, MW124A, MW125A, MW126A, MW127A, and MW128A), 10 will be deep monitoring wells (MW7B, MW20B, MW22B, MW120B, MW121B, MW122B, MW123B, MW124B, MW125B, and MW126B), and two will be deep replacement wells (MW19BR and MW12R). The locations of these wells are shown on Figures 5 and 6 of the OU Work Plan. The monitoring wells will be installed in soil borings completed in accordance with the drilling methods described in Appendix D and the sampling methods described in Appendix A.

At most locations, 5 feet of well screen will be used, with the exception that shallow wells installed under water table conditions will have at least 10 feet of screen with no more than 7 feet of the screened interval extending below the water table. The screen lengths for each well are detailed in the Work Plan. A filter pack, consisting of an appropriately sized silica sand, will be installed in the annular space around the screen and will extend to approximately 2 feet above the top of the screen except where a well is installed immediately below the base of residuals. At these locations the filter pack will extend only 6 inches above the screened interval. The purpose of the filter pack is to filter out particles from the adjacent formation; stabilize aquifer materials to reduce settlement of materials above the well intake during well development; and increase the well's effective diameter and thereby increase water flow into the well. A bentonite seal, at least 2 feet thick, will be installed in the annular space above the sand filter pack. In the annular space above the bentonite seal, a cement/bentonite grout (up to 4 percent bentonite) will be placed by

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tremie pipe to the surface. A more detailed description of monitoring well installation procedures and methods is presented in Appendix D.

All monitoring well casings and screens will be cleaned prior to installation, using the procedures in Appendix B.

Upon completion, each monitoring well will be developed to remove fine-grained materials that have settled in or around the well during installation, and to improve the hydraulic connection between the monitoring well and the surrounding formation. The procedures used for developing monitoring wells are provided in Appendix E. Wells screened in residuals will not be developed. After the monitoring wells are developed, water levels will be measured following procedures provided in Appendix F.

Gamma-ray logging will be performed at the deep well of each well cluster and at selected boreholes, including MW19D, MW16C, MW11, and MW25. The purpose of recording the natural gamma radiation of the subsurface units will be to correlate the subsurface units underlying the site. This is especially important in areas where clay layers may underlie a site and the continuity of these clays needs better definition. The procedure for logging is described in Appendix G.

The physical condition of all existing monitoring wells will be ascertained using the procedures in Appendix H. Existing groundwater monitoring wells at the OU will be re-developed, as necessary, following the methods provided in Appendix E. If, during the well inspection or re-development of the existing wells, it is determined that the well needs to be decommissioned, the procedures provided in Appendix I will be followed.

Upon completion of each monitoring well, a designated measuring point will be marked on the well and surveyed to an existing benchmark. Vertical and horizontal control will be established using standard, accepted surveying methods by a licensed surveyor.

2.5 Piezometer Installation

A total of six piezometers will be installed in the dike of the Bryant HRDL. These will be installed in three sets (P-1 through P-3) of two piezometers each. The locations of these piezometers are shown on Figure 2 of the OU Work Plan. These piezometers will be installed for water level measurements utilizing the same drilling and sampling methods described in Section 2.2 and Appendix A. Descriptions of piezometer installation procedures are presented in Appendix D.

Upon completion, piezometers that yield water will be developed to provide a good hydraulic connection between the screened zone and the formation. The piezometer development procedures are described in Appendix E.

2.6 Groundwater Sampling

As directed by MDNR, one round of groundwater sampling from the monitoring wells will be conducted. However, MDNR may determine a second round of sampling may be necessary to sufficiently characterize the groundwater based upon the results of the first round and therefore a second round would not be necessary.

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Prior to groundwater sampling, the water level measurement of all wells to be sampled at the site will be taken following the procedures in Appendix F. A total of 51 groundwater samples will be obtained from the monitoring wells

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on one occasion in accordance with the procedures in Appendix J and as described in the Work Plan (Blasland & Bouck, 1993a). Specifically all newly installed wells listed in Section 2.5 and the following 27 existing wells will be sampled: MW1, MW2, MW3, MW5, MW7, MW8, MW11, MW12, MW15, MW16B, MW16C, MW17A, MW17B, MW18, MW19C, MW19D, MW20, MW21, MW23, through MW26, MW104, MW106, MW108, MW112, and MW114. The pre-field cleaning procedures, and the cleaning procedures during and after groundwater sampling are provided in Appendix B.

Groundwater samples will be collected and analyzed in the field for temperature, specific conductance, and pH prior to sampling, during well evacuation, and at the time of collection. Turbidity will be measured at the time of collection. The procedures for measuring these parameters in the field are provided in Appendix K.

2.7 In-Situ Hydraulic Conductivity Measurement

In-situ hydraulic conductivity measurements using slug tests will be obtained at all newly installed and selected existing wells using the procedures in Appendix L. Slug tests will be performed after the first round of groundwater samples have been collected. Slug tests can be performed by two different techniques 1) by introducing a solid cylinder of known volume (falling head test); or 2) by withdrawal of a solid cylinder of known volume from the well after the well has been returned to its static level (rising head test). By monitoring the rate of changing water levels, hydraulic conductivity estimates can be calculated. However, as the use of data from a rising head test is typically more representative of the aquifer, rising head test data will be used to calculate

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estimates of the hydraulic conductivity at the OU. The formulae of Hvorslev (1951) and/or Bouwer-Rice (Bouwer and Rice, 1976; Bouwer, 1989) will be used to calculate a value for the hydraulic conductivity. Calculations may be performed using computer programs.

2.8 Gamma-Ray Logging

Gamma-ray logging will be conducted at all deep wells at each well cluster, and at existing wells including: MW19D, MW16C, MW11, and MW25. Appendix G discusses gamma-ray logging procedures.

2.9 Air Monitoring and Sampling

The air monitoring to be performed during the sampling activities at the various study areas will consist of work-area air monitoring (Appendix M) and ambient air monitoring (Appendix N). Four stations will be placed at the locations indicated on Figure 9 of the OU Work Plan.

The work-area monitoring is intended to protect site workers. Field personnel will monitor volatile organic compounds (VOCs) in certain situations as detailed in the Health and Safety Plan (HSP) by using a hand-held monitoring instrument (Appendix M). Action levels and levels of protection will be implemented as described in the HSP, presented under separate cover (Blasland & Bouck, 1993c).

In addition, an ambient air sampling program will be conducted at the Allied Paper, Inc. OU. The details of the program are presented in the Work Plan. The Ambient Air PCB Sampling Program at the Allied Paper, Inc. OU

consists of an air sampling program to measure possible airborne PCB sources for a period of several months.

To provide supporting air sampling data, an ambient air and meteorological program is required during the sampling activities. The overall strategy involves the determination of emission rates and subsequent air dispersion modeling to predict maximum downwind concentrations.

2.10 Clarifier Sampling

One sediment sample will be taken from the Monarch Clarifier (MC-1). The sediment sample will be obtained following the procedures described in Appendix O. The sediment sample may be archived at the field office for possible future analysis of physical characteristics.

2.11 Sediment Sampling

A total of 5 grab sediment samples will be taken from Portage Creek at the locations shown on Figure 6 of the OU Work Plan. The samples will be obtained using the procedures in Appendix O. These samples will be analyzed for PCBs and total organic carbon (TOC).

2.12 Surface Water Sampling

Collection of surface water samples will be performed during both base-flow and storm-event conditions. Samples will be collected from Portage Creek at the Alcott Street dam and from the culvert underneath Cork Street. The surface water sampling procedures are provided in Appendix P. Velocity profiles may

be developed for select river/creek cross-sections. Procedures for obtaining the velocity profile measurements are included in Appendix P.

A duplicate of each surface water sample will be collected and measured in the field for temperature, pH, conductivity, dissolved oxygen (DO), and turbidity at the time of collection. Samples will also be collected and analyzed for suspended solids. The procedures for measuring these parameters are provided in Appendix K.

2.13 Biota Sampling

Samples of bass, walleye, carp, white suckers less than 8 inches, and snapping turtle along the creek will be taken following procedures described in the Biota Sampling Plan to be produced by the MDNR. This plan will also identify the number of samples to be taken and specify the procedures to be followed.

SECTION 3 - FIELD SAMPLING QUALITY ASSURANCE/ QUALITY CONTROL PROCEDURES

3.1 Introduction

This section discusses and defines the field quality assurance/quality control (QA/QC) procedures to be used during implementation of the Work Plan. These procedures will work in conjunction with the QA/QC procedures contained in the "umbrella" QAPP developed for the RI.

3.2 Sample Handling

3.2.1 Sample Collection Precautions

Exposure of samples to air should be minimized by placing the samples in containers as soon as possible after collection. Samples will be introduced into containers gently, so as to minimize agitation which might enhance volatilization. Liquid will be poured into a container without producing air bubbles during filling (e.g., when sampling for volatile organic compounds (VOC) no air bubbles should exist in sample container following collection). Samples will be re-collected if flow into container is turbulent.

No composite samples will be submitted for analysis of VOCs. This applies to all samples collected during the RI for VOC analysis. Presently, two types of composite samples for vertical integration are proposed for CLP TCL/TAL analysis (excluding VOCs):

- Composites of multiple spatially separate samples; and
- Composites of continuous samples over a specific interval (e.g., 0 to 1 foot).

From a practical standpoint, both types of samples require homogenization in the field prior to dispensing aliquots to sample containers. To avoid the production of questionable results for VOCs, which could result from sample homogenization, a different sample methodology will be used for VOCs; a relatively small aliquot from a discrete sample interval collected near the mid-depth of the total interval being composited, or from the middle of a continuous interval being composited, will be analyzed. These aliquots, without any homogenization, will be dispensed into the appropriate sample container, which will be sealed as quickly as possible.

Samples should not be collected or stored near running internal combustion engine or any type of exhaust system. Fumes from such devices could contaminate samples.

3.2.2 Sample Designation System

A concise and easily understandable sample designation system is an important part of the RI sampling activities. It provides a unique sample number that will facilitate both sample tracking and easy re-sampling of certain locations to evaluate temporal changes. The sample designation system to be employed during the sampling activities will be consistent, yet flexible enough to accommodate unforeseen sampling events/conditions. A combination of letters and numbers will be used to yield a unique sample number for each field sample collected. The sample designation system is described more fully in the Data Management Plan (Blasland & Bouck, 1993d).

3.2.3 Sample Containers and Preservation

The sample containerization, preservation, and handling procedures will follow standard protocols as described in the QAPP. The appropriate sample containers, preservation methods, holding times, and the particular analytical method for the specific matrices are presented in Table 3-1. Preservation methods include the addition of parameter-specific chemical preservatives and refrigeration. These methods are presented in Table 3-1.

The analytical laboratory will supply appropriate containers for sample collection and preservation. The field sampling crew is responsible for properly collecting, labeling, and preserving the samples on ice (as needed) in coolers, immediately after collection. Sample containers will be labeled in accordance to procedures in Appendix C.

3.2.4 Sample Packing and Shipping Requirements

Sample packaging and shipping procedures are designed to ensure that the samples will arrive at the laboratory intact with the chain-of-custody (COC) forms.

Samples will be properly packaged for shipment as outlined in Appendix C and dispatched to the appropriate laboratory for analysis with a separate signed custody record enclosed in each sample box or cooler. Shipping containers will be locked and secured with strapping tape and custody seals for shipment to the laboratory. The preferred procedure includes use of a custody seal attached to the front right and back left of the cooler. The custody seals are covered with clear plastic tape. The cooler is strapped shut with strapping tape in at least two locations.

All shipments will be accompanied by the COC form identifying the contents. The original form will accompany the shipment; copies will be retained by the sampler for the sampling office records.

If the samples are sent by common carrier, a bill of lading should be used. Receipts of bills of lading will be retained as part of the permanent project documentation. If sent by mail, the package will be registered with return receipt requested. Commercial carriers are not required to sign off on the custody form as long as the custody forms are sealed inside the sample cooler and the custody seals remain intact.

3.3 Documentation

Field personnel will provide comprehensive documentation covering all aspects of field sampling, field analysis, and COC. This documentation forms a record which will allow reconstruction of field events, thereby aiding the subsequent data review and interpretation process.

All documents, records, and information relating to the performance of the work at the site will be retained. The forms of field documentation which will be maintained throughout the sampling activity are briefly outlined below.

3.3.1 Field Notebook

The field notebook will consist of a bound, surveyor's-type notebook which will contain an overall record of all activities performed at the site, including, but not limited to:

- Project name and number;
- Sample locations;
- Sample descriptions;

- Sample dates;
- Weather conditions;
- Sampling times;
- Sample identification numbers;
- Sample collection methods;
- Sample handling (e.g., filtering) and preservation;
- Specific readings for site testing and sampling;
- Field instrument calibration/operation notes;
- Field measurement data;
- Samplers' names; and
- Any appropriate comments.

Data will be entered in ink with the date and signature of the individual responsible for data entry; blank pages will be noted as being intentionally blank.

The exact readings from site testing and sampling will also be recorded on separate documentation sheets (e.g., subsurface logs). Separate documentation sheets are to be used to allow comprehensive documentation of daily site conditions by field personnel. These logs will be placed in a three-ring binder at the end of the day and numbered sequentially.

3.3.2 Geological Investigation Records

SA 092654

Subsurface logs, sediment sampling forms, in-situ hydraulic conductivity test logs, well inspection forms, and gamma-ray logging records will be completed on site. The subsurface logs will provide a record of information needed to describe the subsurface strata, geotechnical characteristics, and

groundwater conditions observed during drilling. Information from sediment sampling will describe lithographic details. In-situ hydraulic conductivity test logs will be maintained in order to document the time and water level readings taken during slug testing at the monitoring wells. Well inspection forms will be partially completed off site with respect to existing information such as completed well depth and other previously measured data. A comparison of these data will be made in the field and noted on the forms. The gamma-ray logging records will include the depth, time, and reading observed.

After returning to the office, a gamma-ray log will be constructed from the gamma-ray logging record for a borehole or wellhole. The log is a graphic representation of the radiation measured.

3.3.3 Water Sampling Records

Groundwater and surface-water field sampling records will be completed for each completed sample location and will contain water levels, physical appearance of the water, and field meter readings (temperature, pH, DO, turbidity, and specific conductance), where applicable. Water level readings will be measured to surveyed reference points (e.g., top of outer casing, top of inner casing, ground surface, or a surveyed stake, as appropriate) and recorded on a water level record.

SA 092655

Before going out to the site, an existing monitoring well evaluation form must be completed for the wells to be inspected that day. The form contains information derived from historical records. Well inspection forms will be partially completed off-site with respect to existing information such as completed well depth and other previously measured data.

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comparison of these data will be made in the field and noted. After the wells are inspected and information compared with the existing data, a recommendation regarding the well will be made.

Meters (pH, temperature, DO, turbidity, and conductivity) will be calibrated daily in accordance with the manufacturer's recommendations. Standards, solutions used, concentrations, and readings taken will be recorded daily in field calibration logs (Appendix K).

3.3.4 Air Monitoring and Sampling Records

The photoionization detector (PID) will be calibrated as per the manufacturer's recommendations once after every 10 monitoring wells or borings that are field screened, or daily (whichever occurs first). The PID calibration will be recorded on a field calibration log (Appendix N).

During ambient air sampling, data obtained while the sampler is running will be recorded on an air sampling log. Calibrations will be recorded on a High Volume Sampler Field Calibration Log.

3.3.5 Chain-of-Custody Forms

Completed COC forms will be required for all samples to be analyzed. COC forms will be initiated by the sampling crew in the field during the sample collection events. The COC forms will contain the sample's unique identification number, sample date and time, sample description, sample type, sample preservation (if any), and analyses required. The original COC form will accompany the samples to the laboratory and copies will be made prior to shipment (or multiple copy forms used) for separate field documentation. A COC form is included in Appendix C.

3.3.6 Field Reports

Field staff will prepare field reports to the RI/FFS Project Coordinator and the Quality Assurance Manager. The content of the reports will include:

- Performance audit summaries including assessment of field measurement data accuracy, precision, and completeness;
- Significant QA/QC problems and recommended solutions; and
- Resolutions of previously stated problems.

Field reports will be reviewed by the Field Sampling Coordinator prior to submittal to the Field Custodian. The matrix of Project Personnel is provided in the Work Plan.

3.4 Sample Custody

SA 092657

Any person obtaining custody of samples will be responsible for the care and custody of the samples. The term "custody" is defined below.

A person will have custody of samples when the samples are in: their physical possession; their view after being in their physical possession; and their physical possession and secured so they cannot be tampered with. In addition, when samples are secured in a restricted area with access to authorized personnel only, the samples are deemed to be in the custody of such authorized personnel. COC forms will be completed for all samples to be analyzed as described in Section 3.2.5. The COC forms will remain with the samples at all times. The samples and signed COC form will remain in the possession of the sampling crew until the samples are delivered to the express carrier (e.g.

Federal Express). The forms will then be placed in the project files in the Kalamazoo, Michigan project office.

3.5 Quality Control Samples

Sample types include: floodplain soil/sediment; water column; groundwater; soil; and residuals; and air. Diligent adherence to all standard operating protocols described in this QA/QC section of this FSP is necessary to achieve a high degree of confidence in the data generated from the field samples. The rationale for QC samples is provided in the QAPP.

The following types of field QC samples will be included for samples requiring analyses for CLP TCL/TAL constituents, PCDDs, PCDFs, and PCBs:

Field duplicates - two samples collected from the same location. Field duplicates will be used to assess environmental variability and laboratory performance. Field duplicate sample containers will be labeled as ordinary field samples with their own separate unique identification. The samples will not be identified as duplicates, thus the laboratory will analyze them as "blind" audit samples.

Rinse blanks - samples of distilled/deionized water which have been poured over sampling equipment after decontamination procedures have been performed. These samples will be used to evaluate the effectiveness of the equipment cleaning procedures.

Trip blanks - samples of distilled/deionized water which will be used to check for analytes introduced during shipping and handling of the samples prior to, during, and after sample collection. Samples to be analyzed for

VOCs will be accompanied by a trip blank. For air samples, an unused polyurethane foam (PUF) and glass fiber filter will serve as a trip blank. The frequency of required field QC samples is summarized in Table 3-2.

3.6 Field Measurements

In order to maintain field precision and accuracy, all water quality meters, PIDs, and high volume air samplers will be calibrated to known standards. Field analysis and operation procedures, including calibration and sample analysis, are provided in Appendices K (thermometer, DO, turbidity, conductivity, and pH meters), M (PID), and N (air). Preventive maintenance procedures are also included in these appendices.

Temporally sensitive field data will be collected as quickly as possible in order to minimize errors associated with temporal variation.

3.7 Corrective Actions

Corrective actions include procedures to promptly investigate, document, evaluate, and correct any deficiencies in data quality. If a condition is noted to have an adverse effect on data quality, corrective action will be taken to avoid this condition. Condition identification, cause, and the corrective action implemented, will be documented and reported to the Blasland & Bouck RI/FS Project Coordinator and Quality Assurance Manager. Implementation of corrective measures will be verified by documented follow-up action.

All project personnel have the responsibility, as part of their normal work duties, to promptly identify and report conditions adverse to data quality.

Project personnel will, therefore, continuously monitor ongoing work performance in the normal course of daily responsibilities.

Examples of situations which would require corrective actions include, but are not limited to, the following:

- Protocols as defined by the QAPP and FSP, have not been followed;
- Predetermined data acceptance standards are not obtained;
- Procedures have not been performed properly;
- Equipment is not properly calibrated or is not functioning correctly;
- Sample and test results are not completely traceable;
- QC requirements have not been met;
- Improper approvals; or
- Concerns resulting from system or performance audits are identified.

Corrective actions will be documented on a Corrective Action Request Form, as identified in the QAPP.

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Table 2-1

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

Allied Paper, Inc. Operable Unit Field Sampling Plan

Remedial Investigation Samples

Location	Media	PCBs[1]	Dioxins/ Furans	CLP TCL/TAL[4]	TAL[5]	Other Parameters[6]	Geotechnical Samples[7]
RESIDUALS CHARACTERIZATION							
FRDLs							
DLHB-1	Residuals[7]	2	1	1	-	-	-
	Soil	-	-	1	-	-	-
DLHB-2	Residuals[7]	3	-	-	-	-	5/1
DLHB-3	Residuals[7]	2	-	1	-	-	-
	Soil	-	-	1	-	-	-
DLHB-4	Residuals[7]	3	-	-	-	-	-
DLHB-5	Residuals[7]	2	1	1	-	-	-
	Soil	-	-	1	-	-	-
DLHB-6	Residuals[7]	3	-	-	-	-	-
Monarch HRDL							
MLSS-1	Residuals[7]	4	1	1	-	-	-
MLSS-2	Residuals[7]	4	-	-	-	-	-
	Soil	-	-	-	-	-	-
MLSS-3	Residuals[7]	4	1	-	-	-	-
	Soil	-	-	1	-	-	-
MLSS-4	Residuals[7]	4	-	-	-	-	5/1
MLSS-5	Residuals[7]	4	-	-	-	-	-
	Soil	-	-	1	-	-	-
MLHB-1	Soil	2	-	-	-	-	5/0
MLHB-2	Soil	2	-	-	-	-	-
South of Former Type III Landfill							
FLF-1	Soil	3	-	-	-	-	-
FLF-2	Soil	3	-	-	-	-	-
FLF-3	Soil	3	-	-	-	-	-

(See Notes on Page 8)

Table 2-1
(Continued)
Allied Paper, Inc./Portage Creek/Kalamazoo River
Superfund Site

Allied Paper, Inc. Operable Unit Field Sampling Plan

Remedial Investigation Samples

Location	Media	PCBs[1]	Dioxins/ Furans	CLP TCL/TAL[4]	TAL[5]	Other Parameters[6]	Geotechnical Samples[6]
Pilot Study Area							
MA-1	Soil	-	-	-	2	-	-
MA-2	Soil	-	-	-	2	-	-
MA-3	Soil	-	-	-	2	-	-
MA-4	Soil	-	-	-	2	-	-
MA-5	Soil	-	-	-	2	-	-
Western Area							
WA-1	Soil	1	-	1	-	-	-
	Residuals[7]	3	-	1	-	-	-
WA-2	Soil	1	-	1	-	-	-
	Residuals[7]	3	1	1	-	-	-
WA-3	Soil	1	-	1	-	-	-
	Residuals[7]	3	-	1	-	-	-
WA-4	Soil	1	-	1	-	-	-
	Residuals[7]	3	-	1	-	-	-
WA-5	Soil	1	-	1	-	-	-
	Residuals[7]	3	-	1	-	-	-
WA-6	Soil	1	-	1	-	-	-
	Residuals[7]	3	1	1	-	-	-
WA-7	Soil	1	-	1	-	-	-
	Residuals[7]	3	-	1	-	-	-
WA-8	Soil	1	-	1	-	-	-
	Residuals[7]	3	-	1	-	-	-
Bryant HRDL							
BLHB-1	Soil	2	-	-	-	-	-
BLHB-2	Soil	2	-	-	-	-	-
BLHB-3	Soil	2	-	-	-	-	-

(See Notes on Page 8)

Table 2-1
(Continued)
Allied Paper, Inc./Portage Creek/Kalamazoo River
Superfund Site

Allied Paper, Inc. Operable Unit Field Sampling Plan

Remedial Investigation Samples

Location	Media	PCBs[1]	Dioxins/ Furans	CLP TCL/TAL[2]	TAL[3]	Other Parameters[4]	Geotechnical Samples[5]
GEO-1	Soil	-	-	-	-	-	10/3
GEO-2	Soil	-	-	-	-	-	10/3
P-1	Soil	-	-	-	-	-	8/0
P-1C	Soil	-	1	1	-	-	-
P-2	Soil	-	-	-	-	-	8/0
P-2C	Soil	-	1	1	-	-	-
P-3	Soil	-	-	-	-	-	8/0
P-3C	Soil	-	1	1	-	-	-
Former Bryant Mill Pond Area							
BMP-1	Soil	1	-	-	-	-	-
	Sediment	2	-	-	-	-	-
BMP-2	Sediment	5[6]	-	2	2	5[6]	-
BMP-3	Soil	1	-	-	-	-	-
	Sediment	2	-	-	-	-	-
BMP-4	Soil	1	-	-	-	-	-
	Sediment	2	-	-	-	-	-
BMP-5	Soil	1	-	-	-	-	-
	Sediment	2	-	-	-	-	-
BMP-6	Soil	1	-	-	-	-	-
	Sediment	2	-	-	-	-	-
BMP-7	Sediment	2	-	-	-	2[6]	-
BMP-8	Sediment	2	-	-	-	2[6]	1
BMP-9	Sediment	2	-	-	-	2[6]	1
BMP-10	Sediment	2	-	-	-	1[6]	1
BMP-11	Sediment	5	-	-	-	1[6]	-
BMP-12	Sediment	5[6]	-	2	-	5[6]	-

(See Notes on Page 8)

Table 2-1
(Continued)
Allied Paper, Inc./Portage Creek/Kalamazoo River
Superfund Site

Allied Paper, Inc. Operable Unit Field Sampling Plan

Remedial Investigation Samples

Location	Media	PCBs[7]	Dioxins/ Furans	CLP TCL/TAL[8]	TAL[8]	Other Parameters[9]	Geotechnical Samples[10]
Portage Creek							
GS-1	Sediment	1	-	-	-	1[6]	-
GS-2	Sediment	1	-	-	-	1[6]	-
GS-3	Sediment	1	-	-	-	1[6]	-
GS-4	Sediment	1	-	-	-	1[6]	-
GS-5	Sediment	1	-	-	-	1[6]	-
OTHER PROPERTIES							
BMSS-1	Soil	1	-	-	-	-	-
BMSS-2	Soil	1	-	-	-	-	-
BMSS-3	Soil	1	-	-	-	-	-
BMSS-4	Soil	1	-	-	-	-	-

(See Notes on Page 8)

Table 2-1
(Continued)
Allied Paper, Inc./Portage Creek/Kalamazoo River
Superfund Site

Allied Paper, Inc. Operable Unit Field Sampling Plan

Remedial Investigation Samples

Location	Media	PCBs[1]	Dioxins/ Furans	CLP TCL/TAL[2]	TAL[2]	Other Parameters[3]	Geotechnical Analyses[4]
HYDROGEOLOGICAL INVESTIGATION							
MW1	Water	-	-	1	-	1[3]	-
MW2	Water	-	-	1	-	1[3]	-
MW2A	Soil	-	-	-	-	-	5/1
	Water	-	-	1	-	1[3]	-
MW2P	Water	-	-	1	-	1[3]	-
MW3	Water	-	-	1	-	1[3]	-
MW5	Water	-	-	1	-	1[3]	-
MW7	Water	-	-	1	-	1[3]	-
MW7B	Soil	4	-	-	1	-	5/1
	Water	-	-	1	-	1[3]	-
MW8	Water	-	-	1	-	1[3]	-
MW8A	Soil	4	-	-	1	-	5/1
	Water	-	-	1	-	1[3]	-
MW11	Water	-	-	1	-	1[3]	-
MW12	Water	-	-	1	-	1[3]	-
MW12R	Soil	4	-	-	-	-	6/0
	Water	-	-	1	-	1[3]	-
MW15	Water	-	-	1	-	1[3]	-
MW16B	Water	-	-	1	-	1[3]	-
MW16C	Water	-	-	1	-	1[3]	-
MW17A	Water	-	-	1	-	1[3]	-
MW17B	Water	-	-	1	-	1[3]	-
MW18	Water	-	-	1	-	1[3]	-
MW19BR	Soil	1	-	-	-	-	-
	Residuals[7]	2	-	-	-	-	5/1
	Water	-	-	1	-	1[3]	-

(See Notes on Page 6)

Table 2-1
(Continued)
Allied Paper, Inc./Portage Creek/Kalamazoo River
Superfund Site

Allied Paper, Inc. Operable Unit Field Sampling Plan

Remedial Investigation Samples

Location	Media	PCBs[1]	Dioxins/ Furans	CLP TCL/TAL[2]	TAL[2]	Other Parameters[3]	Geotechnical Analyses[4]
MW19C	Water	-	-	1	-	1[3]	-
MW19D	Water	-	-	1	-	1[3]	-
MW20	Water	-	-	1	-	1[3]	-
MW20B	Soil	4	-	-	-	-	5/1
	Water	-	-	1	-	1[3]	-
MW21	Water	-	-	1	-	1[3]	-
MW22A	Water	-	-	1	-	1[3]	-
MW22B	Soil	4	-	-	1	-	-
	Water	-	-	1	-	1[3]	-
MW23	Water	-	-	1	-	1[3]	-
MW24	Water	-	-	1	-	1[3]	-
MW25	Water	-	-	1	-	1[3]	-
MW26	Water	-	-	1	-	1[3]	-
MW104	Water	-	-	1	-	1[3]	-
MW106	Water	-	-	1	-	1[3]	-
MW108	Water	-	-	1	-	1[3]	-
MW112	Water	-	-	1	-	1[3]	-
MW114	Water	-	-	1	-	1[3]	-
MW120A	Water	-	-	1	-	1[3]	-
MW120B	Soil	4	-	-	-	-	-
	Water	-	-	1	-	1[3]	-

(See Notes on Page 8)

Table 2-1
(Continued)
Allied Paper, Inc./Portage Creek/Kalamazoo River
Superfund Site

Allied Paper, Inc. Operable Unit Field Sampling Plan

Remedial Investigation Samples

Location	Media	PCBs[1]	Dioxins/ Furans	CLP TCL/TAL[4]	TAL[5]	Other Parameters[6]	Geotechnical Analyses
MW121A	Water	-	-	1	-	1[3]	-
MW121B	Soil	4	-	-	-	-	5/1
	Water	-	-	1	-	1[3]	-
MW122A	Water	-	-	1	-	1[3]	-
MW122B	Soil	4	-	-	-	-	5/0
	Water	-	-	1	-	1[3]	-
MW123A	Water	-	-	1	-	1[3]	-
MW123B	Soil	4	-	-	-	-	10/3
	Water	-	-	1	-	1[3]	-
MW124A	Water	-	-	1	-	1[3]	-
MW124B	Soil	10	-	-	-	-	-
	Water	-	-	1	-	1[3]	-
MW125A	Water	-	-	1	-	1[3]	-
MW125B	Residuals[7]	3	-	-	-	-	5/0
	Water	-	-	1	-	1[3]	-
MW126A	Water	-	-	1	-	1[3]	-
MW126B	Residuals[7]	3	-	-	-	-	-
	Water	-	-	1	-	1[3]	-
	Soil	2	-	-	-	-	-
MW127A	Water	-	-	1	-	1[3]	-
	Soil	3	-	-	-	-	-
MW128A	Water	-	-	1	-	1[3]	-
Rivulet 2	Water	-	-	1	-	1[3]	-
CLARIFIER SAMPLING		-	-	-	-	-	-
Monarch Clarifier (MC-1)	Solids	1	-	-	-	1[3]	-

(See Notes on Page 8)

Table 2-1
(Continued)
Allied Paper, Inc./Portage Creek/Kalamazoo River
Superfund Site

Allied Paper, Inc. Operable Unit Field Sampling Plan

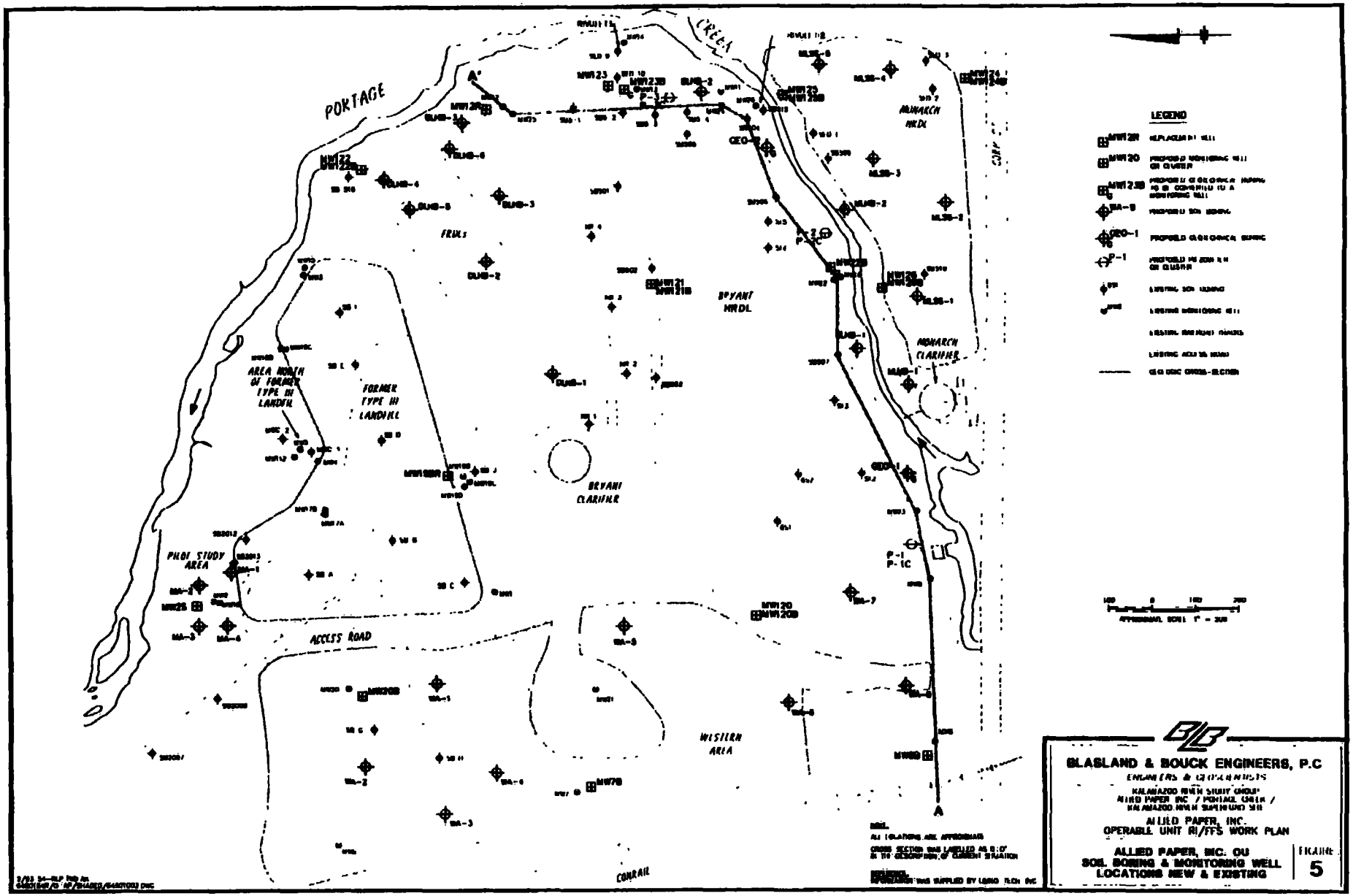
Remedial Investigation Samples

Location	Media	PCBs[1]	Dioxins/ Furans	CLP TCL/TAL[2]	TAL[3]	Other Parameters[4]	Geotechnical Analyses[5]
SURFACE WATER INVESTIGATION							
Cork St. - Baseflow	Water	8	-	-	-	-	-
Cork St. - Event Specific (3 events)	Water	24	-	-	-	-	-
Alcott St. - Baseflow	Water	8	-	-	-	-	-
Alcott St. - Event Specific (3 events)	Water	24	-	-	-	-	-
BIOTA INVESTIGATION							
Bryant Mill Pond	Fish	55	-	-	-	-	-
AIR INVESTIGATION							
Samples	Air	150	-	-	-	-	-
SAMPLE TOTALS							
Sediment		28 (10^6)	-	4	2	23	3
Soil		88	3	16	13	-	95/14
Residuals[7]		67	6	12	-	-	20/3
Groundwater		-	-	53	-	53	-
Surface Water		64	-	-	-	-	-
Fish		55	-	-	-	-	-
Air		150	-	-	-	-	-

Notes:

A second round of samples may be analyzed at MDNR's request.
[1]PCBs exclusively. Additional analyses for PCBs are included with the CLP TCL/TAL constituents.
[3]Metals exclusively.
[4]Other parameters include the following compounds: pH, specific conductance, temperature, turbidity, TOC, DO, NO_3^-, COD, HCO_3^-, Cl^-, SO_4^{2-}, and CO_3^{2-}.
[5]Disturbed/Undisturbed. The geotechnical index property testing will include: moisture contents (ASTM D2216 or D2974) - 30 samples; organic contents (ASTM D2974) - 15 samples; specific gravity (ASTM D854) - 5 samples; Atterberg Limits (ASTM D4318) - 3 samples; and gradation (ASTM D422) - 5 samples. The compressibility characteristics of two samples will be evaluated with the one-dimensional consolidation test (ASTM D2435). The strength characteristics will be measured with unconsolidated-undrained triaxial compression (ASTM D2850) on two samples and consolidated-undrained triaxial compression (ASTM D4767) on one sample if there is sufficient recovery.
Congeners/Oil and Grease.
Organic Carbon (TOC).
[7]The number of samples is estimated and may vary depending on the depth of residuals.
Groundwater sample TAL metals will be analyzed unfiltered (total metals) and field filtered (dissolved metals).

100% Recycled 30% PCW



KZ-KRSG-0016350 6

100% Recycled 30% PCW

WILLOW BOULEVARD/ A-SITE OPERABLE UNIT REMEDIAL INVESTIGATION/ FOCUSED FEASIBILITY STUDY

FIELD SAMPLING PLAN

Kalamazoo River Study Group

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

July 1993

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

SA 092395

KZ-KRSG-[redacted]164209

Willow Boulevard/A-Site Operable Unit Remedial Investigation/ Focused Feasibility Study

Field Sampling Plan

Kalamazoo River Study Group

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

July 1993

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SA 092396 KZ-KRSG-00164210

DISCLAIMER

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PREFACE

This Field Sampling Plan (FSP) supports the Remedial Investigation/Focused Feasibility Study (RI/FFS) Work Plan prepared on behalf of the Kalamazoo River Study Group (KRSG) by Blasland & Bouck Engineers, P.C. (Blasland & Bouck) for the Willow Boulevard/A-Site Operable Unit (WB/A-OU). This FSP serves to identify and describe the methods to be used in the RI/FFS field investigation.

Typically, a Sampling and Analysis Plan is comprised of two parts or documents, the Quality Assurance Project Plan (QAPP) and the Field Sampling Plan (FSP). The QAPP serves to identify the protocols and methods necessary to obtain quality data during the RI/FFS with respect to the data quality objectives. At MDNR's request, the QAPP is comprehensive for all Operable Units to be investigated. The FSPs have been developed specifically for the individual Operable Units.

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SUPERFUND SITE

WILLOW BOULEVARD/A-SITE OPERABLE UNIT
FIELD SAMPLING PLAN

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SECTION 1 - INTRODUCTION

1.1 General

This Field Sampling Plan (FSP) was prepared to document field sampling procedures in support of the Remedial Investigation/Focussed Feasibility Study (RI/FFS) for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, Willow Boulevard/A-Site Operable Unit (WB/A-OU). This FSP provides details on sampling objectives, locations and frequency of sampling, sampling and field procedures for each matrix of concern, sample handling and documentation, and field quality assurance/quality control (QA/QC) procedures.

The procedures specified herein will be used for sampling soil, paper-making residuals, sediments, air, surface water, and groundwater. Laboratory and applicable QA/QC procedures for the collected samples are discussed in a separate document entitled the Quality Assurance Project Plan (QAPP) (Blasland & Bouck, 1993a). The field procedure(s) used in obtaining a given sample may have a significant effect on analytical data generated from that sample. Therefore, it is imperative that standardized protocols be utilized and that sample integrity and quality assurance standards be maintained during site investigations and environmental sampling events.

This FSP fulfills a requirement of the Administrative Order by Consent (AOC), which became effective on December 28, 1990, between the Michigan Department of Natural Resources (MDNR) and the members of the Kalamazoo River Study Group (KRSG). This plan is intended to complement the QAPP; the documents together comprise the Sampling and Analysis Plan and dictate the

QA/QC and field sampling procedures that will be followed during the RI/FFS.

This FSP contains a compilation of sampling methods which provides practical, state-of-the-art field methods. It is subject to modifications where unforeseen sampling difficulties present themselves, and will be updated to reflect collection of any additional samples/data not covered by the current version of this plan.

1.2 Sampling Objectives

The objectives of the field sampling activities are to collect samples that can be used to characterize the site. The results of the WB/A-OU investigation portion of the RI will ultimately provide data to be used in the assessment of preliminary remedial alternatives during the FFS.

The goals of the RI, as stated in the AOC, are to:

- Fully characterize the nature of paper-making residuals at the WB/A-OU;
- Define any regulated constituent sources at the WB/A-OU;
- Determine the vertical and horizontal extent of regulated constituents originating at the WB/A-OU;
- Spatially quantify regulated constituents to the extent necessary to enable preparation of an Endangerment Assessment and a FFS, and to the extent that such constituents may be attributable to the WB/A-OU;
- Identify potential migration pathways and movement; and
- Quantify public health and environmental risk.

The AOC did not specifically identify the WB/A-OU as an area to be investigated, nevertheless the goals, as stated above, will be applied to the RI/FFS.

This FSP provides the information necessary for field sampling personnel to attain these goals for fulfillment of the overall WB/A-OU investigation objectives.

SECTION 2 - SAMPLING AND FIELD PROCEDURES

2.1 Introduction

As part of the various field investigations, several standard field procedures will be performed. They include:

- Soil/Residual Boring Drilling and Sampling;
- Groundwater Monitoring Well Installation;
- Piezometer Installation;
- Groundwater Sampling;
- In-Situ Hydraulic Conductivity Measurement;
- Air Monitoring and Sampling;
- Surface Water Sampling; and
- Sediment Sampling.

This section of the FSP introduces and references the appropriate detailed procedures in the appendices, including ancillary procedures for equipment cleaning, water level measurements, well development, field measurements, and calibration and maintenance of field instruments. Sample handling, packing, and shipping procedures together with field QA/QC requirements are described in Section 3. All sample locations, analytical parameters, and geotechnical analyses for the following sections are summarized in Table 1.

2.2 Soil/Residual Boring Drilling and Sampling

The WB/A-OU is comprised of two distinct residuals disposal areas. To conduct the Residuals Characterization, eight borings will be drilled within paper-

making residuals. These eight borings are identified as WB-1 to WB-5 and AS-1 to AS-3. Five sediment cores, WRN-1 to WRN-5, will be drilled to determine the extent of paper-making residuals in the Kalamazoo River near the Willow Boulevard Site. Five cores, ARN-1 to ARN-5, will also be drilled to determine if residuals extend from the A-Site into the river. The locations of these borings are shown on Figure 4 of the WB/A-OU Work Plan (Blasland & Bouck 1993b).

In addition to the borings collected during the Residuals Characterization, 11 borings will be drilled during the Soils and Sediment Investigation. Three reconnaissance borings, ARS-1 to ARS-3, will be drilled to the south of A-Site. Eight borings, EDC-1 to EDC-8, will be drilled in the area east of Davis Creek.

Split-spoon (ASTM D1586) or thin-walled piston samplers (ASTM D4700) will be used to obtain samples on a continuous basis. Split-spoon samplers will be the preferred method of sampling with the piston samplers being used in conditions where the materials cannot be recovered using split-spoon sampling methods or where undisturbed samples are required for geotechnical testing. Materials such as paper residuals or very fine, saturated sands may require the use of the piston sampling method.

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Borings will be advanced with a drill rig, where possible, using either the hollow-stem auger method or the driven casing method, depending on the nature of the subsurface materials. The hollow-stem auger is the preferred method as it does not require the use of drilling fluids or additives other than water. The alternate method (driven casing) requires the use of a drilling fluid to lift the cuttings from the boring, but does not require the use of any additives other than water or bentonite. The drilling fluid to be used will be water with the addition of bentonite only when necessary. In situations where physical

features limit the use of drill rigs, borings will be completed with either a hand-driven or a portable power-driven split-spoon sampler, depending on the required depth and material. The detailed procedures for sampling of soil borings are provided in Appendix A.

Pre-field cleaning procedures, post-field cleaning procedures, and cleaning procedures between borings are provided in Appendix B. While drilling the borings, soil/residual samples will be obtained as described in Appendix A. Samples of the subsurface material encountered during soil boring installation will be collected continuously (every two feet) until the required depth of the borehole is reached.

Representative portions of all soil samples will be retained in appropriate containers for: 1) visual classification by the supervising geologist and 2) laboratory analyses, where appropriate. A representative portion of each sample will be placed in a clean jar and the headspace will be screened with a photoionization detector (PID) (Appendix L). The results will be recorded on the boring log. The number, location, and laboratory analysis required for the samples obtained at the borings are identified in the WB/A-OU Work Plan. Representative samples, as directed in the WB/A-OU Work Plan, will be analyzed for polychlorinated biphenyls (PCBs), the Contract Laboratory Program Target Compound List/Target Analyte List (CLP TCL/TAL) constituents, polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), or geotechnical parameters as listed on Table 1.

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Disturbed samples with be collected for geotechnical analysis during the drilling of G20-1, GEO-1, GEO-2, P-1, P-2, P-3, P-4WT, P-5WT, WB-3, WB-5, WMW-3A, WMW-4B, AMW-6B, AMW-9B, and AS-2. Relatively undisturbed samples

will be collected during the drilling of WMW-3A, WMW-4B, AMW-6B, AMW-9B, AS-2, P-5WT, WB-3, G20-1, GEO-1, and GEO-2 for geotechnical evaluation. The samples will be collected using a Shelby tube (ASTM D1587) or thin-walled piston sampler (ASTM D4700). Field vane shear testing (ASTM D2573) will be performed in borings WMW-3A, WMW-4B, AMW-6B, AMW-9B, AS-2, GEO-1, and GEO-2, if field conditions are appropriate.

The procedures for handling, packing, and shipping the samples are provided in Appendix C.

2.3 Groundwater Monitoring Well Installation

As required by MDNR, a total of up to 27 new monitoring wells could be installed. Six well clusters will be installed; WMW-4, AMW-6, AMW-7, AMW-8, AMW-9, and AMW-10. Existing wells WMW-1, WMW-3, and AMW-3 will be made into clusters by the addition of one well each. The locations of these wells are shown on Figure 4 of the WB/A-OU Work Plan.

As directed by the MDNR, the monitoring well clusters WMW-4, AMW-6, AMW-7, AMW-8, AMW-9, and AMW-10 may include wells with screened intervals in saturated residuals. Identification of saturated residuals will be made in the field as outlined in Appendix D.

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The monitoring wells will be installed in completed soil borings, as described in Appendix D. Monitoring well boreholes will be advanced utilizing the same drilling and sampling methods described in Section 2.2 and Appendix A. As directed by the MDNR, the wells will be constructed with a stainless steel well screen and riser. At most locations, 5 feet of well screen will be used, with the exception that shallow wells installed under water table conditions

will have a 10-foot screen with a maximum of seven feet of the screened interval extending below the water table. The screen lengths for each well are detailed in the WB/A-OU Work Plan.

A filter pack consisting of an appropriately sized silica sand will be installed in the annular space around the screen and extending to approximately 2 feet above the top of the screen, except where a well is installed immediately below the base of residuals. At these locations the filter pack will extend only 6 inches above the screened interval. The purpose of the filter pack is to: filter out particles from the adjacent formation; stabilize aquifer materials to reduce settlement of materials above the well intake during well development and; increase the well's effective diameter and thereby increase water flow into the well. A bentonite seal, at least 2 feet thick, will be installed in the annular space above the sand filter pack. In the annular space above the bentonite seal, a cement/bentonite grout (up to 4 percent bentonite) will be placed by tremie pipe to the surface. Descriptions of monitoring well installation procedures and methods are presented in Appendix D.

All monitoring well casings and screens will be cleaned prior to installation, using the procedures in Appendix B.

Upon completion, each monitoring well will be developed to remove fine-grained materials that have settled in or around the well during installation, and to improve the hydraulic connection between the monitoring well and the surrounding formation. The procedures used for developing monitoring wells are provided in Appendix E. Wells screened in residuals will not be developed. After the monitoring wells are developed, water levels will be measured following procedures provided in Appendix F.

The physical condition of all existing monitoring wells will be ascertained using the procedures in Appendix G. Existing groundwater monitoring wells at the WB/A-OU will be redeveloped, as necessary, following the methods provided in Appendix E. If during the well inspection or redevelopment of the existing wells, it is determined that the well needs to be decommissioned, the procedures provided in Appendix H will be followed.

Upon completion of each monitoring well, a designated measuring point will be marked on the well and surveyed to an existing benchmark. Vertical and horizontal control will be established using standard, accepted surveying by a licensed surveyor.

2.4 Piezometer Installation

A total of eight piezometers will be installed at the WB/A-OU (P1-D, P1-RS, P2-D, P2-RS, P3-D, P3-RS, P-4WT, and P-5WT). These piezometers will be constructed of 2-inch diameter polyvinyl chloride (PVC). The locations of these piezometers are shown on Figure 4 of the WB/A-OU Work Plan. These piezometers will be installed for water level measurements utilizing the same drilling and sampling methods described in Section 2.2 and in Appendix A. Descriptions of piezometer installation procedures are presented in Appendix D.

Upon completion, piezometers that yield water will be developed to provide a good hydraulic connection between the screened zone and the formation. The piezometer development procedures are described in Appendix E.

2.5 Groundwater Sampling

As directed by MDNR, one round of groundwater sampling from the monitoring wells will be conducted. However, MDNR may determine a second round of sampling may be necessary to sufficiently characterize the groundwater based upon the results of the first round.

Prior to groundwater sampling, the water level measurement of all wells to be sampled at the OU will be taken following the procedures in Appendix F. Groundwater samples will be obtained from the monitoring wells in accordance with the procedures in Appendix I. The pre-, during and post-field cleaning procedures are provided in Appendix B.

Groundwater samples will be collected and analyzed in the field for temperature, specific conductance, and pH prior to sampling, during well evacuation, and at the time of collection. Turbidity will also be sampled at the time of collection. The procedures for measuring these parameters in the field are provided in Appendix J.

2.6 In-Situ Hydraulic Conductivity Measurement

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In-situ hydraulic conductivity measurements using slug tests will be obtained at selected newly installed and existing monitoring wells, using the procedures in Appendix K. Slug tests will be performed after the first round of groundwater samples have been collected. Slug tests can be performed by two different techniques: 1) by introducing a solid cylinder of known volume (falling head test); or 2) by withdrawal of a solid cylinder of known volume from the well after the well has returned to its static level (rising head test). By monitoring the rate of changing water levels, hydraulic conductivity estimates can be

calculated. However, as the use of data from a rising head test is typically more representative of the aquifer, rising head test data will be used to calculate estimates of the hydraulic conductivity at the WB/A-OU. The formulae of Hvorslev and/or Bouwer-Rice will be used to calculate a value for the hydraulic conductivity. Calculations may be performed using computer programs.

2.7 Air Monitoring and Sampling

The air monitoring to be performed during the sampling activities at the various study areas will consist of work area air monitoring (Appendix L). The work area monitoring is intended to protect site workers. Field personnel will monitor volatile organic compounds (VOCs) in certain situations as detailed in the Health and Safety Plan (HSP) by using a hand-held monitoring instrument (Appendix L). Action levels and levels of protection will be implemented as described in the HSP (Blasland & Bouck, 1993c).

In addition, an ambient air sampling program will be conducted at the WB/A-OU in accordance with the protocols described in Appendix M. Samples will be collected from four locations near the WB/A-OU. The details of the program are presented in the WB/A-OU Work Plan.

The Ambient Air PCB Sampling Program at the WB/A-OU consists of an air sampling program to measure possible airborne PCB transport for a period of several months.

To provide supporting air sampling data, an ambient air and meteorological program is required during the sampling activities. The overall strategy involves the determination of emission rates and subsequent air dispersion modeling to predict maximum downwind concentrations.

2.8 Surface Water Sampling

Surface water will be collected from Davis Creek and the former Olmstead Creek. Three samples will be collected from each creek. Surface water will also be collected at the two river gauges during groundwater sampling events. All surface water samples will be collected in accordance with Appendix N.

A duplicate of the surface water samples will be collected and measured in the field for temperature, pH, conductivity, dissolved oxygen (DO), and turbidity at the time of collection. The procedures for measuring these parameters are provided in Appendix J.

2.9 Sediment Sampling

Sediment samples will be obtained following the procedures described in Appendix O. A total of six locations will be sampled for sediments, three in Davis Creek and three in the former Olmstead Creek.

SECTION 3 - FIELD SAMPLING QUALITY ASSURANCE/ QUALITY CONTROL PROCEDURES

3.1 Introduction

This section discusses and defines the field QA/QC procedures to be used during implementation of the OU Work Plan. These procedures will work in conjunction with the QA/QC procedures contained in the "umbrella" QAPP developed for the RI.

3.2 Sample Handing

3.2.1 Sample Collection Precautions

Exposure of samples to air should be minimized by placing the samples in containers as soon as possible after collection. Samples will be introduced into containers gently, so as to minimize agitation which might enhance volatilization. Liquid will be poured into a container without producing air bubbles during filling (e.g., when sampling for volatile organic compounds (VOCs), no air bubbles should exist in sample container following collection). Samples will be recollected if flow into container is turbulent.

No composite samples will be submitted for analysis of the VOCs. This applies to all samples collected during the RI for VOC analysis. Presently, two types of composite samples for vertical integration are proposed for CLP TCL/TAL analysis (excluding VOCs):

- Composites of multiple spatially separate samples; and

- Composites of continuous samples over a specific interval (e.g., 0 to 1 foot).

From a practical standpoint, both types of samples require homogenization in the field prior to dispensing aliquots to sample containers. To avoid the production of questionable results for VOCs, which could result from sample homogenization, a different sample methodology will be used for VOCs; a relatively small aliquot from a discrete sample interval collected near the mid-depth of the total interval being composited, or from the middle of a continuous interval being composited, will be analyzed. These aliquots, without any homogenization, will be dispensed into the appropriate sample container, which will be sealed as quickly as possible.

Samples should not be collected or stored near running internal combustion engines or any type of exhaust system. Fumes from such devices could contaminate samples.

3.2.2 Sample Designation System

A concise and easily understandable sample designation system is an important part of the RI sampling activities. It provides a unique sample number that will facilitate both sample tracking and easy resampling of certain locations to evaluate temporal changes. The sample designation system to be employed during the sampling activities will be consistent, yet flexible enough to accommodate unforeseen sampling events/conditions. A combination of letters and numbers will be used to yield a unique sample number for each field sample collected. The sample designation system is

described more fully in the Data Management Plan (Blasland & Bouck, 1993d).

3.2.3 Sample Containers and Preservation

The sample containerization, preservation, and handling procedures will follow standard protocols as described in the QAPP. The appropriate sample containers, preservation methods, holding times, and the specific analytical methods for the specific matrices are presented in Table 2. Preservation methods include the addition of parameter-specific chemical preservatives and refrigeration.

The analytical laboratory will supply appropriate containers for sample collection and preservation. The field sampling crew is responsible for properly collecting, labeling, and preserving the samples on ice (as needed) in coolers, immediately after collection. Sample containers will be labeled in accordance to procedures in Appendix C.

3.2.4 Sample Packing and Shipping Requirements

Sample packaging and shipping procedures are designed to ensure that the samples will arrive at the laboratory intact with the chain-of-custody (COC).

Samples will be properly packaged for shipment as outlined in Appendix C and dispatched to the appropriate laboratory for analysis with a separate signed custody record enclosed in each sample box or cooler. Shipping containers will be secured with strapping tape and custody seals for shipment to the laboratory. The preferred procedure includes use of a custody seal attached to the front right and back left of the cooler. The

custody seals are covered with clear plastic tape. The cooler is strapped shut with strapping tape in at least two locations.

All shipments will be accompanied by a COC form identifying the contents. The original form will accompany the shipment; copies will be retained by the sampler for the sampling office records.

If the samples are sent by common carrier, a bill of lading should be used. Receipts or bills of lading will be retained as part of the permanent project documentation. If sent by mail, the package will be registered with return receipt requested. Commercial carriers are not required to sign off on the COC as long as the custody forms are sealed inside the sample cooler and the custody seals remain intact.

3.3 Documentation

Field personnel will provide comprehensive documentation covering all aspects of field sampling, field analysis, and COC. This documentation forms a record which allows reconstruction of field events, thereby aiding the subsequent data review and interpretation process.

All documents, records, and information relating to the performance of the work at the site will be retained. The forms of field documentation which will be maintained throughout the sampling activity are briefly outlined below.

3.3.1 Field Notebook

The field notebook will consist of a bound, surveyor's-type notebook which will contain an overall record of all activities performed at the site, including, but not limited to:

- Project name and number;

- Sample locations;
- Sample descriptions;
- Sample dates;
- Weather conditions;
- Sampling times;
- Sample identification numbers;
- Sample collection methods;
- Sample handling (e.g., filtering) and preservation;
- Specific readings for site testing and sampling;
- Field instrument calibration/operation notes;
- Field measurement data;
- Samplers' names; and
- Any appropriate comments.

Data will be entered in ink with the date and signature of the individual responsible for data entry; blank pages will be noted as being intentionally blank. The exact readings from site testing and sampling will also be recorded on separate documentation sheets (e.g., subsurface logs). Separate documentation sheets are to be used to allow comprehensive documentation of daily site conditions by field personnel. These logs will be placed in a three-ring binder at the end of the day and numbered sequentially.

3.3.2 Geological Investigation Records

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Subsurface logs, sediment sampling forms, in-situ hydraulic conductivity test logs, and well inspection forms will be completed on site. The subsurface logs will provide a record of information needed to describe the

subsurface strata, geotechnical characteristics, and groundwater conditions observed during drilling. Information from sediment sampling will describe lithographic details. In-situ hydraulic conductivity test logs will be maintained in order to document the time and water level readings taken during slug testing at the monitoring wells.

3.3.3 Water Sampling Records

Groundwater and surface water field sampling records will be completed for each sample location and will contain water levels, physical appearance of the water, and field meter readings (temperature, pH, DO, turbidity, and specific conductance), where applicable. Water level readings will be measured to surveyed reference points (e.g., top of outer casing, top of inner casing, ground surface, or a surveyed stake, as appropriate) and recorded on a water level record.

Before going out to the site, an existing monitoring well evaluation form must be completed for the wells to be inspected that day. The form contains information derived from historical records. Well inspection forms will be partially completed off-site with respect to existing information such as completed well depth and other previously measured data. After the wells are inspected and information compared with the existing data, a recommendation regarding the well will be made.

Meters (pH, temperature, DO, turbidity, and conductivity) will be calibrated daily in accordance with the manufacturer's recommendations. Standards, solutions used, concentrations, and readings taken will be recorded daily in field calibration logs (Appendix J).

3.3.4 Air Monitoring and Sampling Records

The photoionization detector (PID) will be calibrated as per the manufacturer's recommendations once after every 10 monitoring wells or borings are field screened, or daily (whichever occurs first). The PID calibration will be recorded on a field calibration log (Appendix L).

During ambient air sampling, data obtained while the sampler is running will be recorded on an air sampling log. Calibrations will be recorded on a High Volume Sampler Field Calibration Log.

3.3.5 Chain-of-Custody Forms

Completed COC forms will be required for all samples to be analyzed. COC forms will be initiated by the sampling crew in the field during the sample collection events. The COC forms will contain the sample's unique identification number, sample date and time, sample description, sample type, sample preservation (if any), and analyses required. The original COC form will accompany the samples to the laboratory and copies will be made prior to shipment (or multiple-copy forms used) for separate field documentation. A COC form is included in Appendix C.

3.3.6 Field Reports

Field staff will prepare field reports to the Remedial Investigation/Feasibility Study (RI/FS) Project Coordinator and the Quality Assurance Manager. The content of the reports will include:

- Performance audit summaries including assessment of field measurement data accuracy, precision, and completeness;
- Significant QA/QC problems and recommended solutions; and
- Resolutions of previously stated problems.

Field reports will be reviewed by the Field Sampling Coordinator prior to submittal to the File Custodian. The matrix of Project Personnel is provided in the WB/A-OU Work Plan (Blasland & Bouck, 1993b).

3.4 Sample Custody

Any person obtaining custody of samples will be responsible for the care and custody of the samples. The term "custody" is defined below.

A person will have custody of samples when the samples are in: their physical possession; their view after being in their physical possession; and their physical possession and secured so they cannot be tampered with. In addition, when samples are secured in a restricted area with access to authorized personnel only, the samples are deemed to be in the custody of such authorized personnel. Chain-of-custody forms will be completed for all samples to be analyzed as described in Section 3.2.5. The chain-of-custody forms will remain with the samples at all times. The samples and signed COC form will remain in the possession of the sampling crew until the samples are delivered to the express carrier (e.g., Federal Express). The forms will then be placed in the project files in the Kalamazoo, Michigan project office.

3.5 Quality Control Samples

Sample types include: surface water; groundwater; soil; residuals; and air. Diligent adherence to all standard operating procedures described in this QA/QC section of this FSP is necessary to achieve a high degree of confidence in the data generated from the field samples. The rationale for QC samples is provided in the QAPP (Blasland & Bouck, 1993a).

The following types of field QC samples will be included for samples requiring analyses for CLP TCL/TAL constituents, PCDDs, PCDFs, and PCBs:

Field duplicates - two samples collected from the same location. Field duplicates will be used to assess environmental variability and laboratory performance. Field duplicate sample containers will be labeled as ordinary field samples with their own separate unique identification. The samples will not be identified as duplicates, thus the laboratory will analyze them as "blind" audit samples.

Rinse blanks - samples of distilled/deionized water which have been poured over sampling equipment after decontamination procedures have been performed. These samples will be used to evaluate the effectiveness of the equipment cleaning used.

Trip blanks - samples of distilled/deionized water which will be used to check for analytes introduced during shipping and handling of the samples prior to, during, and after sample collection. Samples to be analyzed for VOCs and metals will be accompanied by a trip blank. For air samples, an unused polyurethane foam (PUF) and glass fiber filter will serve as a trip blank.

The frequency of required field QC samples is summarized in Table 3.

3.6 Field Measurements

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In order to maintain field precision and accuracy, all water quality meters, PIDs, and high volume air samples will be calibrated to known standards. Field analysis and operation procedures, including calibration and sample analysis, are provided in Appendices J (temperature, DO, turbidity, conductivity, and pH

meters), L (PID), and M (air). Preventive maintenance procedures are also included in these appendices.

Temporally sensitive field data will be collected as quickly as possible in order to minimize errors associated with temporal variation.

3.7 Corrective Actions

Corrective actions include procedures to promptly investigate, document, evaluate, and correct any deficiencies in data quality. If a condition is noted to have an adverse effect on data quality, corrective action will be taken to avoid this condition. Condition identification, cause, and the corrective action implemented, will be documented and reported to the Blasland & Bouck's RI/FS Project Coordinator and Quality Assurance Manager. Implementation of corrective measure will be verified by documented follow-up action.

All project personnel have the responsibility, as part of their normal work duties, to promptly identify and report conditions adverse to data quality. Project personnel will, therefore, continuously monitor ongoing work performance in the normal course of daily responsibilities.

Examples of situations which would require corrective actions include, but are not limited to, the following:

- Protocols, as defined by the QAPP and FSP, have not been followed;
- Predetermined data acceptance standards are not obtained;
- Procedures have not been performed properly;
- Equipment is not properly calibrated or is not functioning correctly;
- Sample and test results are not completely traceable;
- QC requirements have not been met;

- Improper approvals; or
- Concerns resulting from system or performance audits are identified.

Corrective actions will be documented on a Corrective Action Request Form, as identified in the QAPP.

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Table 1

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

Willow Boulevard/A-Site OU Field Sampling Plan

Remedial Investigation Samples

Location	Media	PCBs[1]	Dioxins/ Furans	CLP TCL/TAL[4]	Other Parameters[2]	Geotechnical Analyses[3]
RESIDUALS CHARACTERIZATION						
WILLOW BOULEVARD						
WB-1	Residuals	5	1	1	-	-
	Soil	-	-	1	-	-
WB-2	Residuals	3	1	1	-	-
	Soil	-	-	1	-	-
WB-3	Residuals	3	1	1	-	10
	Soil	-	-	1	-	-
WB-4	Residuals	3	-	1	-	-
	Soil	-	-	1	-	-
WB-5	Residuals	3	-	1	-	10
	Soil	-	-	1	-	-
WRN-1	Residuals	1	-	-	-	-
	Soil	-	-	-	-	-
WRN-2	Residuals	1	-	-	-	-
	Soil	-	-	-	-	-
WRN-3	Residuals	1	-	-	-	-
	Soil	-	-	-	-	-
WRN-4	Residuals	1	-	-	-	-
	Soil	-	-	-	-	-
WRN-5	Residuals	1	-	-	-	-
	Soil	-	-	-	-	-

(See Notes on Page 7)

Table 1
(cont'd)
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

Willow Boulevard/A-Site OU Field Sampling Plan

Remedial Investigation Samples

Location	Media	PCBs[1]	Dioxins/ Furans	CLP TCL/TAL[4]	Other Parameters[5]	Geotechnical Analyses[6]
A-SITE						
AS-1	Residuals	4	1	1	-	-
	Soil	-	-	1	-	-
AS-2	Residuals	6	1	1	-	10
	Soil	-	-	1	-	-
AS-3	Residuals	6	1	1	-	-
	Soil	-	-	1	-	-
ARN-1	Residuals	1	-	-	-	-
ARN-2	Residuals	1	-	-	-	-
ARN-3	Residuals	1	-	-	-	-
ARN-4	Residuals	1	-	-	-	-
ARN-5	Residuals	1	-	-	-	-
HYDROGEOLOGIC INVESTIGATION						
WILLOW BOULEVARD						
WMW-1	Water	-	-	1	1	-
WMW-1A	Soil	1	-	1	-	-
	Water	-	-	1	1	-
WMW-2	Water	-	-	1	1	-
WMW-3	Water	-	-	1	1	-
WMW-3A	Residuals	4	-	1	-	10
	Soil	-	-	1	-	-
	Water	-	-	1	1	-
WMW-3P	Water	-	-	1	1	-
WMW-3R	Water	-	-	1	1	-

(See Notes on Page 7)

Table 1
(cont'd)
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

Willow Boulevard/A-Site OU Field Sampling Plan

Remedial Investigation Samples

Location	Media	PCBs[1]	Dioxins/ Furans	CLP TCL/TAL[4]	Other Parameters[2]	Geotechnical Analyses[3]
WILLOW BOULEVARD (Cont'd)						
WMW-4P	Water	-	-	1	1	-
WMW-4R	Water	-	-	1	1	-
WMW-4A	Water	-	-	1	1	-
WMW-4B	Residuals	5	-	1	-	10
	Soil	-	-	1	-	-
	Water	-	-	1	1	-
A-SITE						
AMW-1	Water	-	-	1	1	-
AMW-2	Water	-	-	1	1	-
AMW-3	Water	-	-	1	1	-
AMW-3A	Soil	1	-	1	-	-
	Water	-	-	1	1	-
AMW-4	Water	-	-	1	1	-
AMW-5	Water	-	-	1	1	-
AMW-6P	Water	-	-	1	1	-
AMW-6R	Water	-	-	1	1	-
AMW-6A	Water	-	-	1	1	-
AMW-6B	Residuals	4	-	1	-	10
	Soil	-	-	1	-	-
	Water	-	-	1	1	-
AMW-7P	Water	-	-	1	1	-
AMW-7R	Water	-	-	1	1	-

(See Notes on Page 7)

Table 1
(cont'd)
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

Willow Boulevard/A-Site OU Field Sampling Plan

Remedial Investigation Samples

Location	Media	PCBs[1]	Dioxins/ Furans	CLP TCL/TAL[4]	Other Parameters[2]	Geotechnical Analyses[3]
A-SITE (Cont'd.)						
AMW-7A	Water	-	-	1	1	-
AMW-7B	Residuals	5	-	1	-	-
	Soil	-	-	1	-	-
	Water	-	-	1	1	-
AMW-8P	Water	-	-	1	1	-
AMW-8R	Water	-	-	1	1	-
AMW-8A	Water	-	-	1	1	-
AMW-8B	Residuals	5	-	1	-	-
	Soil	-	-	1	-	-
	Water	-	-	1	1	-
AMW-9P	Water	-	-	1	1	-
AMW-9R	Water	-	-	1	1	-
AMW-9A	Water	-	-	1	1	-
AMW-9B	Residuals	5	-	1	-	10
	Soil	-	-	1	-	-
	Water	-	-	1	1	-
AMW-10P	Water	-	-	1	1	-
AMW-10R	Water	-	-	1	1	-
AMW-10A	Water	-	-	1	1	-
AMW-10B	Residuals	2	-	1	-	-
	Soil	-	-	1	-	-
	Water	-	-	1	1	-
RG-1	Water	-	-	-	2	-
RG-2	Water	-	-	-	2	-

(See Notes on Page 7)

Table 1
(cont'd)
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

Willow Boulevard/A-Site OU Field Sampling Plan

Remedial Investigation Samples

Location	Media	PCBs[1]	Dioxins/ Furans	CLP TCL/TAL[4]	Other Parameters[5]	Geotechnical Analyses[7]
SOILS AND SEDIMENT INVESTIGATION						
WILLOW BOULEVARD						
WBAS-1	Soil	1	-	-	-	-
WBAS-2	Soil	1	-	-	-	-
WBAS-3	Soil	1	-	-	-	-
A-SITE						
GEO-1	Dike	4	-	1	-	10
	Soil	-	-	1	-	-
GEO-2	Dike	4	-	1	-	10
	Soil	-	-	1	-	-
G20-1	Dike	2	-	-	-	10
ARS-1	Residuals	1	-	-	-	-
	Soil	1	-	-	-	-
ARS-2	Residuals	1	-	-	-	-
	Soil	1	-	-	-	-
ARS-3	Residuals	1	-	-	-	-
	Soil	1	-	-	-	-
EDC-1	Residuals	1	-	-	-	-
	Soil	1	-	-	-	-
EDC-2	Residuals	1	-	-	-	-
	Soil	1	-	-	-	-
EDC-3	Residuals	1	-	-	-	-
	Soil	1	-	-	-	-
EDC-4	Residuals	1	-	-	-	-
	Soil	1	-	-	-	-

(See Notes on Page 7)

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Table 1
(cont'd)
Allied Paper, Inc./Portage Creek/Kalamazoo River
Superfund Site

Willow Boulevard/A-Site OU Field Sampling Plan

Remedial Investigation Samples

Location	Media	PCBs[1]	Dioxins/ Furans	CLP TCL/TAL[4]	Other Parameters[5]	Geotechnical Analyses[6]
A-SITE (Cont'd.)						
EDC-5	Residuals	1	-	-	-	-
	Soil	1	-	-	-	-
EDC-6	Residuals	1	-	-	-	-
	Soil	1	-	-	-	-
EDC-7	Residuals	1	-	-	-	-
	Soil	1	-	-	-	-
EDC-8	Residuals	1	-	-	-	-
	Soil	1	-	-	-	-
P-1RS	Dike	-	-	-	-	10
P-2RS	Dike	-	-	-	-	10
P-3RS	Dike	-	-	-	-	10
P-1D	Dike	-	-	-	-	10
P-2D	Dike	-	-	-	-	10
P-3D	Dike	-	-	-	-	10
P-4WT	Dike	-	-	1	-	10
P-5WT	Dike	-	-	1	-	10
SURFACE WATER INVESTIGATION						
DAVIS CREEK						
DCU-SED	Sediment	1	-	-	-	-
DCM-SED	Sediment	1	-	-	-	-
DCD-SED	Sediment	1	-	-	-	-
DCU-SW	Water	1	-	-	1	-
DCM-SW	Water	1	-	-	1	-
DCD-SW	Water	1	-	-	1	-

(See Notes on Page 7)

Table 1
(cont'd)
Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site

Willow Boulevard/A-Site OU Field Sampling Plan

Remedial Investigation Samples

Location	Media	PCBs[1]	Dioxins/ Furans	CLP TCL/TAL[4]	Other Parameters[2]	Geotechnical Analyses[3]
OLMSTEAD CREEK						
OCU-SED	Sediment	1	-	-	-	-
OCM-SED	Sediment	1	-	-	-	-
OCD-SED	Sediment	1	-	-	-	-
OCU-SW	Water	1	-	-	1	-
OCM-SW	Water	1	-	-	1	-
OCD-SW	Water	1	-	-	1	-
AIR INVESTIGATION						
# 1 to #4	Air	150	-	-	-	-
SAMPLE TOTALS						
Residuals Total		84	6	15	-	70
Soil Total		16	-	19	-	-
Sediment Total		6	-	-	-	-
Dike Total		10	-	4	-	110
Groundwater Total		-	-	37	41	-
Surface Water Total		6	-	-	6	-
Air Total		150	-	-	-	-

Notes:

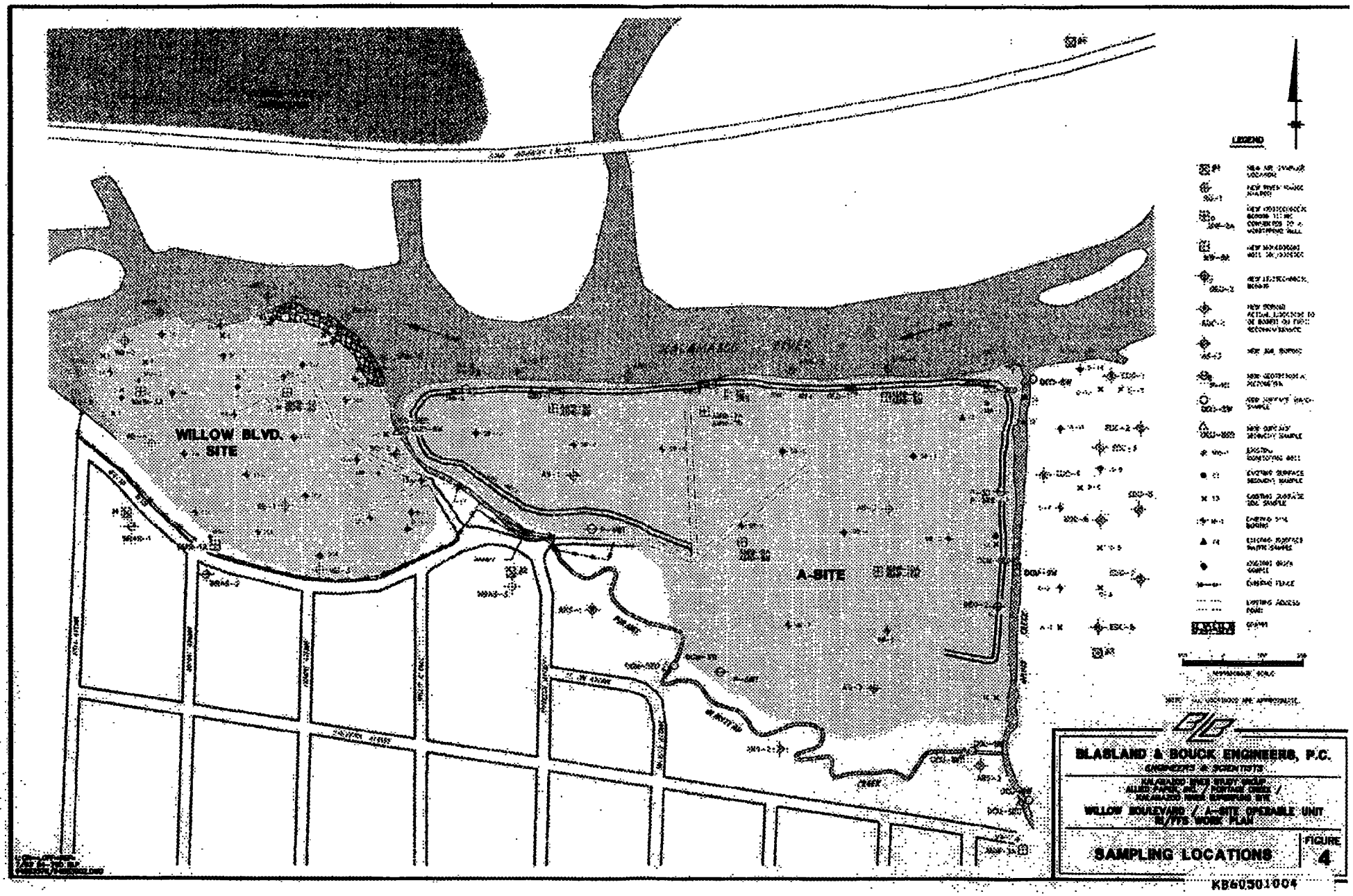
[1] PCBs exclusively. Additional analyses for PCBs are included with the CLP TCL/TAL constituents.

[2] Other parameters include the following compounds:
Groundwater: pH, specific conductance, temperature, turbidity TOC, DO, COD, HCO_3^-, NO_3^- Cl^-, SO_4^{2-}, and CO_3^{2-}.
River water: pH, specific conductance, temperature, DO, turbidity, TAL, CO_3^{2-}, HCO_3^-, Cl^-, and SO_4^{2-}.
Creek water: TSS.

[3] Geotechnical analyses include the following: gradation, Atterberg Limits, laboratory permeability, moisture content, organic content, specific gravity, unconsolidated-undrained triaxial compression test, one-dimensional consolidation, consolidated-undrained triaxial compression test.

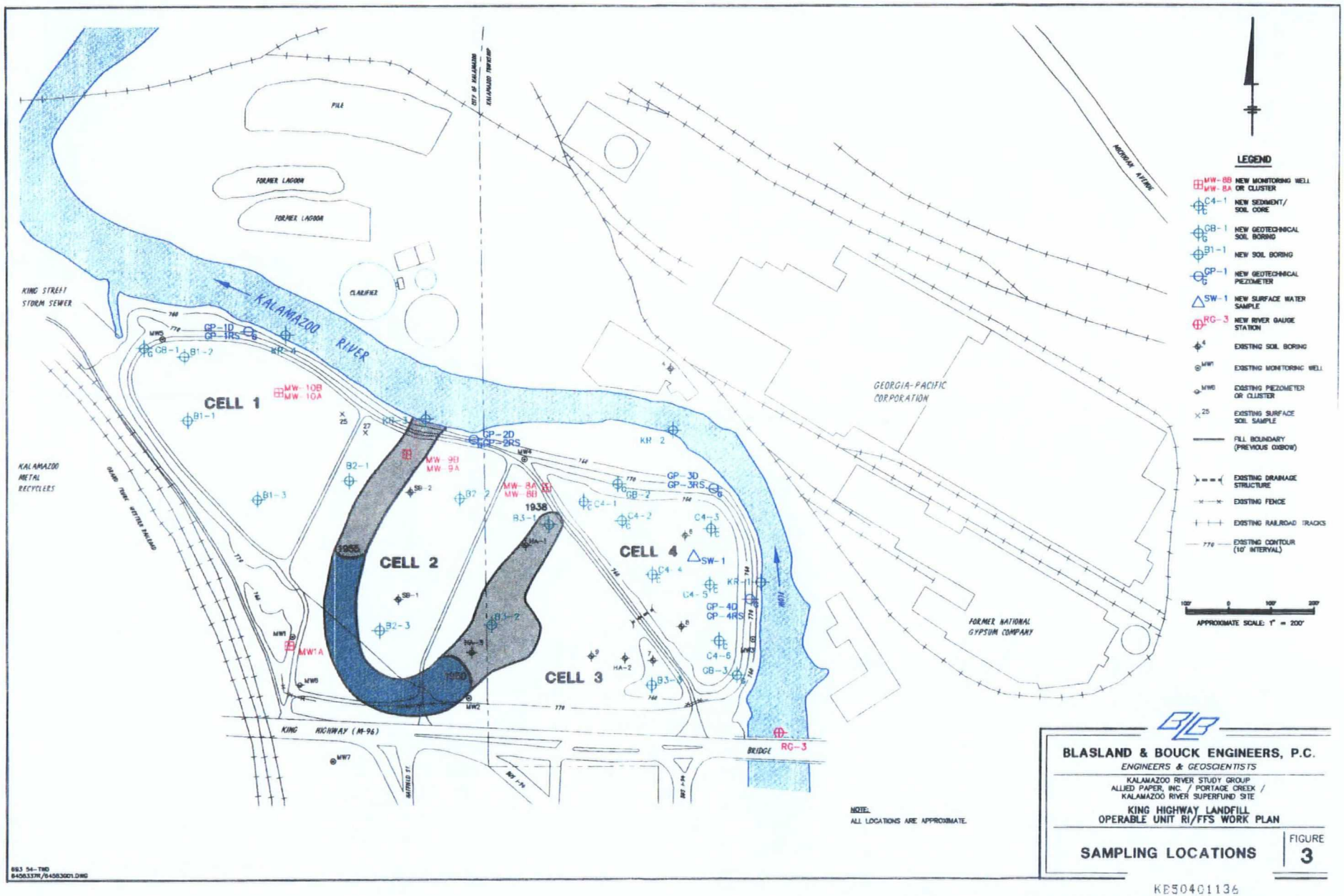
[4] Groundwater sample TAL metals will be analyzed both unfiltered (total metals) and field filtered (dissolved metals).

100% Recycled 30% PCW


WILLOW BLVD.
SITE
A-SITE
LEGEND
BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & SCIENTISTS
WILLOW BOULEVARD / A-SITE OPERABLE UNIT
RI/FS WORK PLAN
SAMPLING LOCATIONS
FIGURE
4

KB60501004

100% Recycled 30% PCW



NOTE:
ALL LOCATIONS ARE APPROXIMATE.

BLASLAND & BOUCK ENGINEERS, P.C.
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KALAMAZOO RIVER STUDY GROUP
ALLIED PAPER, INC. / PORTAGE CREEK /
KALAMAZOO RIVER SUPERFUND SITE

KING HIGHWAY LANDFILL
OPERABLE UNIT RI/FFS WORK PLAN

SAMPLING LOCATIONS

FIGURE **3**

KB50401136

BB3 54-TWD
8408337R/8408360D1.DWG

100% Recycled 30% PCW

KING HIGHWAY LANDFILL OPERABLE UNIT REMEDIAL INVESTIGATION/ FOCUSED FEASIBILITY STUDY

FIELD SAMPLING PLAN

Kalamazoo River Study Group

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

July 1993

BLASLAND, BOUCK & LEE, INC.
ENGINEERS & SCIENTISTS

SA 093037

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King Highway Landfill Operable Unit Remedial Investigation/ Focused Feasibility Study

Field Sampling Plan

Kalamazoo River Study Group

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

July 1993

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DISCLAIMER

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PREFACE

This Field Sampling Plan (FSP) supports the Remedial Investigation/Focused Feasibility Study (RI/FFS) Work Plan prepared on behalf of the Kalamazoo River Study Group (KRSG) by Blasland & Bouck Engineers, P.C. (Blasland & Bouck) for the King Highway Landfill Operable Unit (KHL-OU). This FSP serves to identify and describe the methods to be used in the RI/FFS field investigation.

Typically, a Sampling and Analysis Plan is comprised of two parts or documents, the Quality Assurance Project Plan (QAPP) and the Field Sampling Plan (FSP). The QAPP serves to identify the protocols and methods necessary to obtain quality data during the RI/FFS with respect to the data quality objectives. At MDNR's request, the QAPP is comprehensive for all Operable Units (OUs) to be investigated. The FSPs have been developed specifically for the individual OUs.

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

KING HIGHWAY LANDFILL OPERABLE UNIT
FIELD SAMPLING PLAN

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

KING HIGHWAY LANDFILL OPERABLE UNIT
FIELD SAMPLING PLAN

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Table 2 Required Containers, Preservation Techniques, and Holding Times
Table 3 Required Quality Control Analyses

APPENDICES

Appendix A Soil/Residuals Sampling Procedures
Appendix B Equipment Cleaning Procedures
Appendix C Handling, Packing, and Shipping Procedures
Appendix D Installation Procedures for Monitoring Well/Piezometer Completion
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Appendix F Water Level Measurement Procedures
Appendix G Monitoring Well Inspection Procedures
Appendix H Monitoring Well Decommissioning Procedures
Appendix I Groundwater Purging/Evacuation and Sampling Procedures
Appendix J Field Procedures for Water Quality Measurements
Appendix K In-Situ Hydraulic Conductivity Test Procedures
Appendix L Photoionization Detector (PID) Field Screening Procedures
Appendix M Surface Water Sampling Procedures
Appendix N Sediment Sampling Procedures
Appendix O Immunoassay PCB-Testing Procedures

SECTION 1 - INTRODUCTION

1.1 General

This Field Sampling Plan (FSP) was prepared to document field sampling procedures in support of the Remedial Investigation/Focused Feasibility Study (RI/FFS) for the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site, King Highway Landfill Operable Unit (KHL-OU). This FSP provides details on sampling objectives, locations and frequency of sampling, sampling and field procedures for each matrix of concern, sample handling and documentation, and field quality assurance/quality control (QA/QC) procedures.

The procedures specified herein will be used for sampling soil, paper-making residuals, sediments, surface water, and groundwater. Laboratory and applicable QA/QC procedures for the collected samples are discussed in a separate document entitled the Quality Assurance Project Plan (QAPP) (Blasland & Bouck, 1993a). The field procedure(s) used in obtaining a given sample may have a significant effect on analytical data generated from that sample. Therefore, it is imperative that standardized protocols be utilized and that sample integrity and quality assurance standards be maintained during site investigations and environmental sampling events.

This FSP fulfills a requirement of the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site Administrative Order by Consent (AOC), which became effective on December 28, 1990, between the Michigan Department of Natural Resources (MDNR) and the members of the Kalamazoo River Study Group (KRSG). This plan is intended to complement the QAPP, which together

dictate the QA/QC and field sampling procedures that will be followed during the RI/FFS.

This FSP contains a compilation of sampling methods which provides practical, state-of-the-art field methods. It is subject to modifications where unforeseen sampling difficulties present themselves, and it will be updated to reflect collection of any additional samples/data not covered by the current version of this plan.

1.2 Sampling Objectives

The objectives of the field sampling activities are to collect samples that can be used to further characterize the site. The results of the Site Investigation portion of the RI will ultimately provide data to be used in the assessment of preliminary remedial alternatives during the FFS.

The goals of the RI, as stated in the AOC, are to:

- Fully characterize the nature of paper-making residuals at the OU;
- Define any regulated constituent sources at the OU;
- Determine the vertical and horizontal extent of regulated chemicals originating at the OU;
- Spatially quantify regulated constituents to the extent necessary to enable preparation of an Endangerment Assessment (EA) and a FFS, and to the extent that such constituents may be attributable to the OU;
- Identify potential migration pathways and movement; and
- Quantify public health and environmental risk.

The AOC did not specifically identify the KHL-OU as an area to be investigated, nevertheless the goals as stated above will be applied to the RI/FFS.

This FSP provides the information necessary for field sampling personnel to attain these goals for fulfillment of the overall Site Investigation objectives.

SECTION 2 - SAMPLING AND FIELD PROCEDURES

2.1 Introduction

As part of the various field investigations, several standard field procedures will be performed. They include:

- Soil/Residual Boring Drilling and Sampling;
- Groundwater Monitoring Well Installation;
- Piezometer Installation;
- Groundwater Sampling;
- In-Situ Hydraulic Conductivity Measurement;
- Surface Water Sampling; and
- Sediment Sampling.

This section of the FSP introduces and references the appropriate detailed procedures in the appendices, including ancillary procedures for equipment cleaning, water level measurements, well development, field measurements, and calibration and maintenance of field instruments. Sample handling, packing, and shipping procedures together with field QA/QC requirements are described in Section 3. All sample locations, analytical parameters, and geotechnical analyses for the following sections are summarized in Table 1.

2.2 Soil/Residual Boring Drilling and Sampling

The KHL-OU is comprised of four distinct cells, three of which contain paper-making residuals, and the fourth ponded water. To conduct the Residuals Characterization, three borings will be drilled in each of three cells filled with

paper-making residuals. These nine borings are identified as B1-1, B1-2, B1-3, B2-1, B2-2, B2-3, B3-1, B3-2, and B3-3. The locations of these borings are shown on Figure 3 of the KHL-OU Work Plan (Blasland & Bouck, 1993b).

Split-spoon (ASTM D1586) or thin-walled piston samplers (ASTM D4700) will be used to obtain samples on a continuous basis. Split-spoon samplers will be the preferred method of sampling with the piston samplers being used in conditions where the materials cannot be recovered using split-spoon sampling methods or where undisturbed samples are required for geotechnical testing. Materials such as paper-making residuals or very fine, saturated sands may require the use of the piston sampling method.

Borings will be advanced with a drill rig, where possible, using either the hollow-stem auger method or the driven casing method, depending on the nature of the subsurface materials. The hollow-stem auger is the preferred method as it does not require the use of drilling fluids or additives other than water. The alternate method (driven casing) requires the use of a drilling fluid to lift the cuttings from the boring, but does not require the use of any additives other than water or bentonite. The drilling fluid to be used will be water with the addition of bentonite only when necessary. In situations where physical features limit the use of drill rigs, borings will be completed with either a hand-driven or a portable power-driven split-spoon sampler, depending on the required depth and material. The detailed procedures for sampling of soil borings are provided in Appendix A. Samples of the subsurface material encountered during soil boring installation will be collected continuously (every 2 feet) until the required depth of the borehole is reached.

Pre-field cleaning procedures, post-field cleaning procedures, and cleaning procedures between borings are provided in Appendix B.

Representative portions of all split-spoon soil samples will be retained in appropriate containers for: 1) visual classification by the supervising geologist and 2) laboratory analyses, where appropriate. A representative portion of each sample will be placed in a clean jar and the headspace screened with a PID (Appendix L). The results will be recorded on the boring log. The number, location, and laboratory analysis required for the samples obtained at the borings are identified in the KHL-OU Work Plan. Representative samples, as directed in the KHL-OU Work Plan, will be analyzed for polychlorinated biphenyls (PCBs), the Contract Laboratory Program Target Compound List/Target Analyte List (CLP TCL/TAL) constituents, polychlorinated dibenzo-p-dioxins (PCDDs), polychlorinated dibenzofurans (PCDFs), or geotechnical parameters as listed on Table 1.

Disturbed samples with be collected for geotechnical analysis during the drilling of GB-1, GB-2, GB-3, GP-1, GP-2, GP-3, GP-4, MW-10B, MW-9B, B1-3, B2-3, B3-1, and B3-2. Relatively undisturbed samples will be collected during the drilling of B1-3, B2-3, B3-2, MW-10B, and GB-1 GB-2, and GB-3, for geotechnical evaluation. The samples will be collected using a Shelby tube (ASTM D1587) or thin-walled piston sampler (ASTM D4700). Field vane shear testing (ASTM D2573) will be performed in borings B1-3, B2-3, B3-1, B3-2, GB-1, GB-2, and GB-3 if field conditions are appropriate.

Four sediment cores (KR-1 to KR-4) will be installed in the River near the KHL-OU. The cores will be installed following the procedures in Appendix N. Samples will be analyzed for PCBs using the procedures in Appendix O.

The procedures for handling, packing, and shipping the samples are provided in Appendix C.

2.3 Groundwater Monitoring Well Installation

As required by MDNR, total of up to 11 new monitoring wells could be installed. Four well clusters will be installed; two clusters of two wells (MW-1 and MW-8) and two clusters of up to four wells (MW-9 and MW-10). The locations of these wells are shown on Figure 3 of the KHL-OU Work Plan.

As required by MDNR, the monitoring well clusters MW-9 and MW-10 may include wells with screened intervals in saturated residuals. Identification of saturated residuals will be made in the field as outlined in Appendix D.

The monitoring wells will be installed in completed soil borings, as described in Appendix D. Monitoring well boreholes will be advanced utilizing the same drilling and sampling methods described in Section 2.2 and Appendix A. The wells will be constructed with a stainless steel well screen and riser. The screened portion of the monitoring well will be less than 10 feet in length. At most locations, 5 feet of well screen will be used, with the exception that shallow wells installed under water table conditions will have at least a 10 foot screen with a maximum of seven feet of the screened interval extending below the water table. The screen lengths for each well are detailed in the KHL-OU Work Plan.

A filter pack consisting of an appropriately sized silica sand will be installed in the annular space around the screen and extending to approximately two feet above the top of the screen, except where a well is installed immediately below the base of the residuals. At these locations, the filter pack will extend only six inches above the screened interval. The purpose of the filter pack is to: filter out particles from the adjacent formation; stabilize aquifer materials to reduce settlement of materials above the well intake during well development; and increase the well's effective diameter and thereby increase water flow into the well. A bentonite seal, at least 2 feet thick, will be installed in the annular space above the sand filter pack. In the annular space above the bentonite seal, a cement/bentonite grout (up to 4 percent bentonite) will be placed by tremie pipe to the surface. Descriptions of monitoring well installation procedures and methods are presented in Appendix D.

All monitoring well casings and screens will be cleaned prior to installation, using the procedures in Appendix B.

Upon completion, each monitoring well will be developed to remove fine-grained materials that have settled in or around the well during installation, and to improve the hydraulic connection between the monitoring well and the surrounding formation. The procedures used for developing monitoring wells are provided in Appendix E. Wells screened in residuals will not be developed. After the monitoring wells are developed, water levels will be measured following procedures provided in Appendix F.

The physical condition of all existing monitoring wells will be ascertained using the procedures in Appendix G. Existing groundwater monitoring wells at

the KHL-OU will be re-developed, as necessary, following the methods provided in Appendix E. If, during the well inspection or re-development of the existing wells, it is determined that the well needs to be decommissioned, the procedures provided in Appendix H will be followed.

Upon completion of each monitoring well, a designated measuring point will be marked on the well and surveyed to an existing bench mark. Vertical and horizontal control will be established using standard, accepted surveying by a licensed surveyor.

2.4 Piezometer Installation

A total of eight piezometers (GP-1D/RS, GP-2D/RS, GP-3D/RS, and GP-4D/RS) will be installed in the dikes surrounding the KHL-OU. These piezometers will be constructed of 2-inch diameter PVC. The locations of these piezometers are shown on Figure 3 of the KHL-OU Work Plan. These piezometers will be installed for water level measurement purposes utilizing the same drilling and sampling methods described in Section 2.2 and in Appendix A. Descriptions of piezometer installation procedures are presented in Appendix D.

Upon completion, piezometers that yield water will be developed to provide a good hydraulic connection between the screened zone and the formation. The piezometer development procedures are described in Appendix E.

2.5 Groundwater Sampling

As directed by MDNR, two rounds of groundwater sampling from the monitoring wells will be conducted, unless MDNR determines that the data from

one round of sampling have sufficiently characterized the groundwater and therefore a second round would not be necessary.

Prior to groundwater sampling, the water level measurement of all wells to be sampled at the OU will be taken following the procedures in Appendix F. Groundwater samples will be obtained from the monitoring wells in accordance with the procedures in Appendix I. The pre-, during, and post-field cleaning procedures are provided in Appendix B.

Groundwater samples will be collected and analyzed in the field for temperature, specific conductance, and pH prior to sampling during well evacuation and at the time of collection. Turbidity will also be sampled at the time of collection. The procedures for measuring these parameters in the field are provided in Appendix J.

2.6 In-Situ Hydraulic Conductivity Measurement

In-situ hydraulic conductivity measurements using slug tests will be obtained at selected newly installed and existing monitoring wells using the procedures in Appendix K. Slug tests will be performed after the first round of groundwater samples have been collected. Slug tests can be performed by two different techniques: 1) by introducing a solid cylinder of known volume (falling head test); or 2) by withdrawal of a solid cylinder of known volume from the well after the well has returned to its static level (rising head test). By monitoring the rate of changing water levels, hydraulic conductivity estimates can be calculated. However, as the use of data from a rising head test is typically more representative of the aquifer, rising head test data will be used to

calculate estimates of the hydraulic conductivity at the KHL-OU. The formulae of Hvorslev or Bouwer-Rice will be used to calculate a value for the hydraulic conductivity. Calculations may be performed using computer programs.

2.7 Air Monitoring

The air monitoring to be performed during the sampling activities at the various study areas will consist of work area air monitoring (Appendix L). The work-area monitoring is intended to protect site workers. Field personnel will monitor volatile organic compounds (VOCs) in certain situations as detailed in the Health and Safety Plan (HSP) by using a hand-held monitoring instrument (Appendix L). Action levels and levels of protection will be implemented as described in the HSP (Blasland & Bouck, 1993c).

2.8 Surface Water Sampling

One surface water sample will be collected from Cell 4 (SW-1). Surface water will also be collected at the river gauge during groundwater sampling events. All surface water samples will be collected in accordance with Appendix M.

A duplicate of the surface water sample will be collected and measured in the field for temperature, pH, conductivity, dissolved oxygen (DO), and turbidity at the time of collection. The procedures for measuring these parameters are provided in Appendix J.

2.9 Sediment Sampling

Sediment samples will be obtained following the procedures described in Appendix N. A total of six locations, C4-1 through C4-6, within Cell 4 will be sampled. Three will be analyzed for PCBs and three will be collected for visual classification only.

SECTION 3 - FIELD SAMPLING QUALITY ASSURANCE/ QUALITY CONTROL PROCEDURES

3.1 Introduction

This section discusses and defines the QA/QC procedures to be used during implementation of the Work Plan. These procedures will work in conjunction with the QA/QC procedures contained in the "umbrella" QAPP developed for the RI.

3.2 Sample Handling

This section discusses and defines the field QA/QC procedures to be used during implementation of the Work Plan. These procedures will work in conjunction with the QA/QC procedures contained in the "umbrella" QAPP developed for the RI.

3.2.1 Sample Collection Precautions

Exposure of samples to air should be minimized by placing the samples in containers as soon as possible after collection. Samples will be introduced into containers gently, so as to minimize agitation which might enhance volatilization. Liquid will be poured into a container without producing air bubbles during filling (e.g., when sampling for volatile organic compounds (VOCs), no air bubbles should exist in sample container following collection). Samples will be recollected if flow into container is turbulent.

No composite samples will be submitted for analysis of VOCs. This applies to all samples collected during the RI for VOC analysis. Presently,

two types of composite samples for vertical integration are proposed for CLP TCL/TAL analysis (excluding VOCs):

- Composites of multiple spatially separate samples; and
- Composites of continuous samples over a specific interval (e.g., 0 to 1 foot).

From a practical standpoint, both types of samples require homogenization in the field prior to dispensing aliquots to sample containers. To avoid the production of questionable results for VOCs, which could result from sample homogenization, a different sample methodology will be used for VOCs; a relatively small aliquot from a discrete sample interval collected near the mid-depth of the total interval being composited, or from the middle of a continuous interval being composited will be analyzed. These aliquots, without any homogenization, will be dispensed into the appropriate sample container, which will be sealed as quickly as possible.

Samples should not be collected or stored near running internal combustion engines or any type of exhaust system. Fumes from such devices could contaminate samples.

3.2.2 Sample Designation System

A concise and easily understandable sample designation system is an important part of the RI sampling activities. It provides a unique sample number that will facilitate both sample tracking and easy resampling of certain locations to evaluate temporal changes. The sample designation system to be employed during the sampling activities will be consistent, yet

flexible enough to accommodate unforeseen sampling events/conditions. A combination of letters and numbers will be used to yield a unique sample number for each field sample collected. The sample designation system is described more fully in the Data Management Plan (Blasland & Bouck, 1993d).

3.2.3 Sample Containers and Preservation

The sample containerization, preservation, and handling procedures will follow standard protocols as described in the QAPP. The appropriate analytical method for the specific matrices are presented in Table 2. Preservation methods include the addition of parameter-specific chemical preservatives or refrigeration. These methods are presented in Table 2.

The analytical laboratory will supply appropriate containers for sample collection and preservation. The field sampling crew is responsible for properly collecting, labeling, and preserving the samples on ice (as needed) in coolers, immediately after collection. Sample containers will be labeled in accordance to procedures in Appendix C.

3.2.4 Sample Packing and Shipping Requirements

After samples are placed in appropriate containers and labeled, those containers will be immediately placed in a cooler and carefully packed to minimize the possibility of container breakage. Completed chain-of-custody (COC) forms will accompany each sample shipment. Shipments will also contain matrix spike/matrix spike duplicate samples, trip blanks and rinse blanks, and field duplicates as prescribed in Table 3.

Sample packaging and shipping procedures are designed to ensure that the samples will arrive at the laboratory intact with the COC.

Samples will be properly packaged for shipment as outlined in Appendix C and dispatched to the appropriate laboratory for analysis with a separate signed custody record enclosed in each sample box or cooler. Shipping containers will be secured with strapping tape and custody seals for shipment to the laboratory. The preferred procedure includes use of a custody seal attached to the front right and back left of the cooler. The custody seals are covered with clear plastic tape. The cooler is strapped shut with strapping tape in at least two locations.

All shipments will be accompanied by the COC form identifying the contents. The original form will accompany the shipment; copies will be retained by the sampler for the sampling office records.

If the samples are sent by common carrier, a bill of lading should be used. Receipts of bills of lading will be retained as part of the permanent project documentation. If sent by mail, the package will be registered with return receipt requested. Commercial carriers are not required to sign off on the custody form as long as the custody forms are sealed inside the sample cooler and the custody seals remain intact.

3.3 Documentation

Field personnel will provide comprehensive documentation covering all aspects of field sampling, field analysis, and COC. This documentation forms

a record which will allow reconstruction of field events, thereby aiding the subsequent data review and interpretation process.

All documents, records, and information relating to the performance of the work at the site will be retained. The forms of field documentation which will be maintained throughout the sampling activity are briefly outlined below.

3.3.1 Field Notebook

The field notebook will consist of a bound, surveyor's-type notebook which will contain an overall record of all activities performed at the site, including, but not limited to:

- Project name and number;
- Sample locations;
- Sample descriptions;
- Sample dates;
- Weather conditions;
- Sampling times;
- Sample identification numbers;
- Sample collection methods;
- Sample handling (e.g., filtering) and preservation;
- Specific readings for site testing and sampling;
- Field instrument calibration/operation notes;
- Field measurement data;
- Samplers' names; and
- Any appropriate comments.

Data will be entered in ink with the date and signature of the individual responsible for data entry; blank pages will be noted as being intentionally blank.

The exact readings from site testing and sampling will also be recorded on separate documentation sheets (e.g., subsurface logs). Separate documentation sheets are to be used to allow comprehensive documentation of daily site conditions by field personnel. These logs will be placed in a three-ring binder at the end of the day and numbered sequentially.

3.3.2 Geological Investigation Records

Subsurface logs, sediment sampling forms, in-situ hydraulic conductivity test logs, and well inspection forms will be completed on site. The subsurface logs will provide a record of information needed to describe the subsurface strata, geotechnical characteristics, and groundwater conditions observed during drilling. Information from sediment sampling will describe lithographic details. In-situ hydraulic conductivity test logs will be maintained in order to document the time and water level readings taken during slug testing at the monitoring wells.

3.2.3 Water Sampling Records

Groundwater and surface water field sampling records will be completed for each sample location and will contain water levels, physical appearance of the water, and field meter readings (temperature, pH, DO, turbidity, and specific conductance), where applicable. Water level readings will be measured to surveyed reference points (e.g., top of outer casing,

top of inner casing, ground surface, or a surveyed stake, as appropriate) and recorded on a water level record.

Before going out to the site, an existing monitoring well evaluation form must be completed for the wells to be inspected that day. The form contains information derived from historical records. Well inspection forms will be partially completed off-site with respect to existing information such as completed well depth and other previously measured data. After the wells are inspected and information compared with the existing data, a recommendation regarding the well will be made.

Meters (pH, temperature, DO, turbidity, and conductivity) will be calibrated daily in accordance with the manufacturer's recommendations. Standards, solutions used, concentrations, and readings taken will be recorded daily in field calibration logs (Appendix J).

3.3.4 Air Monitoring Records

The photoionization detector (PID) will be calibrated as per the manufacturer's recommendations once after every 10 monitoring wells or borings are field screened, or daily (whichever occurs first). The PID calibration will be recorded on a field calibration log (Appendix L).

3.3.5 COC Forms

Completed COC forms will be required for all samples to be analyzed. COC forms will be initiated by the sampling crew in the field during the sample collection events. The COC forms will contain the sample's unique identification number, sample date and time, sample description, sample type, sample preservation (if any), and analyses required. The original COC

form will accompany the samples to the laboratory and copies will be made prior to shipment (or multiple-copy forms used) for separate field documentation. A COC form is included in Appendix C.

3.3.6 Field Reports

Field staff will prepare field reports to the RI/FFS Project Coordinator and the Quality Assurance Manager. The content of the reports will include:

- Performance audit summaries including assessment of field measurement data accuracy, precision, and completeness;
- Significant QA/QC problems and recommended solutions; and
- Resolutions of previously stated problems.

Field reports will be reviewed by the Field Sampling Coordinator prior to submittal to the File Custodian. The matrix of Project Personnel is provided in the KHL-OU Work Plan (Blasland & Bouck, 1993b).

3.4 Sample Custody

Any person obtaining custody of samples will be responsible for the care and custody of the samples. The term "custody" is defined below.

A person will have custody of samples when the samples are in: their physical possession; their view after being in their physical possession; or their physical possession and secured so they cannot be tampered with. In addition, when samples are secured in a restricted area with access to authorized personnel only, the samples are deemed to be in the custody of such authorized personnel. COC forms will be completed for all samples to be analyzed as

described in Section 3.2.5. The COC forms will remain with the samples at all times. The samples and signed COC form(s) will remain in the possession of the sampling crew until the samples are delivered to the express carrier (e.g., Federal Express). The forms will then be placed in the project files in the Kalamazoo, Michigan project office.

3.5 Quality Control Samples

Sample types include: surface water; groundwater; soil; and residuals. Diligent adherence to all standard operating protocols described in this QA/QC section of this FSP is necessary to achieve a high degree of confidence in the data generated from the field sample analyses. The rationale for QC samples is provided in the QAPP (Blasland & Bouck, 1993a).

The following types of field QC samples will be included for samples requiring analyses for CLP TCL/TAL constituents, PCDDs, PCDFs, and PCBs:

Field duplicates - two samples collected from the same location. Field duplicates will be used to assess environmental variability and laboratory performance. Field duplicate sample containers will be labeled as ordinary field samples with their own separate unique identification. The samples will not be identified as duplicates, thus the laboratory will analyze them as "blind" audit samples.

Rinse blanks - samples of distilled/deionized water which have been poured over sampling equipment after decontamination procedures have been performed. These samples will be used to evaluate the effectiveness of the equipment cleaning procedures.

Trip blanks - samples of distilled/deionized water which will be used to check for analytes introduced during shipping and handling of the samples prior to, during, and after sample collection. Samples to be analyzed for VOCs and metals will be accompanied by a trip blank.

The frequency of required field QC samples is summarized in Table 3.

3.6 Field Measurements

In order to maintain field precision and accuracy, all water quality meters and PIDs will be calibrated to known standards. Field analysis and operation procedures, including calibration and sample analysis, are provided in Appendices J (thermometer, DO, turbidity, conductivity, and pH meters) and L (PID). Preventive maintenance procedures are also included in these appendices.

Temporally sensitive field data will be collected as quickly as possible in order to minimize errors associated with temporal variation.

3.7 Corrective Actions

Corrective actions include procedures to promptly investigate, document, evaluate, and correct any deficiencies in data quality. If a condition is noted to have an adverse effect on data quality, corrective action will be taken to avoid this condition. Condition identification, cause, and the corrective action implemented will be documented and reported to Blasland & Bouck's Remedial Investigation/Feasibility Study (RI/FS) Project Coordinator and Quality Assurance Manager. Implementation of corrective measure(s) will be verified by documented follow-up action.

All project personnel have the responsibility, as part of their normal work duties, to promptly identify and report conditions adverse to data quality. Project personnel will, therefore, continuously monitor ongoing work performance in the normal course of daily responsibilities.

Examples of situations which would require corrective actions include, but are not limited to, the following:

- Protocols, as defined by the QAPP and FSP, have not been followed;
- Predetermined data acceptance standards are not obtained;
- Procedures have not been performed properly;
- Equipment is not properly calibrated or is not functioning correctly;
- Sample and test results are not completely traceable;
- QC requirements have not been met;
- Improper approvals; or
- Concerns resulting from system or performance audits are identified.

Corrective actions will be documented on a Corrective Action Request Form, as identified in the QAPP.

References

REFERENCES

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Table 1

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

King Highway Landfill Operable Unit Field Sampling Plan

Remedial Investigation Samples

Location	Media	PCBs[1]	Dioxins/ Furans	CLP TCL/TAL[2]	TAL	Other Parameters[3]
RESIDUALS CHARACTERIZATION						
B1-1	Residuals	6	-	1	-	-
	Soil	-	-	1	-	-
B1-2	Residuals	6	1	1	-	-
	Soil	-	-	1	-	-
B1-3	Residuals	6	-	1	-	10
	Soil	-	-	1	-	-
B2-1	Residuals	4	-	1	-	-
	Soil	-	-	1	-	-
B2-2	Residuals	5	1	1	-	-
	Soil	-	-	1	-	-
B2-3	Residuals	4	-	1	-	10
	Soil	-	-	1	-	-
B3-1	Residuals	4	1	1	-	10
	Soil	-	-	1	-	-
B3-2	Residuals	4	-	1	-	10
	Soil	-	-	1	-	-
B3-3	Residuals	4	-	1	-	-
	Soil	-	-	1	-	-
C4-1	Residuals	1	-	-	-	-
C4-2	Residuals	-	-	-	-	1
C4-3	Residuals	1	-	-	-	-
C4-4	Residuals	-	-	-	-	1
C4-5	Residuals	1	-	-	-	-
C4-6	Residuals	-	-	-	-	1
KR-1	Residuals	1	-	-	-	-

(See Notes on Page 4)

Table 1
(Cont'd)
Allied Paper, Inc./Portage Creek/Kalamazoo River
Superfund Site

King Highway Landfill Operable Unit Field Sampling Plan

Remedial Investigation Samples

Location	Media	PCBs[1]	Dioxins/ Furans	CLP TCL/TAL[2]	TAL	Other Parameters[3]
KR-2	Residuals	1	-	-	-	-
KR-3	Residuals	1	-	-	-	-
KR-4	Residuals	1	-	-	-	-
HYDROGEOLOGICAL INVESTIGATION						
MW1	Water	-	-	1	-	1
MW1A	Soil	2	-	1	-	-
	Water	-	-	1	-	1
MW2	Water	-	-	1	-	1
MW3	Water	-	-	1	-	1
MW4	Water	-	-	1	-	1
MW5	Water	-	-	1	-	1
MW7	Water	-	-	1	-	1
MW8A	Water	-	-	1	-	1
MW8B	Soil	4	-	2	-	-
	Water	-	-	1	-	1
MW9P	Water	-	-	1	-	1
MW9R	Water	-	-	1	-	1
MW9A	Water	-	-	1	-	1
MW9B	Residuals	4	-	1	-	10
	Soil	-	-	1	-	-
	Water	-	-	1	-	1
MW10P	Water	-	-	1	-	1
MW10R	Water	-	-	1	-	1
MW10A	Water	-	-	1	-	1

(See Notes on Page 4)

Table 1
(Cont'd)
Allied Paper, Inc./Portage Creek/Kalamazoo River
Superfund Site

King Highway Landfill Operable Unit Field Sampling Plan

Remedial Investigation Samples

Location	Media	PCBs[1]	Dioxins/ Furans	CLP TCL/TAL[2]	TAL	Other Parameters[3]
MW10B	Residuals	4	-	1	-	-
	Soil	-	-	1	-	10
	Water	-	-	1	-	1
RG-3	Water	-	-	-	2	2
SOILS AND SEDIMENT INVESTIGATION						
GB-1	Dike	3	-	1	-	10
	Soil	-	-	1	-	-
GB-2	Dike	3	-	1	-	10
	Soil	-	-	1	-	-
GB-3	Dike	3	-	1	-	10
	Soil	-	-	1	-	-
GP-1	Dike	-	-	-	-	10
GP-2	Dike	-	-	-	-	10
GP-3	Dike	-	-	-	-	10
GP-4	Dike	-	-	-	-	10
SURFACE WATER INVESTIGATION						
SW-1	Water	1	-	-	-	1
TOTALS						
Residuals Total		58	3	11	-	53
Soil Total		6	-	17	-	10
Dike Total		9	-	3	-	70
Groundwater Total		-	-	17	-	17
Surface Water Total		1	-	-	2	3

(See Notes on Page 4)

Table 1
(Cont'd)
Allied Paper, Inc./Portage Creek/Kalamazoo River
Superfund Site

King Highway Landfill Operable Unit Field Sampling Plan

Remedial Investigation Samples

Notes:

[1] PCBs exclusively. Additional analyses for PCBs included with the CLP TCL/TAL constituents.

[2] Other parameters include the following compounds:

Groundwater:	pH, specific conductance, temperature, turbidity, TOC, DO, COD, HCO_3^-, NO_3^{2-}, Cl^-, SO_4^{2-}, and CO_3^{2-}. The second round of ground-water samples will also include volatile or semi-volatile compounds found to be present in the first round sample.
River water:	pH, specific conductance, temperature, DO, turbidity, CO_3^{2-}, HCO_3^-, Cl^- and SO_4^{2-}.
Surface water:	Total suspended solids
Cores in Cell 4:	visual description
Dike and residuals:	geotechnical analyses

[3] Groundwater sample TAL metals will be analyzed both unfiltered (total metals) and field filtered (dissolved metals.

100% Recycled 30% PCW

Sally Beebe
OU1/L2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL MONITORING SYSTEMS LABORATORY-LAS VEGAS
P.O. BOX 93478
LAS VEGAS, NEVADA 89193-3478
(702/798-2100 · FTS 545-2100)

March 13, 1992

MEMORANDUM

SUBJECT: Second Phase Sampling Design for Bryant Mill Pond Area, Kalamazoo River Superfund Site

FROM: Kenneth W. Brown
Manager, Technology Support Center

TO: Terese Van Donsel
Remedial Project Manager
Region 5 (5HS-11)

Terese, as per our conference call, please find attached an original and 4 copies of a sampling design for the Bryant Mill Pond Area (Figure 14 A-B), prepared by Dr. A.K.Singh, EMSL-LV (UNLV) Statistician.

I have sent a copy of the attachment to Scott and Sally. If you have any questions or need additional clarification, please call me at FTS 545-2270. I will be on travel through March 20th, will be back in office on March 23rd.

Attachment

cc:
Phil Malley, LESC
Scott Cornelius, MDNR
Sally Beebe, MDNR ✓

RECEIVED
MAR 19 1992
ERD-SUPERFUND

SECOND PHASE SAMPLING

3-12-92

● about 150' apart (41 locations) in the creek

● 46+41 locations (Soil samples) (50 to 100' apart)

MW107	
DATE	PCB(ug/L)
10/04/89	<0.01
10/04/89	<0.01 #

MW108	
DATE	PCB(ug/L)
10/04/89	<0.01
10/04/89	<0.01 #
12/11/89	<0.01
12/11/89	<0.01 #

MW110	
DATE	PCB(ug/L)
10/04/89	<0.01
10/04/89	<0.01 #
12/11/89	<0.01
12/11/89	<0.01 #

MW111	
DATE	PCB(ug/L)
10/04/89	0.07
10/04/89	<0.01 #
12/05/89	<0.01
12/05/89	<0.01 #
12/11/89	<0.01
12/11/89	<0.01 #

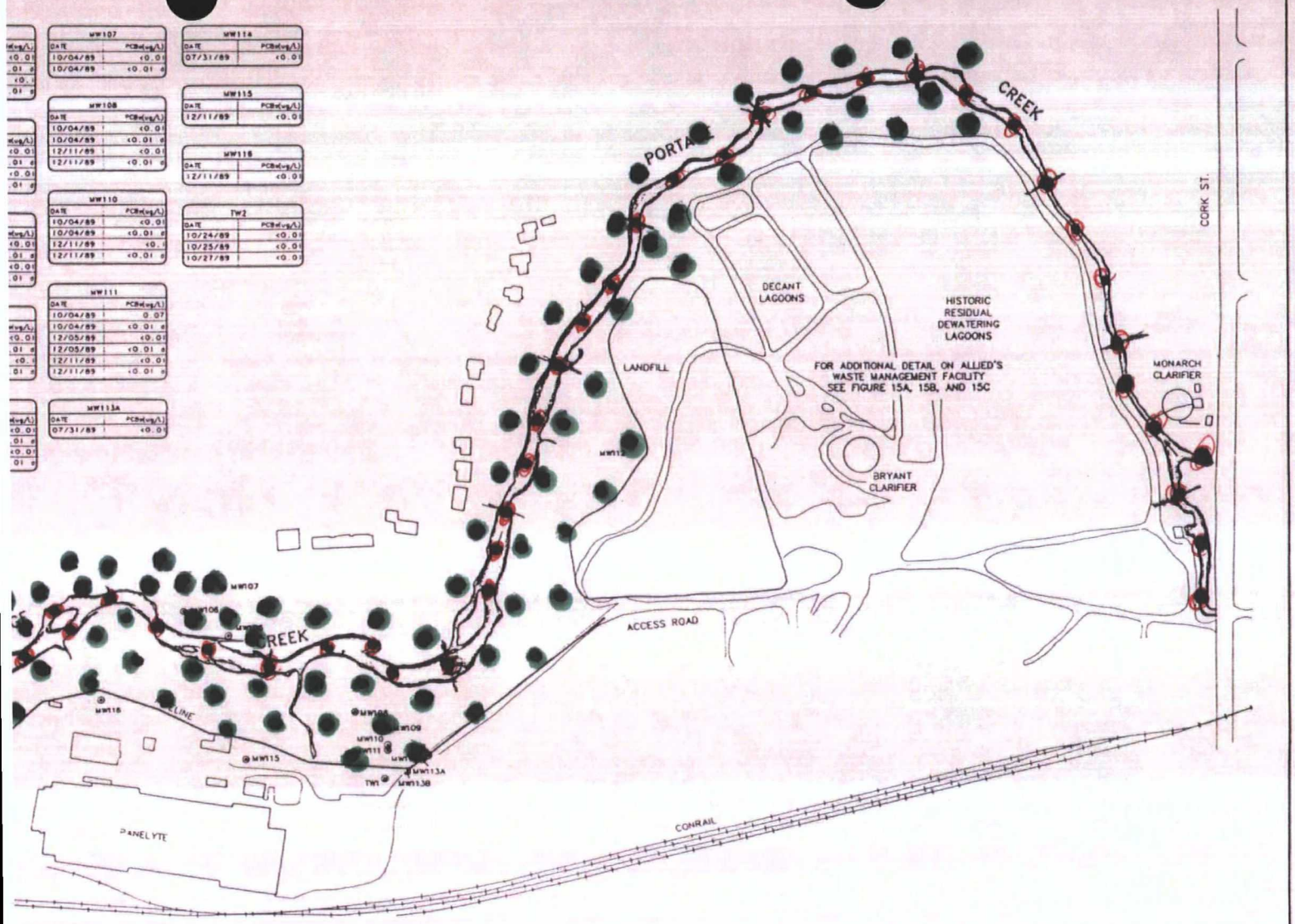
MW113A	
DATE	PCB(ug/L)
07/31/89	<0.01

MW114	
DATE	PCB(ug/L)
07/31/89	<0.01

MW115	
DATE	PCB(ug/L)
12/11/89	<0.01

MW116	
DATE	PCB(ug/L)
12/11/89	<0.01

TW2	
DATE	PCB(ug/L)
10/24/89	<0.01
10/25/89	<0.01
10/27/89	<0.01



LEGEND

● MONITORING WELL

150' 0 150' 300'

NOTE:

1. WELL LOCATIONS ARE APPROXIMATE. ALL MONR DUPLICATE SAMPLES MAY NOT BE INCLUDED
2. # = DISSOLVED TOTAL PCB CONCENTRATION
3. <0.01 = BELOW DETECTABLE LEVEL
4. MW105, 109, AND 30 WERE NOT SAMPLED FOR PCBs

REFERENCE:
INFORMATION WAS SUPPLIED BY LIMNO-TECH, INC.

KALAMAZOO RIVER STUDY GROUP

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

SITE MAP

FIGURE 14B

BRYANT MILL POND AREA MONITORING WELLS

BLASLAND & BOUCK ENGINEERS, P.C.
ENGINEERS & GEOSCIENTISTS

H-2
Allied

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF RESEARCH AND DEVELOPMENT
ENVIRONMENTAL MONITORING SYSTEMS LABORATORY-LAS VEGAS
P.O. BOX 93478
LAS VEGAS, NEVADA 89193-3478
(702/798-2100 - FTS 545-2100)

April 29, 1992

RECEIVED
MAY 11 1992
ERD -SUPERFUND

MEMORANDUM

SUBJECT: Variogram Modeling for the Bryant Mill Pond Area

FROM: Kenneth W. Brown
Manager, Technology Support Center

TO: Terese Van Donsel
Remedial Project Manager
Region 5 (5HS-11)

Terese, as per our meeting in Chicago, please find attached a report addressing the variogram modeling for the Bryant Mill Pond data. Two different variogram models (linear and exponential) were fitted to the data by Dr. A.K. Singh.

If you have questions or need additional explanation concerning the attached, please give me a call at (702)798-2270.

Attachment

cc:
Phil Malley, LESC

VARIOGRAM MODELING FOR THE BRYANT MILL POND PCB DATA

The software package GEO-EAS was used for exploratory data analysis and variogram modeling of the total PCB contamination data (top 0-1 ft) from the Bryant Mill Pond area of the Allied Paper Superfund Site. A postplot (plot of sample locations with associated total PCB measurements) showed no clear trend for this area, and hence (local) stationarity was assumed for this preliminary analysis.

The programs PREVAR and VARIO were used to plot the observed omnidirectional variogram values, which showed a range of approximately 2000 feet. Two different variogram models were fitted to the data:

(i) A linear model with nugget = 10,000, sill = 8000, and range = 2000 feet, and

(ii) An exponential model with nugget = 6500, sill = 10,500 and range = 1800 feet.

The plots of the observed variogram and the two chosen models are attached.

Cross-validation with the GEO-EAS program XVALID was used to verify these two models. The histograms of the errors (actual and standardized) for the two models are also attached. The second (exponential) model gave better results.

April 1992

ALLIED PAPER/BRYANT MILL POND DATA

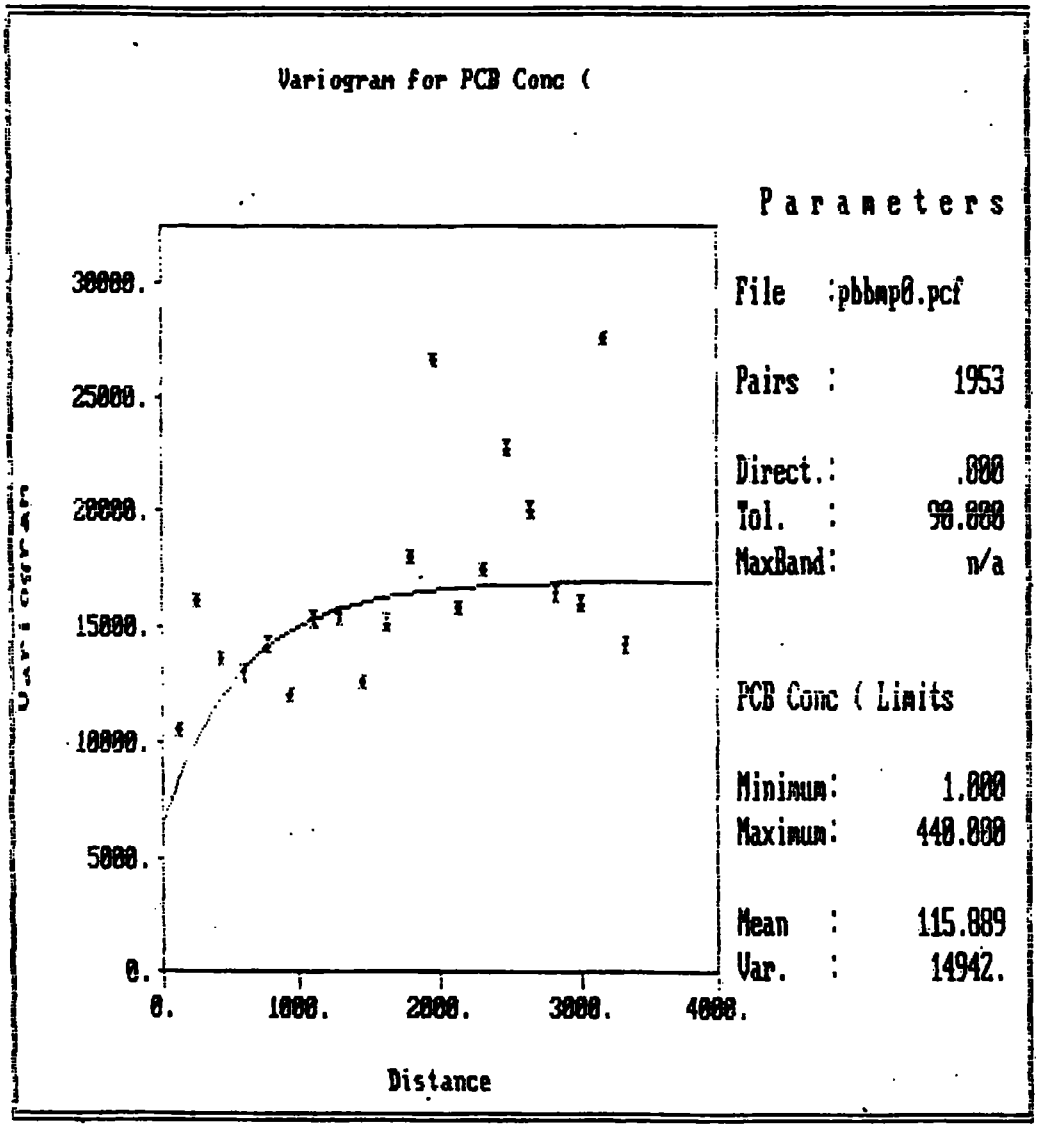
M O D E L

	PAIRS	AVERAGE DISTANCE	VALUE
1	122	118,593	10534.680
2	265	257,500	16123.810
3	179	432.241	13623.800
4	185	597.197	12995.040
5	166	774.484	14229.690
6	150	936.411	12088.440
7	174	1113.472	15397.940
8	143	1292.362	15510.520
9	95	1452.330	12630.800
10	99	1623.706	15219.790
11	78	1794.130	18066.720
12	68	1964.772	26606.950
13	52	2131.927	15839.170
14	39	2309.979	17511.950
15	34	2482.071	22758.210
16	30	2644.602	20091.940
17	26	2824.526	16481.670
18	25	3001.567	16019.280
19	16	3170.777	27592.580
20	7	3323.944	14258.030
21			
22			
23			
24			

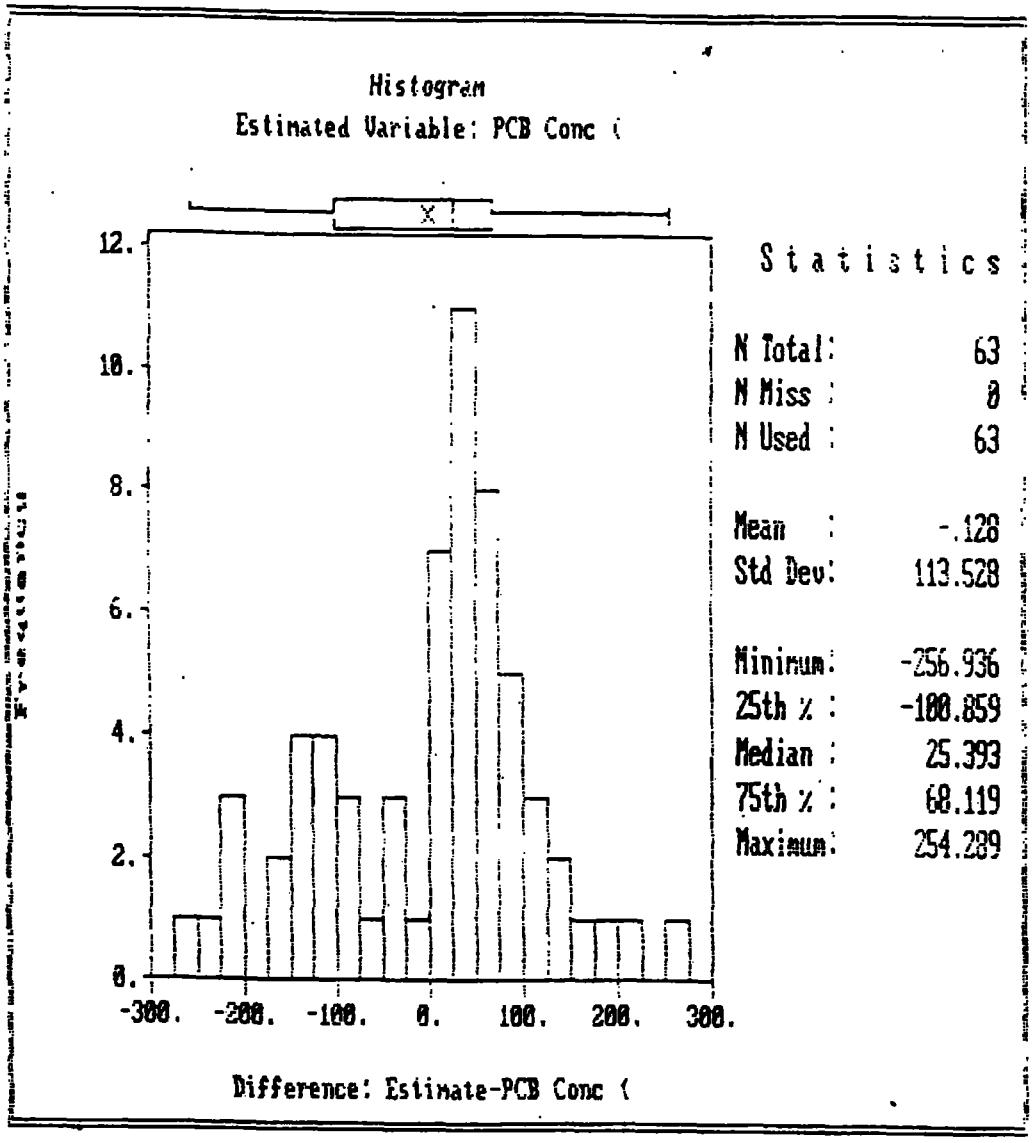
Model

	NUGGET:	6500.000
Type	Sill	Range
Exponent	10500.000	1800.000

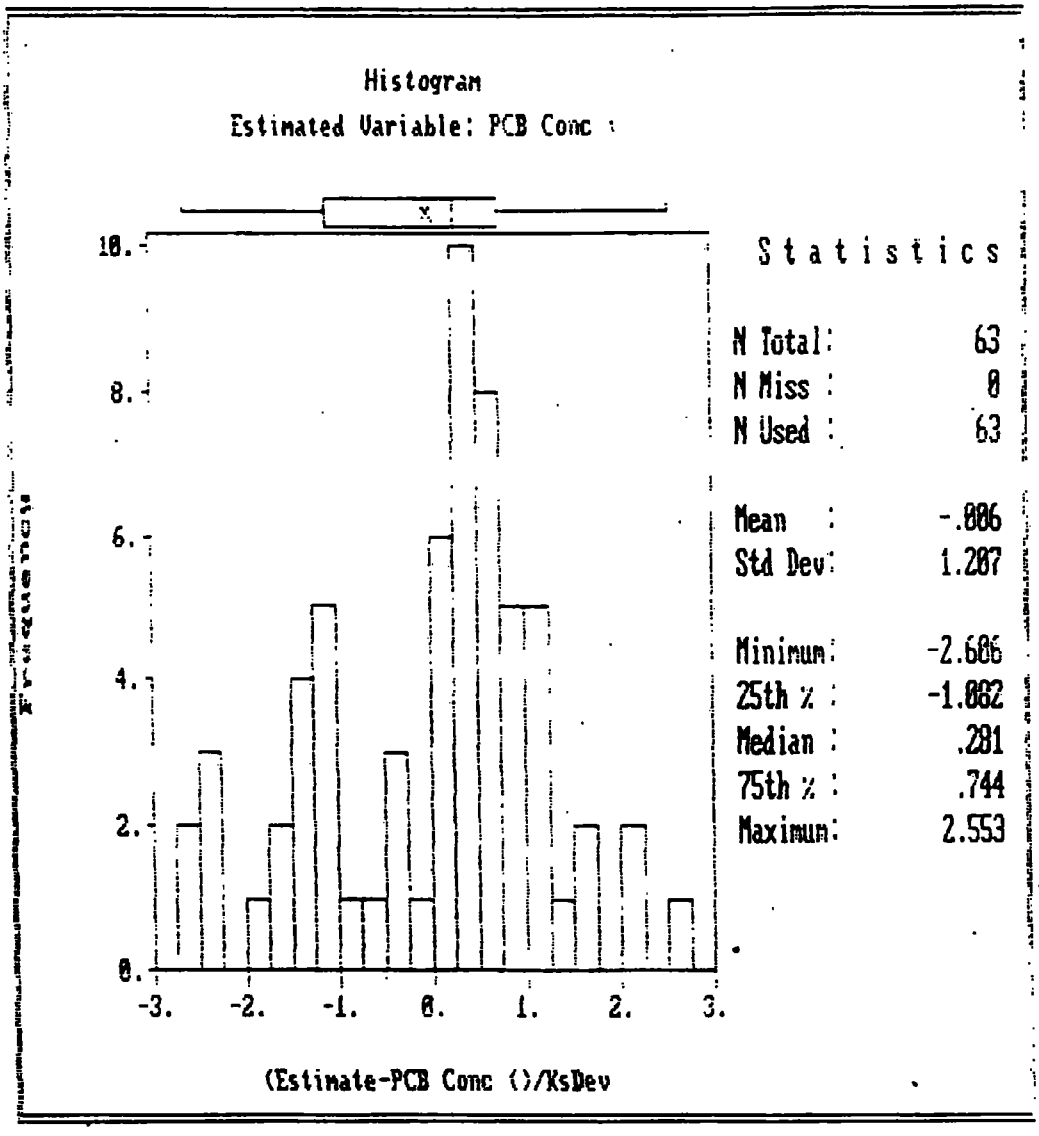
Model Plot Options Quit
Plot the variogram and Model


Variogram for PCB Conc (
30000.
25000.
20000.
15000.
10000.
5000.
0.
0.
1000.
2000.
3000.
4000.
Distance
Parameters
File :pbbmp0.pcf
Pairs : 1953
Direct.: .000
Tol. : 90.000
MaxBand: n/a
PCB Conc (Limits
Minimum: 1.000
Maximum: 440.000
Mean : 115.889
Var. : 14942.

CROSS-VALIDATION RESULTS



CROSS-VALIDATION RESULTS



April 1992

ALLIED PAPER/BRYANT MILL POND DATA

M O D E L

	PAIRS	AVERAGE DISTANCE	VALUE
1	122	118,593	10534.680
2	265	257,500	16123.810
3	179	432.241	13623.800
4	185	597.197	12995.040
5	166	774.484	14229.690
6	150	936.411	12088.440
7	174	1113.472	15397.940
8	143	1292.362	15510.520
9	95	1452.330	12630.800
10	99	1623.706	15219.790
11	78	1794.130	18066.720
12	68	1964.772	26606.950
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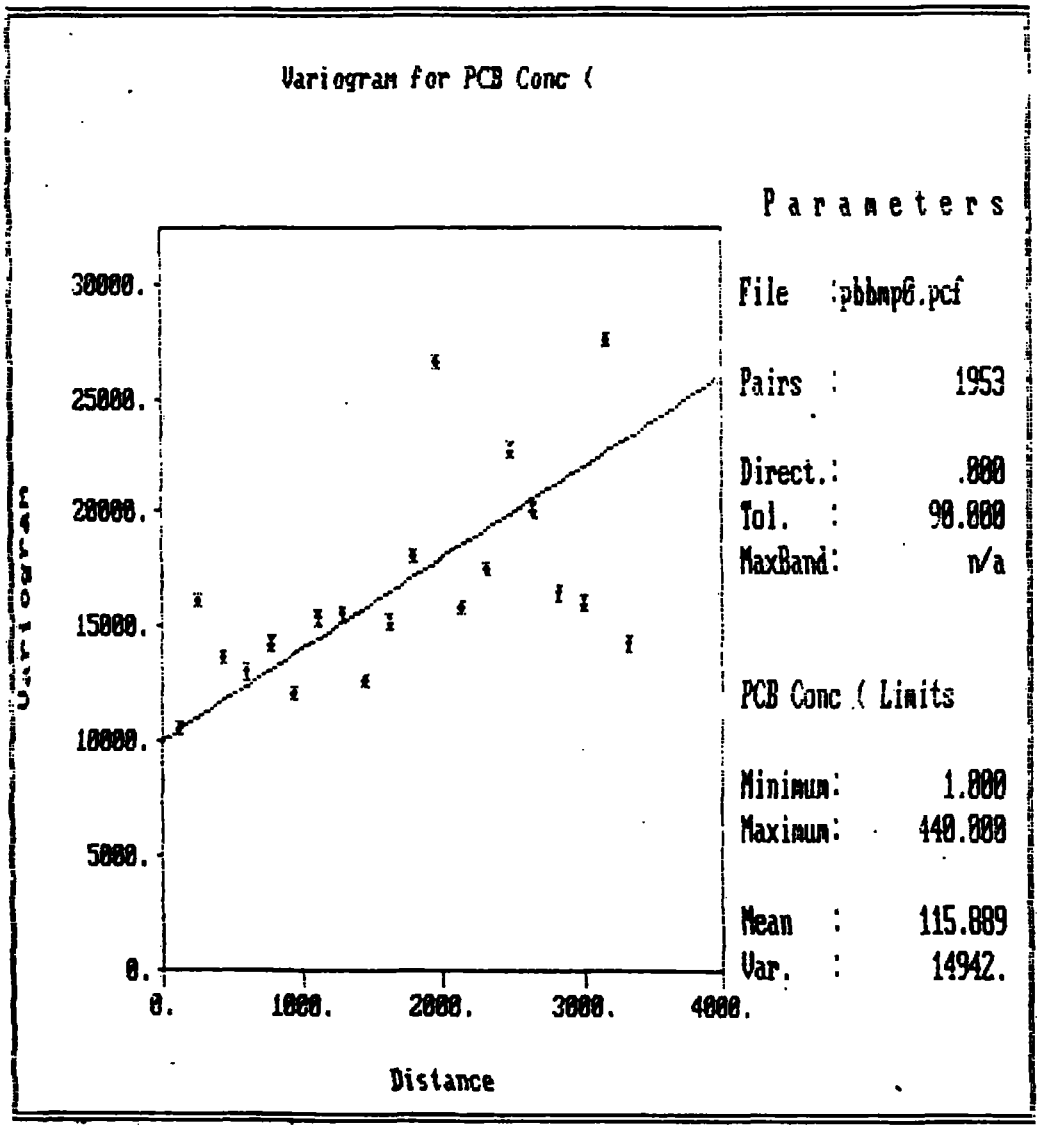
18	25	3001.567	16019.280
19	16	3170.777	27592.580
20	7	3323.944	14258.030
21			
22			
23			
24			

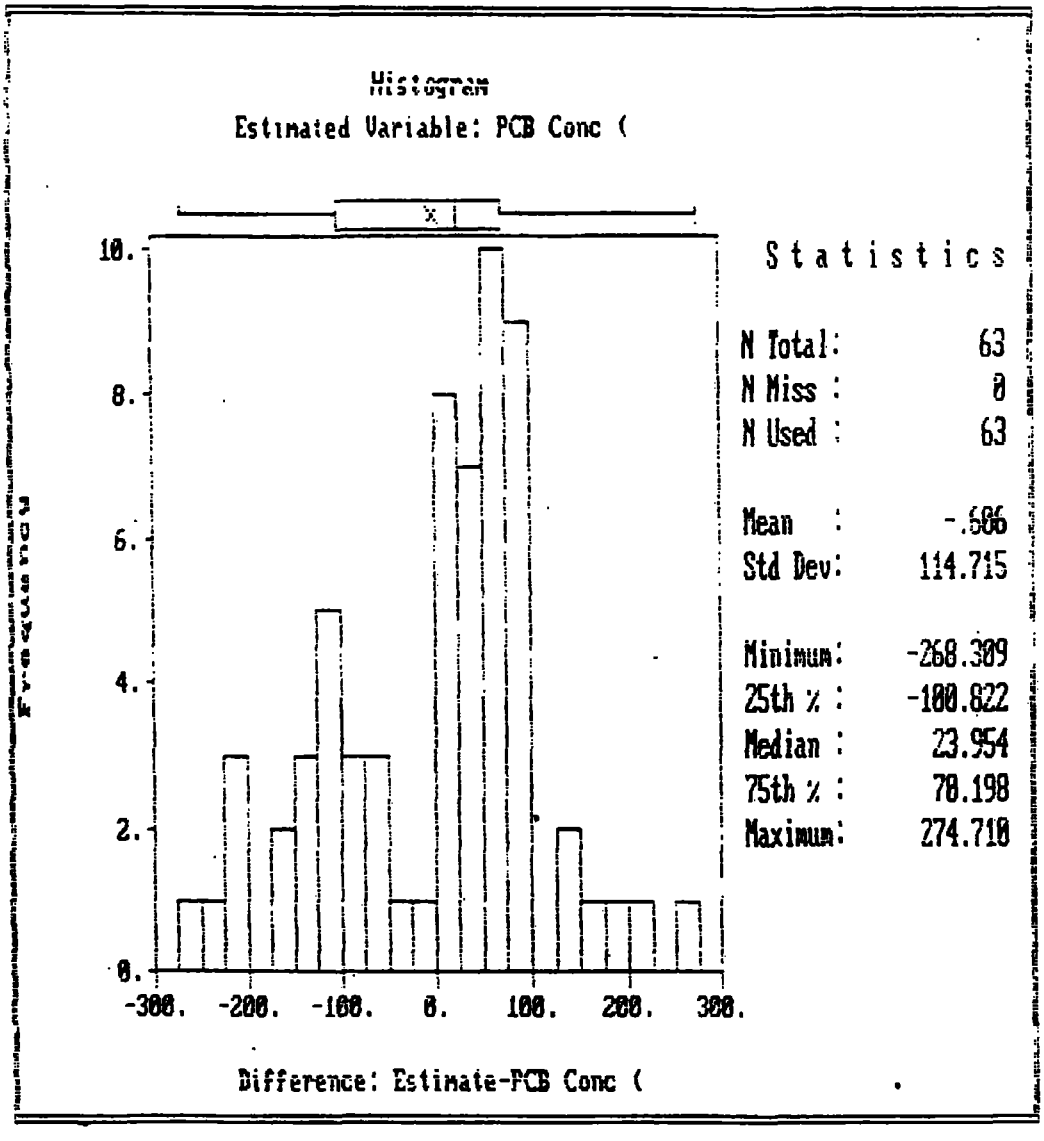
Model

	NUGGET:	10000.000
Type	Sill	Range
Linear	8000.000	2000.000

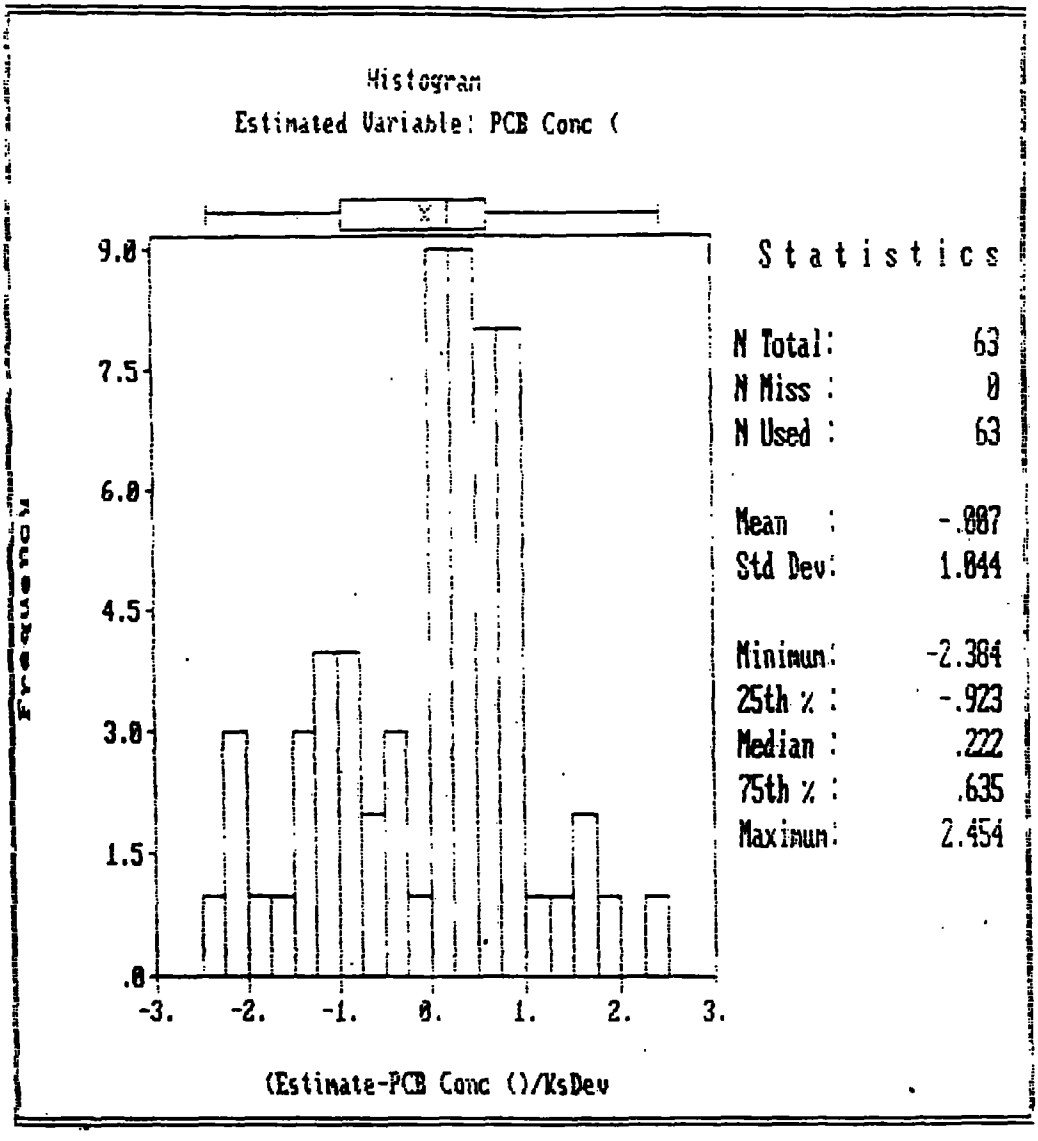
Model Plot Options Quit
Plot the variogram and Model


Variogram for PCB Conc (
Parameters
File :pbbmp6.pcf
Pairs : 1953
Direct.: .000
Tol. : 90.000
MaxBand: n/a
PCB Conc (Limits
Minimum: 1.000
Maximum: 440.000
Mean : 115.889
Var. : 14942.
30000.
25000.
20000.
15000.
10000.
5000.
0.
0.
1000.
2000.
3000.
4000.
Distance

CROSS-VALIDATION RESULTS



CROSS-VALIDATION RESULTS



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River H/

BBL
BLASLAND, BOUCK & LEE, INC.
engineers & scientists

Transmitted Via Facsimile

August 28, 2000

Mr. Alan J. Howard, P.E.
Chief, Environmental Response Division
MDEQ-ERD
Knapps Centre – Mezzanine Level
P. O. Box 30426
Lansing, MI 48909

Re: Dispute Resolution Regarding RI/FS Preparation
BBL Project #: 645.24

Dear Mr. Howard:

This letter invokes dispute resolution pursuant to *Paragraph 36* of the Administrative Order by Consent DFO-ERD-91-001. The disputed issues are:

1. MDEQ's direction to not consider data collected outside of the work plans approved by the MDEQ in the Remedial Investigation and Feasibility Study (RI/FS);
2. MDEQ's direction to not include the development and application of the PCB fate and transport model in the RI/FS; and
3. The MDEQ's August 11, 2000 letter communicating the criteria to be met by a preferred remedy.

Issues 1 and 2 were the subject of considerable discussion at our August 24, 2000 meeting. Issue 1 also was addressed in a concluding paragraph of MDEQ's letter dated August 3, 2000.

The KRSG believes that MDEQ's decision to exclude from the RI/FS, data collected outside the work plan is arbitrary and capricious. First, the decision is not based upon any articulated concerns about the quality or validity of the data. Assuming that MDEQ had any such questions, those concerns might go to the emphasis to be placed on the data, not whether it is included at all.

MDEQ's decision to censor the full set of scientifically valid information for KRSG's use in the RI/FS is even more questionable because MDEQ has not applied this standard to itself. For example, MDEQ has used bird egg data collected outside of MDEQ-approved work plans to calculate floodplain soil cleanup criteria. MDEQ also has used unapproved yearling smallmouth bass data in its 1999 Ecological Risk

13 Hamilton Street • 1st Floor • New Bedford, MA 02740
Tel (508) 992-3609 • Fax (508) 992-5024 • www.bbl-inc.com
Offices Nationwide

Howard82800

EXHIBIT
7013
DEPONENT NAME: A. Hilarides
DATE: 7/10/04

0006139

WYDQ004224

Assessment which were collected by KRSG. MDEQ has offered no explanation for its decision to pick and choose data, rather than including all data in the RI/FS and remedial decision-making process.

The unapproved data are both reliable and necessary to meet the AOC's stated purpose of providing "all appropriate necessary information for the RI/FS." Data were collected according to the data collection standards set forth in the AOC and the SOW, the reliability of which is borne out by the MDEQ's decision to rely on certain disapproved data in developing its 1999 Ecological Risk Assessment. Moreover, the KRSG informed MDEQ of its sample collection activities and has been regularly reporting results to MDEQ.

The KRSG also believes that the MDEQ's direction, prohibiting the KRSG from including the fate and transport model in the RI/FS, is arbitrary and contrary to the approved 1993 work plan which contemplated the development of a fate and transport model. In fact, MDNR "directed the KRSG to ensure that the data collected as part of the RI be sufficient to operate USEPA surface water quality and bioaccumulation models being contemplated by MDNR." (page 5-54 of the work plan). The section of the work plan addressing the data needs for model development begins: "Mathematical models of PCB transport have been used to assess the hypothetical response of rivers, including the Kalamazoo River, to potential sediment remediation alternatives. The endpoints of interest for the evaluation of the long-term effectiveness of remediation alternatives for sediment contaminants, such as PCBs, include future contaminant concentrations in biota, water and sediment." This is why we developed the model.

Ignoring both data collected and the results of the fate and transport model developed under the direction of Dr. Joseph DePinto will result in a substandard RI/FS and one that will force a conclusion upon the reader that is not scientifically valid. The practice of conducting RI/FS at large river PCB sites for more than the past decade includes the incorporation of mathematical models to analyze the effectiveness of sediment remediation alternatives. We know of no alternative way that is nearly as credible.

As to how the RI/FS would mislead the reader, consider the issue of plant PCB data from the Trowbridge impoundment recently generated by Professor John Giesy as part of his research related to PCB in the Kalamazoo River. Dr. Giesy's study shows that MDEQ's calculations of risks to songbirds that assume relatively high rates of PCB accumulation in plants are incorrect. Ignoring the actual measurements of PCB levels in plants in favor of these incorrect calculations will lead the reader to believe, incorrectly, that significant exposure to songbirds occurs via consumption of plants when in fact it is negligible.

In short, MDEQ's decisions to exclude important data and data interpretation from an RI/FS that was nearly 8 years in the making compromises the remedial decision making process itself and substantially weakens the scientific basis for any remedial decision.

The surface water, soil and sediment criteria and application of sediment criteria are being disputed for several reasons:

- Some of the criteria were calculated using incorrect assumptions and methods (e.g. soil criteria for non-piscivorous omnivorous raptors and omnivorous songbirds);
- Criteria are provided (e.g. certain surface water and sediment criteria) which cannot be met for the site due to PCB transport from upstream areas (which areas cannot meet the criteria even though they are upstream of all of the KRSG current and former facilities); and

- The required application of the sediment criteria developed for the Kalamazoo River to all soils in the three former impoundments is arbitrary because the exposure pathways conceptualized for development of sediment criteria do not apply to all soils in the former impoundments..

This letter briefly states our concerns about these issues, but should not be considered as a comprehensive discussion of all significant aspects and sub-issues of the topics outlined above. All of these issues directly affect the remedial investigation/feasibility study being prepared by the KRSG for submission to MDEQ in October. The KRSG believes that it is imperative that MDEQ reverse its position on these issues to ensure that the document we submit is scientifically supportable and compliant with all applicable legal requirements, including the NCP.

We look forward to meeting with the MDEQ to discuss and resolve these critical issues.

Sincerely,

BLASLAND, BOUCK & LEE, INC.

Mark P. Brown, Ph.D.
Senior Vice President

MPB/mf

cc: Cynthia V. Bailey, Esq.
Bonnie A. Barnett, Esq.
J. Michael Davis, Esq.
Kathy E. B. Robb, Esq.
Paul A. Montney, P.E.
Joyce S. Schlesigner, P.E.
Gus Moody

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Brian Von Gunten: please let Bell know how this was resolved. You can get info & here there you contact Al 9/22 HI

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

RECEIVED SEP 20 2000 ERD - EXECUTIVE OFFICE

RECEIVED SEP 22 2000 1634 ERD-SUPERFUND

SEP 15 2000

REPLY TO THE ATTENTION OF: S-6J

Mr. Al Howard
Chief, Environmental Response Division
MDEQ-ERD
Knapps Centre
P.O. Box 30426
Lansing, MI 48909

Subject: Dispute Resolution Regarding RI/FS Preparation for Phase I of Kalamazoo River
Allied Paper/Bryant Mill Pond/Kalamazoo River Superfund Site

Dear Al:

It was recently brought to my attention that dispute resolution proceedings are currently underway between MDEQ and the Kalamazoo River Study Group (KRSG) regarding the exclusion of certain data collected by the KRSG from the Phase I RI/FS. As you work to resolve this dispute, I want ensure that you are aware of the requirements identified in the National Contingency Plan (NCP) on data collection and analysis. In general, Section 300.430(b)(8) of the NCP requires the development of and approval of sampling and analysis plans to ensure that data of sufficient quality and quantity is obtained for use in selecting the appropriate remedy.

Taking this requirement under consideration, U.S. EPA believes that the KRSG should have the opportunity to present this data to MDEQ in a separate document to demonstrate to the satisfaction of MDEQ, that the data in dispute was collected and analyzed in accordance with the data collection and analysis provisions in the AOC, as well as the approved RI/FS workplan and QAPP. The burden of such a demonstration clearly rests with the KRSG and should occur prior to including such data in the RI/FS report.

If you have any questions regarding my thoughts on this matter, please feel free to contact me. I look forward to completion of the Phase I RI/FS in October, and eventual remedial action at this important site.

Sincerely,

Wm. E. Muno

William E. Muno, Director
Superfund Division

cc: Claudia Kerbawy, MDEQ

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bcc: Beth Reiner, SFD
Eileen Furey, ORC

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UNITED STATES BANKRUPTCY COURT FOR THE SOUTHERN DISTRICT OF NEW YORK
Lyondell Chemical Company, et al. Claims Processing Center
c/o Epiq Bankruptcy Solutions, LLC
FDR Station, P.O. Box 5013
New York, NY 10150-5013

PROOF OF CLAIM

Filed: USBC - Southern District of New York
Lyondell Chemical Company, Et Al.
09-10023 (REG) 0000012972

In re: Lyondell Chemical Company, et al. Debtor.	Chapter 11 Case No. 09-10023 (REG)
Name of Debtor Against Which Claim is Held: Millennium Holdings, LLC	Case No. of Debtor: 09-10071 (REG)

NOTE: This form should not be used to make a claim for an administrative expense arising after the commencement of the case. A request for payment of an administrative expense may be filed pursuant to 11 U.S.C. § 503.

THIS SPACE IS FOR COURT USE ONLY

U.S. Environmental Protection Agency
U.S. Department of Commerce
U.S. Department of the Interior
c/o United States Attorney's Office, S.D.N.Y.
Pierre G. Armand, AUSA
86 Chambers Street, New York, NY 10007
Telephone number: (212)637-2726 Email Address: pierre.armand@usdo .gov

☐ Check this box to indicate that this claim amends a previously filed claim.

Court Claim Number: _____ (If known)

Filed on: _____

Name and address where payment should be sent (if different from above)

Telephone number: Email Address:

☐ Check this box if you are aware that anyone else has filed a proof of claim relating to your claim. Attach copy of statement giving particulars.

☐ Check this box if you are the debtor or trustee in this case.

1. Amount of Claim as of Date Case Filed: $ See Attached

- If all or part of your claim is secured, complete Item 4 below; however, if all of your claim is unsecured, do not complete Item 4.
- If all or part of your claim is entitled to priority, complete Item 5.
- If all or part of your claim qualifies as an administrative expense under 11 U.S.C. §503(b)(9), complete Item 6.

☐ Check this box if claim includes interest or other charges in addition to the principal amount of the claim. Attach itemized statement of interest or additional charges.

2. Basis for Claim: See Attached
(See instruction #2 on reverse side.)

3. Last four digits of any number by which creditor identifies debtor: N/A
3a. Debtor may have scheduled account as: See Attached
(See instruction #3a on reverse side.)

4. Secured Claim (See instruction #4 on reverse side.)
- Check the appropriate box if your claim is secured by a lien on property or a right of setoff and provide the requested information.

Nature of property or right of setoff: ☐ Real Estate ☐ Motor Vehicle ☐ Other

Describe: _____

Value of Property: $_____ Annual Interest Rate _____%

Amount of arrearage and other charges as of time case filed included in secured claim, if any:

$_____ Basis for perfection: _____

Amount of Secured Claim: $ See Attached Amount Unsecured: $ See Attached

6. Amount of Claim that qualifies as an administrative expense under 11 U.S.C. §503(b)(9): $ See Attached
(See instruction #6 on reverse side.)

5. Amount of Claim Entitled to Priority under 11 U.S.C. §507(a). If any portion of your claim falls in one of the following categories, check the box and state the amount.

Specify the priority of the claim:

☐ Domestic support obligations under 11 U.S.C. § 507(a)(1)(A) or (a)(1)(B).
☐ Wages, salaries or commissions (up to $10,950), earned within 180 days before filing of the bankruptcy petition or cessation of the debtor's business, whichever is earlier - 11 U.S.C. § 507(a)(4).
☐ Contributions to an employee benefit plan - 11 U.S.C. § 507(a)(5).
☐ Up to $2,425 of deposits toward purchase, lease, or rental of property or services for personal, family, or household use - 11 U.S.C. § 507(a)(7).
☐ Taxes or penalties owed to governmental units - 11 U.S.C. § 507(a)(8).
☐ Other - Specify applicable paragraph of 11 U.S.C. § 507(a)(____).

Amount entitled to priority:

$ See Attached

7. Credits: The amount of all payments on this claim has been credited for the purpose of making this proof of claim.

8. Documents: Attach redacted copies of any documents that support the claim, such as promissory notes, purchase orders, invoices, itemized statements of running accounts, contracts, judgments, mortgages and security agreements. You may also attach a summary. Attach redacted copies of documents providing evidence of perfection of a security interest. You may also attach a summary. *(See definition of "redacted" on reverse side.)* DO NOT SEND ORIGINAL DOCUMENTS. ATTACHED DOCUMENTS MAY BE DESTROYED AFTER SCANNING. If the documents are not available, please explain.

FOR COURT USE ONLY

FILED | RECEIVED
JUL 06 2009
EPIQ BANKRUPTCY SOLUTIONS, LLC

Date: 07/06/09

Signature: The person filing this claim must sign it. Sign and print name and title, if any, of the creditor or other person authorized to file this claim and state address and telephone number if different from the notice address above. Attach copy of power of attorney, if any.

Penalty for presenting fraudulent claim: Fine of up to $500,000 or imprisonment for up to 5 years, or both. 18 U.S.C. §§ 152 and 3571.

2481

LEV L. DASSIN
Acting United States Attorney for the
Southern District of New York
By: PIERRE G. ARMAND
BRANDON COWART
Assistant United States Attorneys
86 Chambers Street
New York, New York 10007
Tel. No.: (212) 637-2724/2693
Fax No.: (212) 637-2730/2717
Email: Pierre.Armand@usdoj.gov
Brandon.Cowart@usdoj.gov

UNITED STATES BANKRUPTCY COURT
SOUTHERN DISTRICT OF NEW YORK

In re:	Chapter 11
MILLENNIUM HOLDINGS, LLC,	Case No. 09-10071 (REG)
Debtor.	Jointly Administered

PROOF OF CLAIM OF THE UNITED STATES, ON BEHALF OF THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, THE UNITED STATES DEPARTMENT OF THE INTERIOR, AND THE UNITED STATES DEPARTMENT OF COMMERCE

1. The United States files this Proof of Claim at the request of the United States Environmental Protection Agency ("EPA"), the United States Department of the Interior ("DOI") acting through the Fish and Wildlife Service, and the United States Department of Commerce acting through the National Oceanic and Atmospheric Administration ("NOAA"), against debtor Millennium Holdings, LLC ("MHLLC") for the recovery of: (i) response costs incurred and to be incurred by the United States under the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. §§ 9601-9675; (ii) stipulated penalties pursuant to two Administrative Orders on Consent; and (ii) natural resource damages and assessment costs. In addition, with respect to equitable remedies that are not within the Bankruptcy Code's definition of "claim," *11 U.S.C. § 101(5)*, this Proof of Claim is

filed only in a protective fashion.

CLAIMS FOR RESPONSE COSTS

2. MHLLC is liable to the United States under CERCLA Section 107(a), 42 U.S.C. § 9607(a), with respect to the 68th Street Dump Superfund Site, the Berks Landfill Superfund Site, and the Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (collectively, the "Sites").

3. CERCLA Section 107(a), 42 U.S.C. § 9607(a), provides in pertinent part:

> Notwithstanding any other provision or rule of law, and subject only to the defenses set forth in subsection (b) of this section –
>
> * * *
>
> (1) the owner and operator of a vessel or a facility,
>
> (2) any person who at the time of disposal of any hazardous substance owned or operated any facility at which such hazardous substances were disposed of,
>
> (3) any person who by contract, agreement, or otherwise arranged for disposal or treatment, or arranged with a transporter for transport for disposal or treatment, of hazardous substances owned or possessed by such person . . . at any facility . . . owned or operated by another party or entity and containing such hazardous substances, and
>
> . . . from which there is a release [of a hazardous substance], or a threatened release which causes the incurrence of response costs . . . , shall be liable for –
>
> . . . all costs of removal or remedial action incurred by the United States Government . . . not inconsistent with the national contingency plan
>
> * * *
>
> The amounts recoverable in an action under this section shall include interest on the amounts recoverable under [the foregoing provisions] . . . .

4. Each of the Sites is a "facility" from which there have been actual and threatened "releases" of "hazardous substances" which have caused, and will continue to cause, the United States to incur costs of "response" not inconsistent with the National Contingency Plan, 40 C.F.R. Part 300 – all within the meaning of CERCLA Sections 101(9), 101(14), 101(22), 101(25), 102(a), and 107(a), 42 U.S.C. §§ 9601(9), 9601(14), 9601(22), 9601(25), 9602(a), and 9607(a). Pursuant to CERCLA

Section 107(a), 42 U.S.C. § 9607(a), MHLLC is jointly and severally liable to the United States, along with any and all other responsible parties, for all response costs incurred and to be incurred by the United States in connection with the Sites, plus interest.

68th Street Dump Superfund Site

5. The 68th Street Dump Superfund Site (the "68th Street Site") is located in and about Baltimore, Maryland. The 68th Street Site consists of five disposal areas located on approximately 18 acres within the City of Baltimore and on approximately 150 acres near the Rosedale area of Baltimore County. Various streams and rivers, including Herring Run, flow through the Site and eventually lead into the Back River.

6. From approximately 1950 to 1969, various forms of wastes were accepted at the 68th Street Site for disposal by its owner and operator, Robb Tyler, including but not limited to metals (such as lead and zinc), solvents, paint waste, acids, and pesticides.

7. Hazardous substances within the meaning of CERCLA Sections 101(14) and 102(a), 42 U.S.C. §§ 9601(14) and 9602(a), have been detected at the 68th Street Site, including volatile organic compounds, semi-volatile organic compounds, polychlorinated biphenyls, and metals such as lead and zinc.

8. MHLLC is liable to the United States in connection with the 68th Street Site because it is a successor to both The Glidden Company ("Glidden") and SCM Corporation ("SCM"), which arranged for disposal of hazardous substances at the Site, or arranged for transport of hazardous substances for disposal at the Site, within the meaning of CERCLA Section 107(a)(3), 42 U.S.C. § 9607(a)(3).

9. From approximately 1950 to 1979, MHLLC's predecessors, Glidden and SCM, owned and operated a facility located at 5601 Eastern Avenue, Baltimore, Maryland (the "Eastern Avenue Plant").

Glidden owned and operated the Eastern Avenue Plant until approximately 1967, when Glidden merged into SCM. SCM subsequently sold the Eastern Avenue Plant in 1979.

10. The Eastern Avenue Plant manufactured frit and inorganic oxides.[1] The manufacturing of these products generated dust and sludge containing a variety of hazardous substances with the meaning of CERCLA Sections 101(14) and 102(a), 42 U.S.C. §§ 9601(14) and 9602(a), including fluorine and oxides of a number of metals, such as lead, cadmium, chromium, hexavalent chromium, copper, nickel, and zinc.

11. Glidden and SMC arranged for the foregoing hazardous substances to be transported to, and disposed of at, the 68th Street Site. Specifically, Robb Tyler, Inc., and its successor-in-interest, Browning-Ferris Industries, transported trash, dust, and sludge contaminated with hazardous substances from the Eastern Avenue Plant to the Site for disposal.

12. In response to a release or threat of release of hazardous substances at or from the 68th Street Site, EPA and twenty-three potentially responsible parties ("PRPs"), including MHLLC, entered into an administrative order on consent ("AOC") on April 27, 2006. Pursuant to the AOC, the PRPs are required to conduct a Site-wide remedial investigation and feasibility study ("RI/FS") and to reimburse EPA for its future response costs, including oversight costs, associated with the RI/FS.

13. On July 11, 2008, EPA and the same group of PRPs entered into a second AOC requiring the PRPs to conduct a removal of contaminated debris, soil, and subsurface soil at the 68th Street Site. The PRPs agreed to pay the costs associated with EPA's oversight of the removal action.

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[1] Frit is a customized mixture of particles of glass which is produced by quenching a molten vitreous metal. Frit is used in introducing soluble or unstable ingredients into glaze and enamels. Inorganic oxides are a group of color products including porcelain enamel oxide, ceramic stains, glaze stains, and ceramic colors. Inorganic oxides are used in, among other things, plastics, organic coatings, roofing granules, exterior paints, and ceramic coatings.

14. As of May 2008, EPA had incurred approximately $2.4 million in unreimbursed response costs in connection with the 68th Street Site. EPA has incurred additional response costs since that time, and expects to incur response costs in the future.

15. Because investigations at the 68th Street Site are continuing and no final remedy has been selected, the cost of future response actions is uncertain at this time. EPA estimates that it may ultimately incur approximately [redacted]

16. This Proof of Claim is filed for all unreimbursed response costs for which MHLLC is liable in connection with the 68th Street Site. Other parties may, along with MHLLC, also be jointly and severally liable to the United States for such costs.

Berks Landfill Superfund Site

17. The Berks Landfill Superfund Site (the "Berks Site") is located in Sinking Springs, Pennsylvania, approximately seven miles southwest of Reading, Pennsylvania. The Berks Site consists of two closed landfills: a 49-acre eastern landfill and a 19-acre western landfill. From the 1950s to the 1980s, the Berks landfill operated as a municipal landfill.

18. Although the Berks landfill accepted predominately municipal refuse and demolition debris, various industrial waste streams were also sent to the landfill. Glidden, a paint manufacturer, generated waste latex paint, solvents, full and empty paint cans, and pigment powder as part of its manufacturing process. As a result, from 1965 to 1984, Glidden sent plant trash to the Berks Site, including pallets, paper, latex paint cans (full and empty), and powdered pigment. Through such activity, Glidden arranged for disposal of hazardous substances at the Berks Site, or arranged for transport of hazardous substances for disposal at the Berks Site, within the meaning of CERCLA Section 107(a)(3), 42 U.S.C. § 9607(a)(3). MHLLC is a successor to Glidden and therefore is liable to the United States pursuant to CERCLA Section 107(a)(3).

19. Hazardous substances within the meaning of CERCLA Sections 101(14) and 102(a), 42 U.S.C. §§ 9601(14) and 102(a), have been detected at the Berks Site, including volatile organic compounds ("VOCs") and metals. VOCs detected at the Site include vinyl chloride, trichloroethene, and cis-1,2-dichloroethene, and metals such as aluminum, iron, and manganese.

20. In response to a release or threat of release of hazardous substances at or from the Berks Site, EPA issued a Record of Decision ("ROD") on July 27, 1997, calling for implementation of various remedial measures at the Site.

21. On March 31, 1998, the EPA issued a Unilateral Administrative Order ("UAO") to eighteen PRPs including Glidden, ordering them to implement the remedy described in the ROD.

22. Glidden, along with several other PRPs, resolved their liability to the United States for past response costs incurred through May 31, 2002 in connection with the Berks Site, pursuant to a consent decree entered by the United States District Court for the Easter District of Pennsylvania, *United States v. Agere Systems, Inc.*, Civil Case No. 02-1681.

23. MHLLC, on behalf of Glidden, with seven other defendants (the "Settling Defendants") entered into another consent decree (the "Berks Consent Decree") to reimburse EPA for $190,000 of its past costs incurred since June 1, 2002. On January 22, 2009, the United States District Court for the Eastern District of Pennsylvania approved and entered the Berks Consent Decree in *United States v. Agere, Inc., et. al.*, Civil Action No. 08-CV-5123. Under the terms of the Berks Consent Decree, the Settling Defendants, including their successors, are jointly and severally liable to reimburse EPA for all future response costs at the Berks Site, including oversight costs associated with implementation of the remedial action as ordered in the UAO.

24. EPA has incurred approximately $147,368 in unreimbursed response costs in connection with the Berks Site and will continue to incur response costs of approximately $15,000 per year for twenty years.

25. This Proof of Claim is filed for all unreimbursed response costs for which MHLLC is liable pursuant to the Berks Consent Decree.

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

26. The Allied Paper, Inc./Portage Creek/Kalamazoo River Superfund Site (the "Kalamazoo Site") is located in Kalamazoo and Allegan Counties, Michigan. The Kalamazoo Site is included on the National Priorities List, EPA's list of the most serious hazardous waste sites identified for possible long-term remedial action. The Site currently consists of five former paper mill properties, four waste disposal areas, approximately 80 miles of the Kalamazoo River, and approximately three miles of Portage Creek, a tributary of the Kalamazoo River.

27. The Kalamazoo Site is divided into the following five areas, known collectively as operable units ("OUs") and individually as "OU1" through "OU5": (a) OU1, the Allied Paper Landfill; (b) OU2, the Willow Boulevard/A-Site Landfill; (c) OU3, the King Highway Landfill; (d) OU4, the 12th Street Landfill; and (e) OU5, the Kalamazoo River and Portage Creek sediments. In addition, a number of former Allied Paper mills exist along the Kalamazoo River (the "Associated Mill Properties"). EPA is currently investigating whether the Associated Mill Properties are a source of polychlorinated biphenyl ("PCB") contamination to the Kalamazoo River.

28. MHLLC is a corporate successor of Allied Paper Corporation ("Allied"), which owned and operated a number of paper mills at and in the vicinity of the Kalamazoo Site. From approximately 1954 to 1985, Allied's paper mill operations involved the recycling of paper products containing PCBs and

other hazardous substances within the meaning of CERCLA Sections 101(14) and 102(a), 42 U.S.C. §§ 9601(14) and 9602(a).

29. During its operations, Allied disposed of PCB-contaminated wastes in lagoons, landfills, and other disposal areas located at OU1, which MHLLC still owns, and at OU2, which Allied sold to Georgia Pacific, LLC ("GP") in 1975. Allied also discharged PCB-contaminated wastes directly into Portage Creek and the City of Kalamazoo wastewater treatment facility.

30. PCBs have been, and continue to be, released into waterways, surface water, soils, and sediments at the Kalamazoo Site, including PCBs that have been, and may continue to be, released from the portion of the Site that MHLLC currently owns. EPA estimates that disposal areas at the Site, which are located along river banks, contain roughly 8 million cubic yards of PCB-contaminated waste. Studies indicate ongoing contamination to the sediments of the Kalamazoo River and Portage Creek from surface runoff and seeps in OU1 and OU2. EPA presently estimates that there are more than 300,000 pounds of PCBs in the sediments and soils in, or adjacent to, Portage Creek and the Kalamazoo River.

31. Pursuant to CERCLA Section 107(a), 42 U.S.C. § 9607(a), 42 U.S.C. § 9607(a), MHLLC is liable to the United States in connection with the Kalamazoo Site because, *inter alia*: (i) MHLLC is the current owner and/or operator of a portion of the Site; (ii) MHLLC was the owner and operator of a portion of the Site at the time of disposal of hazardous substances; and (iii) MHLLC is a corporate successor of Allied, which was the owner and operator of a portion of the Site at the time of disposal of hazardous substances and an arranger for disposal of hazardous substances that it owned or possessed at the Site.

32. In response to a release or threat of release of hazardous substances at or from the Kalamazoo Site, EPA entered into two Administrative Orders on Consent ("AOCs") on February 21, 2007. The AOCs require MHLLC and GP to perform investigative and cleanup work at OU1, OU5, and the Associated Mill Properties.

33. The first AOC, *In re Allied Paper/Portage Creek/Kalamazoo River Superfund Site* (EPA CERCLA Docket No. V-W-07-c-863) (the "First Kalamazoo AOC"), requires MHLLC and GP to complete a time-critical removal action at OU5 involving excavation of sediment in the Kalamazoo River. MHLLC and GP began the removal action required by the First Kalamazoo AOC under EPA oversight in 2007, and the removal action is scheduled for completion in June 2009.

34. The second AOC, *In re Allied Paper/Portage Creek/Kalamazoo River Superfund Site* (EPA CERCLA Docket No. V-W-07-c-864) (the "Second Kalamazoo AOC"), requires MHLLC and GP to conduct: (i) a supplemental remedial investigation and feasibility study ("SRI/FS") of the Kalamazoo River; (ii) a feasibility study of OU1; and (iii) source investigations of the Associated Mill Properties.

35. On February 5, 2009, counsel for the Debtors advised EPA by letter that, while MHLLC would continue to perform work required by the Second Kalamazoo AOC relating to OU1, which is debtor-owned, MHLLC would not perform any other work required by either AOC relating to OU5 and the Associated Mill Properties, which are not debtor-owned.

36. In accordance with the Second Kalamazoo AOC, MHLLC is currently developing the feasibility study for OU1, which is due to EPA in September 2009. MHLLC has ceased all other work required by the two AOCs.

37. As of May 2009, the United States had incurred unreimbursed response costs of approximately $6.3 million with respect to OU1 and OU5. The United States has incurred additional response costs since that time, and expects to incur response costs in the future. Because investigations at the Kalamazoo Site are continuing and the final remedy has not yet been selected, the cost of future response action is uncertain at this time. However, the United States currently estimates future site

response costs at approximately $184.2 million for OU1, approximately $2.4 billion for OU5, and approximately $16.9 million for the Associated Mill Properties.[7]

38. MHLLC is liable to the United States for the above response costs relating to the Kalamazoo Site, totaling approximately $2.6 billion, plus interest under 42 U.S.C. § 9607(a). Other parties may, along with MHLLC, also be jointly and severally liable for the foregoing amounts.

39. This Proof of Claim is also filed in a protective manner with respect to MHLLC's ongoing injunctive obligation to perform work pursuant to the aforementioned AOCs. *See, e.g.*, Paragraph 48 *infra*.

CLAIM FOR STIPULATED PENALTIES

40. Section XVIII of the First Kalamazoo AOC provides that MHLLC is liable for stipulated penalties for any failure to timely perform work required under the AOC in the amount of $750 per day for the first through 14th day of noncompliance; $1,000 per day for the 15th through 30th day of noncompliance; and $1,500 per day for the 31st day of noncompliance and beyond. In addition, Section XVIII of the First Kalamazoo AOC provides that MHLLC is liable for stipulated penalties for any failure to timely provide adequate reports to EPA under the AOC in the amount of $100 per day for the first through 14th day of noncompliance; $250 per day for the 15th through 30th day of noncompliance; and $500 per day for the 31st day of noncompliance and beyond.

41. Since January 6, 2009, MHLLC has failed to perform its obligations under the First Kalamazoo AOC, including its obligation to complete certain activities by milestone completion dates and report certain information to EPA. To date, MHLLC is liable to the United States for stipulated penalties totaling approximately $250,000 for failure to timely perform work and provide reporting required by the First Kalamazoo AOC.

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[7] In May 2009, EPA entered into a Consent Decree with GP, requiring GP to implement the remedy selected for OU2 and to reimburse EPA's past response costs for OU2.

42. Section XVI of the Second Kalamazoo AOC provides that MHLLC is liable for stipulated penalties for any failure to timely perform various work required under the AOC in the amount of $500 per day for the first through 14th day of noncompliance; $1,000 per day for the 15th through 30th day of noncompliance; and $2,000 per day for the 31st day of noncompliance and beyond. Section XVI of the Second Kalamazoo AOC further provides that MHLLC is liable for stipulated penalties for any failure to timely provide adequate SRI/FS planning documents, reports, and technical memoranda to EPA under the AOC in the amount of $500 per day for the first through 14th day of noncompliance; $1,000 per day for the 15th through 30th day of noncompliance; and $2,500 per day for the 31st day of noncompliance and beyond. In addition, the Second Kalamazoo AOC provides that MHLLC is liable for stipulated penalties for any failure to perform any other obligations under the AOC in the amount of $250 per day for the first week of noncompliance and $500 per day of noncompliance thereafter.

43. Since January 6, 2009, MHLLC has failed to perform its obligations under the Second Kalamazoo AOC with respect to OU5. To date, MHLLC is liable to the United States for stipulated penalties totaling approximately $500,000 for failure to timely perform multiple obligations under the Second Kalamazoo AOC.

CLAIM FOR NATURAL RESOURCE DAMAGES AND ASSESSMENT COSTS

44. CERCLA Sections 107(a) and 107(f), 42 U.S.C. §§ 9607(a) and 107(f), provide for the recovery of damages for injury to, or destruction or loss of, natural resources caused by the release of hazardous substances to the environment. Injured resources may include, but are not limited to, birds, mammals, fish, plants, and their supporting habitats. The United States, through DOI and NOAA, is authorized to act on behalf of the public as a trustee to recover natural resource damages, as well as the reasonable costs of assessing the injury to, or destruction or loss of, natural resources.

45. As no remedial action has been completed at the Kalamazoo Site, the eventual amount of damages for natural resource injury, destruction, or loss, including the reasonable costs of assessing the existence and extent of such injury, destruction, or loss, is unknown. However, the United States presently estimates that natural resource damages at or near the Kalamazoo Site are between $303.1 million and $351.5 million.

46. Additionally, through January 2009, DOI has incurred approximately $1,145,000, and NOAA approximately $532,000, in costs associated with assessment of natural resource damages at or near the Kalamazoo Site. DOI and NOAA expect to incur additional, future assessment costs as well, totaling approximately $7.1 million.

47. Pursuant to CERCLA Sections 107(a) and 107(f), 42 U.S.C. §§ 9607(a) and 9607(f), MHLLC is liable to the United States for damages for injury to, or destruction or loss of, natural resources caused by the release of hazardous substances from the Kalamazoo Site, including the reasonable costs of assessing such injury, destruction, or loss. Other parties may, along with MHLLC, also be jointly and severally liable to the United States under CERCLA with respect to such damages and assessment costs.

PROTECTIVE FILING FOR WORK OBLIGATIONS

48. The United States is not required to file a proof of claim with respect to MHLLC's injunctive obligation to comply with work requirements imposed by environmental statutes, regulations, court orders, administrative orders, or permits, because such obligations are not claims under 11 U.S.C. § 101(5). MHLLC and any reorganized debtor must comply with such mandatory requirements. The United States reserves the right to take future actions to enforce any such obligations of MHLLC. While the United States believes that its position will be upheld by the Court, the United States has included the aforementioned obligations and requirements in this Proof of Claim in a protective fashion, to safeguard

against the possibility that MHLLC will contend that it does not need to comply with such obligations and requirements, and the Court finds that it is not required to do so. Therefore, a protective contingent claim is filed in the alternative for such obligations and requirements but only in the event that the Court finds that such obligations and requirements are dischargeable claims under 11 U.S.C. § 101(5), rather than obligations and requirements that any reorganized debtor must comply with. Nothing in this Proof of Claim constitutes a waiver of any rights of the United States or an election of remedies with respect to such rights and obligations.

49. Consistent with the foregoing, this Proof of Claim is filed in a protective manner with respect to any and all compliance and work obligations of MHLLC under the Resource Conservation and Recovery Act ("RCRA"), 42 U.S.C. §§ 6901-6992k. RCRA establishes a comprehensive regulatory program for generators of hazardous waste and for owners and operators of facilities that treat, store, or dispose of hazardous waste. Pursuant to RCRA, EPA has promulgated regulations applicable to generators and owners and operators of hazardous waste management facilities. The federal RCRA implementing regulations are set forth at 40 C.F.R. Part 260 *et seq.* Pursuant to RCRA Section 3006, 42 U.S.C. § 6926, EPA has authorized certain states to administer various aspects of the hazardous waste management program in such states. Pursuant to RCRA Section 3008(a), 42 U.S.C. § 6928(a), these authorized state hazardous waste management program are enforceable by EPA. Under RCRA, regulated entities are required, *inter alia*, to operate in compliance with RCRA regulatory requirements, implement closure and post-closure work and corrective action work, and perform any necessary action with respect to any imminent and substantial endangerment to health or the environment, as required by RCRA and/or RCRA permits, consent decrees, or administrative orders. *See, e.g.*, 42 U.S.C. §§ 6924, 6928, 6973. MHLLC is liable for any and all injunctive and compliance obligations that it is required to perform under RCRA, RCRA permits, and RCRA administrative orders. It is the United States' position

that a proof of claim is not required to be filed for injunctive, compliance, and regulatory obligations and requirements under RCRA.

DEBTOR-OWNED SITES

50. MHLLC has or may in the future have environmental liabilities for properties that are part of its bankruptcy estate and/or for the migration of hazardous substances from property of its bankruptcy estate. For example, as set forth above, MHLLC is the current owner of a portion of the Kalamazoo Site from which hazardous substances have been, and may continue to be, released to other portions of the Site. Pursuant to 28 U.S.C. § 959(b), MHLLC is required to manage and operate estate property in accordance with non-bankruptcy law, including all applicable environmental statutes and regulations. Further, any reorganized debtor will be subject to liability under environmental law with respect to any property it owns or operates. The United States is not required to file a proof of claim relating to property of the estate other than for: (i) response costs incurred before the petition date; and (ii) civil penalties for days of violation occurring before the petition date. This Proof of Claim is only filed protectively with respect to post-petition liabilities and response costs relating to property of the estate. The United States is entitled to administrative expense priority for, *inter alia*, any response costs it incurs with respect to property of the estate after the petition date. The United States reserves the right to file an application for administrative expenses and to take other appropriate action in the future with respect to property of the estate.

ADDITIONAL TERMS

51. This Proof of Claim is filed as an unsecured non-priority claim, except to the extent: (i) any rights of setoff secure the United States' claims; (ii) any secured/trust interest exists in insurance proceeds received by MHLLC on account of the United States' claims; and (iii) administrative priority exists with respect to property of the estate, post-petition violations of law, or otherwise. The United States will file any application for administrative expenses at the appropriate time.

52. This Proof of Claim is also filed to the extent necessary to protect the United States' rights with respect to any insurance proceeds received by MHLLC, and any funds held in escrow by MHLLC, in connection with the matters discussed herein.

53. This Proof of Claim is without prejudice to any right under 11 U.S.C. § 553 to set off, against this claim, debts owed (if any) to MHLLC by these or any other federal agencies.

54. The United States has not perfected any security interest on its claims against MHLLC.

55. Except as stated in this Proof of Claim, no judgments against MHLLC have been rendered on the claims set forth herein.

56. No payments to the United States have been made by MHLLC on the claims set forth herein.

57. This Proof of Claim reflects certain known liabilities of MHLLC to the United States. The United States reserves the right to amend this Proof of Claim to assert additional liabilities, including but not limited to liabilities for additional costs for the matters discussed herein.

58. Additional documentation in support of this Proof of Claim is too voluminous to attach, but is available upon request.

Dated: New York, New York
July 6, 2009

Respectfully submitted,

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Acting United States Attorney
Southern District of New York

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STATE OF MICHIGAN
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JOHN ENGLER
GOVERNOR

K. L. COOL
DIRECTOR

December 6, 2002

RECEIVED
DEC 2 0 2002
SUPERFUND DIVISION
OFFICE OF THE DIRECTOR

Mr. William E. Muno, Director
Superfund Division
U.S. Environmental Protection Agency, Region V
77 W. Jackson Blvd. (SR-6J)
Chicago, IL 60604

Dear Mr. Muno:

SUBJECT: Kalamazoo River CERCLA Site Feasibility Study

We have recently learned that the U.S. Environmental Protection Agency (EPA) will soon be drafting a feasibility study for remediation of the Kalamazoo River and are concerned about some of the information circulating about this study. As you may know, the mainstem segment of river is currently characterized by one operating and several retired hydropower dams, three of the latter of which are owned by the Department of Natural Resources (DNR), Wildlife Division. In addition to this direct property interest in the river, we are also the public trustee for the natural resources of this system, thus have a vested interest in any proposed EPA activities on this system.

For years the DNR has intended to remove our dams, and in fact performed a partial removal in 1988. We were unable to complete this task as decisions and actions to address PCB contaminated paper wastes in the impoundments above the dams have not been made to date. The condition of the dams has continued to deteriorate while the PCB concerns have been investigated and alternatives for their removal developed.

We do not know if you realize the scope of debate that has occurred over the years concerning the future of these dams. We have previously provided your office with records from our files concerning the Kalamazoo River, specifically relating to the three DNR-owned dams dating back to 1966, just prior to state acquisition. Our records demonstrate that the DNR, as owner and natural resources trustee, has had long-standing interest in removing these dams for many reasons, not the least of which is that they are failing. In addition, my staff participated in many Kalamazoo River meetings and workshops with the various interests for the last several years and they have always advocated for remediation planning that allows for and anticipates removal of the DNR-owned dams.

Our intentions have not changed, yet the future of the dams again appears to be part of a debate involving the EPA and the Kalamazoo River Study Group (the responsible parties). Some have suggested that these dams be retained to serve essentially as in-stream waste lagoons. We see this as a very short-sighted solution to handling this significant contaminant problem that only delays the removal of these materials and leaves long-term resource problems and health risks in place. It is simply poor public policy to leave such problems to future generations to deal with, assuming the dams are maintained for that long, when we can

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solve the problem at this time. Thus, the only real solution is the complete removal of these materials from the system. As Director, let me stress that we cannot endorse a scenario that would convert one of the state's major river systems and all its public trust resources, into a "permanent" pollution disposal site in this way and we will actively oppose such a decision. The reality of this potential alternative is that it is not a permanent solution and will require constant inputs of capitol for dam maintenance along with the high risk of catastrophic dam failure and sediment release.

I expect you will consult with this agency directly if you are seriously considering this approach since the ramifications are significant. Please be assured that the DNR is a willing partner in river restoration on the Kalamazoo. We want to work with the EPA and the responsible parties on a remedy that will do more than minimize the public exposure to contaminants for a relatively short period of time. We would like your help in establishing a healthier, safer, and more productive river, and in seeing a lasting remedy implemented.

Again, please don't hesitate to contact our spokesperson on this site, Ms. Sharon Hanshue of the Fisheries Division at 517-335-4058, or you may call my office at 517-335-4873.

Sincerely,

K.L. Cool
Director

cc: Mr. Robert Beck, President, Kalamazoo River Watershed Council
Mr. Mark Brown, Kalamazoo River Study Group
Mr. Russell J. Harding, Director Department of Environmental Quality (DEQ)
Mr. Jim Sygo, DEQ
Mr. George E. Burgoyne, Resource Management Deputy, DNR
Ms. Rebecca Humphries, DNR
Mr. Kelley Smith, DNR

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STATE OF MICHIGAN
DEPARTMENT OF ENVIRONMENTAL QUALITY
LANSING

JOHN ENGLER
GOVERNOR

RUSSELL J. HARDING
DIRECTOR

December 13, 2002

Mr. William E. Muno, Director
Superfund Division
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard (S-6J)
Chicago, Illinois 60604-3590

Dear Mr. Muno:

SUBJECT: Integrating the Fate of Plainwell, Otsego, and Trowbridge Dams in Kalamazoo River Superfund Site Feasibility Studies

The Michigan Department of Environmental Quality (MDEQ) wants to ensure that the United States Environmental Protection Agency (EPA) understands the State of Michigan's (state) position on the fate of three state-owned dams on the Kalamazoo River. In a January 18, 2002 letter to the EPA (enclosed), the Michigan Department of Natural Resources (MDNR) explained the state's long-standing intention to remove its dams and begin implementing its fisheries management plans. A package of background information on the MDNR's plan was included with that letter. We trust the MDNR letter was added to the EPA's administrative record and will be given appropriate weight during the feasibility study process for the Kalamazoo River Superfund site.

The MDEQ expresses full support of the MDNR's plans to remove its dams, which need to be removed for many reasons, including:

1) The MDNR purchased the dams and surrounding impoundment acreage with state funds, with the objective to improve the water quality of the Kalamazoo River. Provided that the sediment contamination in the river is appropriately addressed, removal of the dams will improve water quality.
2) The dams have clearly exceeded their design life; for some time now, they have not been usable for the purpose for which they were engineered.
3) The dams cannot be repaired to keep them safely in place for the long term. Although the state, in 2001, implemented interim measures to stabilize the dams, these measures are anticipated to last only another two to seven years. The dams are in such decay that the risk of catastrophic failure after that time is considerable.
4) The presence of dams restricts and hinders the MDNR in its duty to manage state fisheries and wildlife resources. The dams, like the contaminants, restrict public use of the resource and prevent the fishery from realizing its potential.

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5) Ongoing expenditure of state funds to maintain unwanted, obsolete, unsafe dams cannot be justified, considering the dams themselves degrade the resource. Such expenditure is in direct opposition to the intent of resource appropriations, which are meant to maintain and improve natural resources. Michigan law (Part 315, Dam Safety, of the Natural Resource and Environmental Protection Act, 1994 PA 451, as amended) specifically identifies dam removal as an acceptable alternative to dam repair. The MDNR intends to implement that alternative.

The MDEQ completely supports the EPA's long term water quality goal and EPA's conclusions regarding aging dams, as expressed in the recent publication *EPA Region 5 State of the Waters 2002* (EPA-905-R-02,007, September, 2002):

> *Our Long Term Goal: ...watersheds and their aquatic ecosystems will be restored and protected to improve human health, enhance water quality, reduce flooding, and provide habitat for wildlife.*
>
> *Returning rivers to a free-flowing condition eliminates safety risks posed by aging dams and improves the biological health of streams. Dam removal can also make sense economically, as the cost of repairing a small dam is on average 300 percent greater than the cost of removing a dam.*

Given the above statements, dam removal is consistent with the EPA's goals. It also would create conditions consistent with the *Great Lakes Strategy 2002*, developed by the U.S. Policy Committee for the Great Lakes, which states:

> *Stressors affecting fishery resources rarely act singly, often having complex interactions, and frequently impact several levels of the aquatic ecosystem.*
>
> *As a consequence, remedial management must address problems on a comprehensive whole-system basis. A natural focus of the fishery agencies, therefore, is the maintenance and development of entire fish communities which can provide improved contributions to society. Such an ecosystem approach requires the protection and rehabilitation of aquatic habitat and fishery management to ensure stable self-sustaining populations.*

It is our view a whole-system approach including dam removal is necessary for the Kalamazoo River to protect habitat and the fishery. Other dams not owned by the MDNR would then be subject to eventual removal or modification to provide fish passage.

It is important to recognize that the state has not proceeded to remove its dams only because contaminated sediment deposits remain in the impoundments. Before dams can be removed, some degree of sediment cleanup must occur. While the MDNR's past attempts to remove its dams were only partially funded, this should not be perceived as a lack of resolve to complete the task. Current budget reductions for the MDNR are also not indicative of dwindling intent, and should not be a consideration in the river's feasibility studies.

If the MDNR is unable to secure funding for dam removal in a timeframe compatible with the EPA's schedule, the MDEQ is committed to fund dam removal in conjunction with the EPA's implementation of site remediation in the vicinity of the dams. State environmental response funds would be requested to remove the three dams to take advantage of sequence, timing, monitoring, and other considerations associated with removal of sediment in the impoundments. Furthermore, when the state removes the dams, it will seek cost recovery from the site's liable parties to the fullest extent of state and federal law.

Given that the conditions of the dams are such that future repairs are not possible, ultimately, the dams will either fail or be removed. Thus, any alternative that depends on the perpetual existence of the Plainwell, Otsego, or Trowbridge dams cannot be deemed feasible, implementable, or permanent. The state will not support selection of any alternative that requires these dams to remain.

We look forward to working with the EPA in a partnership to ensure that remedial actions on the Kalamazoo River allow removal of the obsolete dams and make significant progress toward our common water quality goals. Dam removal is critical to the protection of the valuable resources entrusted to us by the people of Michigan and the surrounding Great Lakes states.

Sincerely,

Jim Sygo, Chief
Remediation and Redevelopment Division
517-335-1104

Enclosure

cc: Ms. Jo Lynn Traub, EPA
Mr. Gary Gulezian, EPA
Ms. Eileen Furey, EPA
Ms. Bonnie Eleder, EPA
Dr. Lisa Williams, United States Fish and Wildlife Service
Mr. Todd Goeks, National Oceanic Atmospheric Administration
Mr. Robert Beck, Kalamazoo River Watershed Council
Mr. Dayle Harrison, Kalamazoo River Protection Association
Mr. Sam Washington, Michigan United Conservation Club
Mr. Matthew Doss, Great Lakes Commission
Mr. Neil Gordon, Michigan Department of Attorney General
Ms. Sharon Hanshue, MDNR
Mr. Harold Fitch, MDEQ
Mr. Richard Powers, MDEQ
Mr. David Ladd, MDEQ
Mr. Andrew W. Hogarth, MDEQ
Ms. Elizabeth Browne, MDEQ

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
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MAR 25 2003

REPLY TO THE ATTENTION OF

S-6J

Mr. Jim Sygo, Chief
Remediation and Redevelopment Division
Michigan Department of Environmental Quality
Knapp's Centre
P.O. Box 30426
Lansing, Michigan 48909

Re: MDEQ Position Regarding Dismantling of Michigan-Owned Dams as Part of the Remedial Action for the Kalamazoo River Operable Unit of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site

Dear Mr. Sygo:

Thank you for your letter dated December 13, 2002, which communicates the position of the Michigan Department of Environmental Quality (MDEQ) regarding the appropriate disposition of the Plainwell, Otsego and Trowbridge dams in the remedy selection for the Kalamazoo River. These three dams are owned by the State of the Michigan and comprise part of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site (the Site). Other dams located at the Site are owned by the cities of Otsego and Allegan. The United States Environmental Protection Agency (U.S. EPA) has been aware for some time that the State of Michigan strongly prefers that any remedy selected for the Kalamazoo River include dam removal as an integral component.

I want to assure you that U.S. EPA has included both your letter and an earlier letter from the Michigan Department of Natural Resources on the same matter in the federal Administrative Record for the Site. I want to assure you further that U.S. EPA will certainly consider the position of the State of Michigan regarding appropriate disposition of these dams during all stages of remedy selection for the Kalamazoo River. As you may know, U.S. EPA is currently drafting a Remedial Investigation/Feasibility Study (RI/FS) for the first two reaches of the Kalamazoo River. I have specifically requested that the FS for these two reaches include an alternative that would require dismantling of the Plainwell and Otsego City dams, and excavation and/or dredging of river sediments and floodplain soils that would be affected by dam removal. The FS will evaluate the degree of protectiveness of human health and the environment that could be achieved as a result of the dams' dismantling, the costs associated with such a course of action, and all other factors that the Agency must consider under the National Oil and Hazardous Substances Pollution Contingency Plan. As you know, one of these factors requires federal consideration of the State's position and key concerns about any preferred alternative (40 C.F.R. § 300.430(e)(9)(iii)(H)).

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Until the FS is complete, U.S. EPA is not in a position to opine on what alternative will ultimately prove the most appropriate for the Kalamazoo River. It may well be that an alternative that is appropriate for one reach of the River is inappropriate, under the NCP's criteria, for another reach. Frankly, the State's position that it "will not support selection of any alternative that requires these dams to remain" seems a bit premature, since neither MDEQ nor Region 5 has yet had the chance to review and evaluate a complete alternative array. I hope that as time goes on, MDEQ will keep an open mind about the range of possibilities on the River.

In closing, I want to express my sincere hope that all of the state and federal agencies with a stake in the selected remedy for this River will continue to work together to ensure that an appropriate remedy is selected for the Kalamazoo, and that cleanup can occur in a timely fashion. The citizens of Michigan deserve no less. If you have any additional questions or concerns regarding the Site, please feel free to contact either myself or Shari Kolak, the Remedial Project Manager at (312) 886-6151.

Sincerely yours,

for William E. Muno, Director
Superfund Division

cc: Ms. Jo Lynn Traub, EPA
Mr. Gary Gulezian, EPA
Ms. Eileen Furey, EPA
Ms. Bonnie Eleder, EPA
Dr. Lisa Williams, United States Fish and Wildlife Service
Mr. Todd Goeks, National Oceanic Atmospheric Administration
Mr. Robert Beck, Kalamazoo River Watershed Council
Mr. Dayle Harrison, Kalamazoo River Protection Association
Mr. Sam Washington, Michigan United Conservation Club
Mr. Matthew Doss, Great Lakes Commission
Mr. Neil Gordon, Michigan Department of Attorney General
Ms. Sharon Hanshue, MDNR
Mr. Harold Fitch, MDEQ
Mr. Richard Powers, MDEQ
Mr. David Ladd, MDEQ
Mr. Andrew W. Hogarth, MDEQ
Ms. Elizabeth Browne, MDEQ

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REPLY TO THE ATTENTION OF:

December 31, 2003

Andrew W. Hogarth, Chief
Remediation and Redevelopment Division
Michigan Department of Environmental Quality
P.O. Box 30426
Lansing, Michigan 48909-7926

Dear Mr. Hogarth:

Thank you for your December 17, 2003, letter regarding the Kalamazoo River Superfund site which was received by me on December 29, 2003. I am glad we had an opportunity to discuss this site and three additional Michigan Superfund sites during our conference call on November 7, 2003. The purpose of this letter is to provide you with some personal observations on recent past events regarding this site and to propose a general approach to address the many issues contained in your letter. Detailed discussion of the specific issues in your letter will occur at a later date.

As an overall impression I felt that MDEQ overreacted to the preliminary draft of the RI/FS which we sent you in July 2003. This draft was our first thoughts on one conceptual approach to addressing the many different components that contribute to the PCB risks in the Kalamazoo River watershed in an incremental fashion. It was never our intention to present this initial draft as an "fait accompli." Rather, it was our intention to begin a dialogue with the State, in the spirit of partnership, to reach agreement on what would be the best approach to cleaning up the river. You can imagine my disappointment when information on this conceptual draft was discussed at an October 2, 2003, public meeting and incorrect information was provided that this conceptual draft was going to be published for public comment.

That being said, let me assure you that in developing a cleanup plan for the Kalamazoo River we intend to fully comply with the Superfund National Contingency Plan (NCP) and applicable national guidance for sediment sites, specifically, "Principles of Managing Contaminated Sediment Risks at Hazardous Waste Sites". As I mentioned to you at the November 7, 2003, conference call, we want to fairly consider all alternatives, including those that involve dam removal, and we have not eliminated any alternative from consideration in our own internal deliberations. I would request that the State do the same for those alternatives that do not comport with positions taken in prior State correspondence. Given the divergent views that exist over several of the alternatives, I have decided to try a facilitated series of discussions with all the relevant

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stakeholders in an attempt to reach consensus on the best alternative to move the cleanup forward. I do need to point out that these discussions will not be an attempt to negotiate a final remedy as U.S. EPA retains the authority to select a final remedy consistent with CERCLA and the NCP. I am hopeful that these discussions will ultimately lead to a global settlement that addresses both the remedial and restoration components for the entire Kalamazoo River watershed. You, along with the other stakeholders, will be receiving more details on this approach in the near future.

I remain optimistic that a resolution of the current impasse is possible such that the actual cleanup of the Kalamazoo River can begin in the relatively near future. I look forward to working with you and your staff to achieve this outcome.

Sincerely yours,

Wm. E. Muno

William E. Muno, Director
Superfund Division

cc: Steven Chester, MDEQ
Jim Sygo, MDEQ
Elizabeth Browne, MDEQ
K. L. Kool, MDNR
Wendy Carney, EPA
Larry Schmitt, EPA
Shari Kolak, EPA
Eileen Furey, EPA

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OCT - 9 2000
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REPLY TO THE ATTENTION OF:

SR-6J

October 4, 2000

VIA E-MAIL AND FIRST CLASS MAIL
Mr. Keith Krawczyk
MDEQ, ERD, Superfund Section
Knapps Centre
P.O. Box 30426
Lansing, MI 48909-7926

Subject: Comments on Draft ROD for OU4 (12th Street Landfill) at the Allied Paper/Portage Creek/Kalamazoo River Superfund Site

Dear Keith:

U.S. EPA has reviewed the Record of Decision (ROD) prepared by the Michigan Department of Environmental Quality (MDEQ) for the 12th Street Landfill Operable Unit (OU) of the Allied Paper/Portage Creek/Kalamazoo River Superfund Site (the Site). The Site, designated as State-Enforcement Lead by agreement between Region 5 and the State of Michigan, was listed on the National Priorities List (NPL) in 1990. To date, U.S. EPA has conducted a time-critical removal action at the Site, and MDEQ has completed a ROD for the King Highway Landfill (KHL), OU-3. In the KHL ROD, MDEQ selected a remedy requiring consolidation and capping in place of the PCB-contaminated soils, sediments and paper residuals in and around the landfill area. Region 5 granted a TSCA waiver for the OU-3 ROD, determining that the liner, hydraulic conditions and leachate collection requirements for chemical waste landfills were not necessary to ensure protection of human health and the environment at that landfill.

The Focused Feasibility Study (FFS) for the 12th Street Landfill (OU-4) was completed in July, 1997; MDEQ issued its Proposed Plan for the OU at that time. MDEQ hosted a public meeting on the Proposed Plan on August 13, 1997. A final Baseline Ecological Risk Assessment (ERA) for the entire Site was completed in June of 1999.

We have several comments and concerns about the OU-4 ROD, which are explained at some length below. Our hope is that these comments provide form and focus to a fruitful meeting between MDEQ and U.S. EPA in the near future.

Finally, as you know, Jim Chapman, U.S. EPA's ecologist for this Site, is currently reviewing the final ERA. Jim's final review of the complete document should be ready towards the end of this

month. In order to assist me with my review of this ROD, however, Jim reviewed the site specific sediment threshold presented in the ERA. Several of his comments are specifically mentioned later in this letter. His complete memorandum to me regarding the sediment threshold is enclosed with this letter.

General Comments

1. Most significantly, U.S. EPA is concerned that several important aspects of the selected Remedial Action have changed since the Proposed Plan was issued on July 30, 1997. These changes include the following items:

   - the establishment of 0.12 ppm as the cleanup level for residuals, soils and sediments at this operable unit

   - the inclusion of sediment dredging in the powerhouse channel, and

   - a three hundred percent increase in the estimated cost of this remedy.

   The NCP provides that, at federal-lead Superfund sites, when a selected remedy differs significantly with respect to scope, performance, or cost from that set forth in a Proposed Plan, then the Agency must either (a) include a discussion of the changes and the reasons therefor in the Record of Decision; or (b) seek additional public comment. The decision to choose either (a) or (b) depends on whether the Agency believes the changes could have been "reasonably anticipated" by the public based on the information available in the proposed plan, the supporting analysis or the Administrative Record. See 40 C.F.R. § 300.430(f)(3)(ii).

   The ROD does not contain a detailed discussion of the changes to the selected remedial action since the Proposed Plan. To U.S. EPA's knowledge, the modified remedy has not been submitted for public review. (Public comment on the Proposed Plan closed on or about September 15, 1997, well before these modifications to the selected remedy were incorporated into this OU.) Although this Site has been designated as state enforcement lead, the Agency is aware that MDEQ has tried to comply with the NCP to the greatest extent possible. We would like to discuss whether MDEQ has made a decision with regard to whether the changes to the remedy reasonably could have been anticipated by the public.

2. U.S. EPA has an additional concern about the proposed sediment removal in the former powerhouse discharge channel of the Plainwell Dam. Congressional appropriations language precludes U.S. EPA from selecting dredging of contaminated sediments as an appropriate response action in any Record of Decision unless the Agency has documented each of the following conditions: (1) the contaminated sediment poses a significant threat to the public health to which an urgent or time critical response is necessary: (2) remedial

and/or removal alternatives to dredging have been fully evaluated; (3) an appropriate site for disposal of the contaminated material has been selected; and (4) the potential impacts of dredging, associated disposal, and alternatives have been explained to the affected community. (U.S. EPA Headquarter's memoranda explaining the FY '99 and '00 appropriations language are enclosed with this letter. We expect even more restrictive language to be included in the FY' 01 appropriations.) As noted in these memoranda, this critical information should be included, if possible, in the decision document itself.

The Agency is concerned that the second and fourth of the Congressional requirements have not been adequately addressed in this ROD or elsewhere in the Administrative Record. Neither this ROD nor the KHL ROD Landfill, relied upon extensively to justify the remedy selected here, evaluated alternatives to dredging (*e.g.* natural attentuation). And, as noted above, the affected community appears not to be aware that MDEQ added the powerhouse channel dredging to this OU. U.S. EPA will not be in a position to concur with this ROD unless and until all of the Congressional requirements have been met.

3. U.S. EPA has some concern about how the cleanup value of 0.12 ppm PCBs was calculated. As Jim Chapman's memo explains in some detail, the Agency believes: (1) that a range of values is consistent with the Superfund guidance on ecological risk assessment (U.S. EPA 1997); and (2) the applicability of the sediment cleanup value to soils may be inappropriate. We should discuss this issue further in our meeting.

4. Region 5 has some concern with MDEQ's approach to verification sampling. The ROD appears to contemplate that excavation will continue until each sample of soil or sediment reaches the 0.12 cleanup level. U.S. EPA believes that a surface weighted average concentration (SWAC) approach to verify dredging results is appropriate and should be incorporated into this ROD.

5. Declaration, pg. iii, ¶ 2 (and throughout the document): This paragraph states, in essence, that if the cleanup level of 0.12 ppm PCBs is not achieved after excavation and verification sampling, then one of two things will occur: either excavation will continue until the cleanup level is achieved, or some unidentified entity (probably the PRP group) may petition MDEQ and U.S. EPA to modify the PCB cleanup level. The Declaration further provides that the decision on such a petition must be made jointly by MDEQ and U.S. EPA, and shall be final and unappealable. Finally, the Declaration provides that, if the cleanup level of 0.12 is not achieved after excavation and sampling, this ROD will no longer be considered a final action ROD, and final remedial action for the wastes will be addressed in the operable unit ROD for the Kalamazoo River.

The Agency has at least two concerns about this approach. First, this "conditional cleanup level" idea appears to be detailed only in the Declaration. It was not explained in either the FFS or in the Proposed Plan. At pages 10 and 33, the ROD text suggests that the

cleanup level of 0.12 ppm is conditional by stating that the remedy will achieve cleanup goals "if" the cleanup level of 0.12 is achieved. But the suggestion is very oblique: the average reader would hardly be put on notice that the cleanup level is subject to change. Furthermore, nowhere outside the Declaration does the ROD state what will happen in the event that the 0.12 ppm level is not achieved or achievable. In short, the public has simply not been made adequately aware that the PRPs can (and in fact, are quite likely to) ask for a review of the cleanup level.

Furthermore, if the PRPs request MDEQ and U.S. EPA to review the cleanup level, U.S. EPA believes that such a change could not be made under the NCP without a ROD Amendment or an Explanation of Significant Difference.

Accordingly, U.S. EPA recommends that this language regarding the conditional nature of the cleanup level be deleted entirely from the document. The ROD should simply state that any change in the cleanup level would occur through a ROD Amendment or an Explanation of Significant Difference, as appropriate.

Specific Comments

6. Declaration, pg. I, #1-5: Should potential groundwater contamination and landfill leachate be added to this list?

7. Declaration, pg. ii, ¶ 5 (#1): The Declaration states that the data collected during the RI "does not provide adequate information, in sufficient detail, regarding the horizontal and vertical extent of PCB contamination to conduct the removal from these areas." This sentence creates the impression that the RI was inadequate, and should be modified to simply state that additional sampling and analysis will be necessary during the remedial design of this ROD. The text of the ROD raises similar issues about the adequacy of the RI (and therefore the adequacy of the cost estimates for this remedy). First, the ROD lacks any estimate whatsoever of the cubic yards of sediments, soils and residuals that will be excavated as part of this remedy. In the description of Alternative 2, the selected remedy, the ROD states as follows:

> The extent of PCB-contaminated material was assumed to be defined by using a grid sampling approach. For the floodplains, wetlands, and adjacent property the grid was assumed to extend approximately 120 feet from the toe of the landfill slope. It was assumed that approximately 2/3 of each sample area would be contaminated, thereby requiring excavation. The depth of contamination requiring excavation was assumed to be 2 feet in the floodplains and wetlands and 1 foot in the adjacent property, woodland and the former powerhouse discharge channel.
>
> (ROD, pp. 27-28.)

The ROD does not describe the reasoning behind the assumptions made about the areal extent and depth of contamination. As such, the accuracy of the cost estimates presented in the ROD is questionable. MDEQ should provide, within the ROD, the reasoned basis for the assumptions underlying these estimates.

8. Declaration, pg. ii, #1: This paragraph states that "[A]ll PCB-contaminated soils, sediments, and residuals above 0.12 ppm PCB's shall be excavated..." As noted above, U.S. EPA is not yet convinced that the 0.12 ppm PCB standard is an appropriate clean-up level for all media, especially those other than sediments. An alternative, higher, standard for soils and residuals may be appropriate since the exposure in these media is not to fish and benthic organisms, but to terrestrial animals and birds. For further discussion on this issue, please see Jim Chapman's memo.

9. Declaration, pg. iii, ¶ 2; ROD text pg. 26: Both the Declaration and the ROD text state that the landfill shall be set back from the Kalamazoo River a distance of 50 feet "unless a demonstration is made to and approved by U.S. EPA that a lesser distance would be as protective." This ambiguity suffers from the same problems as the cleanup level estimate, *i.e.* the contingent nature of proposed setback, and the grant to U.S. EPA of authority to change the ROD without public input.

   MDEQ's response to Comment #4 includes the unambiguous statement: "A 50-foot set back from the Kalamazoo River shall also be incorporated into the RD." (Responsiveness Summary, pg. 64.) The TSCA program's comments on this ROD are similarly unambiguous with regard to the requirement for a 50 foot setback from the Kalamazoo River. The conditional language in the ROD should be deleted.

10. Declaration, pg iii, #2: The first sentence of this paragraph states that "the main channel of the Kalamazoo River shall be excavated and disposed of in the remainder of the landfill." This appears to be the only reference in this document to the main channel being part of the proposed dredging. U.S. EPA understands this to be a typographical error. Please confirm our understanding.

11. Declaration, pg. iv, first partial paragraph: The citation to TSCA is incorrect. U.S. EPA believes that MDEQ intends to satisfy the requirements of "risk-based" PCB disposal provided by 40 C.F.R. § 761.61(c), not § 761.61(6).

12. Declaration, pg. vi, ¶ 1: Assuming we can reach resolution on the issues identified in this letter, particularly those regarding cleanup values and public comment, U.S. EPA will certify that this remedy complies with federal ARARs. On a state enforcement lead site, however, the Agency should not certify that the selected remedial action complies with state ARARs, since that review and determination has been made entirely by the state.

MDEQ may want to review the relevant language used in the KHL OU-3 Declaration, which is slightly more ambiguous in its approach. There, U.S. EPA specifically agreed with MDEQ's determination that the selected remedy was protective of human health and the environment. The statement regarding compliance with state and federal ARARs, however, is agency-neutral.

13. Declaration pg. vi, ¶ 2: The last line of this paragraph should be modified to state that the concurrence of U.S. EPA's Regional Administrator with the remedy selected in this ROD constitutes the written approval required by 40 C.F.R. § 761.61(c)(2).

14. Pg. ix, acronyms: It would be helpful to further identify some of the parties listed here. For example, the document could identify BBL as the KRSG's engineering contractor, KRPA as a community group, etc. Also add KRSG to the list and explain who they are.

15. ROD text, pg.4, #3 and throughout text: Are the floodplain and wetland 200 yards wide each or combined? Please clarify.

16. ROD text, pg 9, ¶ 1 and following: The discussion switches here from discussing OU4 to the Site, and is a little confusing. This general information about the Site would be more useful at the beginning of the document.

17. ROD text, pg. 14, line 1: The word "is" is a typographical error.

18. ROD text, pg. 16, ¶ 1: What was the level of PCB concentration found in the deep soil?

19. ROD text, Pg. 16, ¶ 2: The ROD states that May 1993 sampling indicated that there are dioxins and dibenzofurans in the landfill residuals. The ROD fails to indicate either the amount of dioxins and dibenzofurans at this operable unit or the contaminant level of these toxic substances. U.S. EPA Headquarters has asked for additional information about the dioxins and has reminded Region 5 of the consultation requirements with Headquarters on the dioxin issue.

20. ROD text, pg. 17, ¶ 3: U.S. EPA agrees with MDEQ that the principal contaminants of concern at this OU are PCBs. But the following language could be modified as follows:

The ecological risk assessment demonstrates that, although other contaminants are found at the Site, the principle al threat at ~~this Site and specifically at the~~ 12th St.-OU4 is due to the past and ongoing release of PCBs. A list of the other contaminants identified in the residuals at the OU, and the levels at which they were detected, are attached to this ROD at Attachments 2 and 3.

21. ROD text, pg. 20, ¶ 1: This paragraph is inconsistent with regard to what the remedy will achieve in the way of reduction of risk to surface water. The paragraph first claims that

the risk to surface water will be "eliminated," then later utilizes the term "minimized." The latter term is probably more accurate and should be used consistently.

22. ROD text, pg. 20, ¶ 1: "To accomplish this, the PCB cleanup criteria of 0.12 ppm must be achieved by the removal." This "must" language seems too strong, especially if a SWAC approach will be taken to verify cleanup levels.

23. ROD text, pg. 21, ¶ 2: The ROD states that at "all Superfund sites the acceptable risk level is established by the U.S. EPA Regional Administrator on a site by site basis." At every federal lead Superfund site, the acceptable risk is determined first by the parameters of the NCP. In any event, U.S. EPA's Regional Administrator does not determine acceptable risk at State Enforcement Lead sites like this one. This language should probably be deleted.

24. ROD text, pg. 21, ¶ 3: "The constituents of concern in these media were PCBs and PCDD/PCDF." This is the first reference to PCDD/PCDF. These contaminants are not listed on any of the attachments to the ROD, which are the tables from the Remedial Investigation identifying contaminants of concern and the concentrations at which they were detected. Please clarify.

25. ROD text, pg. 24, ¶ 1: This information about the ability of bald eagles to reproduce is quite old and should be verified and updated. Also, clarify if you mean bald eagles nesting on OU4 or at the Site.

26. ROD text, pg. 27, first incomplete paragraph: Here and elsewhere in the document, MDEQ states that the need for a leachate collection system will be determined during the remedial design phase. The ROD nowhere sets forth the factors that MDEQ will evaluate or the criteria that MDEQ will use to determine whether to require installation of the system. The ROD should set forth those factors and criteria.

27. ROD text, pg. 31, bullet 4 and the discussion that follows: This paragraph and the discussion that follows concerns the applicability of TSCA chemical landfill requirements to this remedial action. U.S. EPA has some concerns about this discussion.

    First, some of the language in this section appears to have been lifted directly from the ROD for OU3. When the ROD for OU3 was signed, the PCB Remediation Wastes regulations were not yet effective, and so U.S. EPA granted a waiver from the bottom liner, hydraulic conditions and leachate collection requirements for a TSCA chemical wastes landfill. Now, however, TSCA provides for a simple procedure by which the Regional Administrator can determine that a proposed remedy for PCB remediation wastes is protective of human health and the environment. These procedures are provided by 40 C.F.R. § 761.61(c). This citation is the correct TSCA chemical-specific ARAR.

The discussion concerning the triggering of TSCA disposal requirements and U.S. EPA waivers of TSCA requirements should be deleted.

It appears later in the ROD, however, that MDEQ wants OU4 to comply with some of TSCA's technical requirements for chemical waste landfills. For example, at page 38, the ROD provides that the newly-constructed berms of the landfill will comply with TSCA's flood protection requirements for chemical waste landfills, 40 C.F.R. § 761.75(b)(4). U.S. EPA assumes that MDEQ is demanding compliance with these TSCA requirements because it has made the determination that such engineering is necessary in order to satisfy the risk- based approach of § 761.61(c). If this interpretation of the ROD is correct, then MDEQ may want to explain the approach more clearly, and identify in a list any and all TSCA chemical landfill requirements that will be need to be satisfied in order to obtain the risk-based approval.

28. ROD text, pg. 34, ¶ 1: To soften the effect of this statement, insert a sentence at the end of this paragraph similar to the following:

    Alternative 2 will, however, achieve significant reduction in the mobility of the contaminants at this operable unit through containment, and this reduction in mobility will endure for as long as the integrity of the cap is maintained.

29. ROD text, pg. 34, ¶ 3: The word "process" should be plural, *i.e.* "processes."

30. ROD text, pg. 35, letter g: The word "include" should be "includes."

31. ROD text, pg. 36, ¶ 3: Please clarify the following sentence:

    The RA for the 12th-St.-OU4 shall insure that exposure to any currently exposed PCBs as provided for in Sections 20121a and 20120b of the NREPA will not be exceeded in the relevant exposure pathways.

    Does MDEQ mean to say that the remedial action will eliminate all exposure pathways, as provided in .....?

32. ROD text, pg. 36, ¶ 1: This language is probably too broad. U.S. EPA need not be "in agreement with the analyses and recommendations" in order to concur on the remedy. Please modify the language to say, like the Declaration, that U.S. EPA agrees that the remedy selected in this ROD is protective of human health and the environment. Alternatively, simply state that U.S. EPA's concurrence is indicated by the signature of the Regional Administrator on the Declaration.

33. ROD text, pg. 36, ¶ 3: The sentence starting with, "The RA for the woodlands" indicates that a cleanup value of 0.12 ppm for PCBs is provided by "applicable sections of the

TSCA." TSCA's cleanup standard is not defined for risk-based disposal of PCB remediation wastes. In fact, if cleanup of the PCB wastes at this operable unit were to follow TSCA's new self-implementing procedures, the cleanup standard would be either ≤1 ppm or ≤25 ppm, depending upon whether the operable unit was located in a high occupancy area or a low occupancy area. See 40 C.F.R. § 761.61(a)(4)(I). If MDEQ wants to mention TSCA here, then you should state that MDEQ's analysis of the ecological risk assessment has resulted in its determination that, to obtain the risk-based approval of U.S. EPA's Regional Administrator under 40 C.F.R. § 761.61(c), cleanup must occur to the 0.12 ppm concentration.

34. ROD text, pg. 37, last ¶: In the first line, delete "a" and substitute "inches" for "inch."

35. ROD text, pg. 38, ¶ 2: With regard to the statement requiring compliance with 40 C.F.R. § 761.75(b)(4), see the discussion above regarding the identification of TSCA landfill requirements as ARARs.

36. ROD text, pg. 38, Long-Term Monitoring, first sentence: monitoring shall be performed "in perpetuity." This requirement seems a bit premature. Why not just state it will be done until the Agencies decide it is no longer needed, and mention that the need to continue such monitoring will be evaluated periodically, as determined by the operations and maintenance component of the RD.

37. ROD text, pg. 39, final ¶: "Any floodplain soils that have the potential to erode into the aquatic environment, shall not exceed... 0.12 ppm." Please see Jim Chapman's memorandum, enclosed with this letter, for U.S. EPA's position on this issue. In Jim's memo, he questions the assumption that these "eroded soils would somehow move intact to sediment deposits." We will need to discuss this matter further.

38. ROD text, pg. 40, ¶ 3: "Surface water samples shall be collected from the River daily and analyzed for total PCB . . . ." Again, this requirement seems excessive and will be very costly. What kind of turn-around does the state expect? This issue is better left for RD and should not be included as part of the ROD.

39. ROD text, pg. 41, first full ¶: This discussion states that "mitigation of the wetlands" will be required. The cost of such mitigation does not appear to have been included in the estimated cost of the remedy. What is the likely cost of such mitigation?

40. ROD text, pg. 41, bottom ¶: The ROD states, *inter alia*, that the "containment system shall be designed, at a minimum, to meet the Michigan Solid Waste Landfill closure regulations . . . and the TSCA, Subpart D of 40 CFR, Section 761." This claim is too broad. Subpart D of Title 40 contains all of TSCA's storage and disposal requirements for PCBs, including the liner and hydraulic conditions requirements of chemical waste landfills. This sentence should be modified to reflect that the containment system will

comply with TSCA's regulations regarding the storage and disposal of PCB remediation wastes.

41. ROD text, pg. 42, ¶ 1: The ROD states that "it is not possible to install a bottom liner." It is possible; it simply is not feasible. Please modify the language.

42. ROD text, pg. 43, ¶ 2: The ROD provides that deed restrictions will prevent the installation of drinking water wells. I understand that the City is planning, after remediation is complete, to use part of this property as a bicycle path/riverside park. Does the City intend to install an in-ground sprinkling system? Would such a system create a potential release of PCB-contaminated groundwater? Should all wells (except for those necessary for monitoring) be prohibited?

43. ROD text, pg. 45, ¶ 1: "The data from the Lake Michigan Mass Balance Study...." This is the first reference to this study. Please provide a full citation to the study, including year completed.

44. ROD text, pg. 47, first partial ¶; pg. 51, final line: As explained above, this ROD requires no TSCA waiver. This discussion should be simplified and revised to be consistent with comment #27, above.

45. ROD text, pg. 48, first bullet: "The waste has been bottom drained and top drained for years....There is, therefore expected to be little or no old leachate down deep and not much shallow leachate...." Earlier, at page 12 of the ROD, it states: "Leachate is perched within the landfill at elevations ranging from 13 to 2 feet higher than groundwater in the surficial aquifer." This inconsistency needs to be addressed.

46. ROD text, pg. 49, first bullet: "Leachate collection is required." The next sentence goes on to say that it is required only if shown during RD to be necessary. Let's stick with "only if leachate exists or may develop" and drop the "required."

47. ROD text, pg. 58, last full ¶: Insert the word "located" before the phrase "near the City of Plainwell."

We appreciate the opportunity to offer our comments on the remedy MDEQ has proposed for the 12th Street Landfill. If you have any questions or need clarification on any of these comments, please call me.

Sincerely,

Beth Reiner

Beth Reiner
Remedial Project Manager

Enclosures

cc (w/o encl): W. Carney
E. Furey
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D. Eagle