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IN THE UNITED STATES DISTRICT COURT  
FOR THE SOUTHERN DISTRICT OF  
EASTERN DIVISION

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KENNETH J. MURPHY

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U.S. DISTRICT COURT  
SOUTHERN DISTRICT OF OHIO  
COLUMBUS

State of Ohio )

Plaintiff, )

v. )

E. I. du Pont de Nemours and )  
Company and PPG Industries, Inc., )

Defendants and Third- )  
Party Plaintiffs, )

v. )

Ellen J. Bowers, as Executrix )  
of the Estate of John N. Bowers, )  
Georgia-Pacific Corporation, and )  
General Electric Company, )

Third-Party Defendants. )

C2 96 - 783

CIVIL ACTION NO.

Judge Graham  
Magistrate Judge King

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U.S. DISTRICT COURT  
SOUTHERN DIST. OHIO  
EAST. DIV. COLUMBUS

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CONSENT DECREE

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IN THE UNITED STATES DISTRICT COURT  
FOR THE SOUTHERN DISTRICT OF OHIO  
EASTERN DIVISION

State of Ohio	)	
	)	
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of the Estate of John N. Bowers,	)	
Georgia-Pacific Corporation,	)	
General Electric Company,	)	
	)	
Third-Party Defendants.	)	

CONSENT DECREE

I. BACKGROUND

A. WHEREAS the State of Ohio, on relation of Attorney General Betty D. Montgomery, has filed a Complaint in this matter pursuant to §§107 and 113 of the Comprehensive Environmental Response, Compensation, and Liability Act ("CERCLA"), 42 U.S.C. §§9607 and 9613, and pursuant to applicable sections of the Ohio Revised Code Chapters 3734 and 6111.

B. The State of Ohio in its Complaint seeks reimbursement for past costs in responding to releases and threatened releases of hazardous substances into the environment from the Bowers Landfill Site located in Pickaway County, Ohio ("Bowers Site" or "Site"), and

a declaratory judgment that the Defendants are liable for all future response costs to be incurred by the State of Ohio pursuant to the provisions of this Consent Decree.

C. Pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, U.S. EPA placed the Site on the National Priorities List, set forth at 40 C.F.R. Part 300, Appendix B, by publication in the Federal Register on September 8, 1983, 48 Fed. Reg. 40658.

D. In response to a release or a substantial threat of a release of a hazardous substance at or from the Site, on January 15, 1985, the Settling Defendants signed an Administrative Order on Consent to perform a Remedial Investigation and Feasibility Study ("RI/FS") for the Site pursuant to 40 C.F.R. §300.430.

E. Settling Defendants completed a Remedial Investigation ("RI") Report on or about August 22, 1988, and Settling Defendants completed a Feasibility Study ("FS") Report on or about February 3, 1989.

F. A final Record of Decision ("ROD") was executed on March 31, 1989. The State has reviewed and commented and has given its concurrence to the ROD. (The ROD has been filed in this Court as Appendix A to the Consent Decree lodged by the United States on August 31, 1993 and approved by order of this Court entered December 14, 1993, in a companion action captioned United States of America v. E.I. du Pont de Nemours and Company and PPG Industries, Inc., et al. Case No.C2-91-742) (hereinafter referred to as the "U.S. EPA Consent Decree"). Notice of the final plan for the Remedial Action was published in accordance with Section 117(b) of CERCLA.

G. The Remedial Action has been completed by U.S. EPA. The First-Year Groundwater Monitoring task has been performed by the Settling Defendants in accordance with the First-Year Groundwater Monitoring Work Plan approved by U.S. EPA and Ohio EPA, attached to the U.S. EPA Consent Decree as Appendix B. The Operation and Maintenance of the Remedial Action will be performed by the Settling Defendants in accordance with this Consent Decree and the "Groundwater Monitoring/Operation and Maintenance Plan" approved by Ohio EPA which is attached hereto as Appendix A.

H. The State has incurred costs in addressing releases of hazardous substances from the Site and expects to incur additional costs.

I. The purpose of this Consent Decree is to provide for: (1) reimbursement of the State of Ohio's Response Costs, as this term is defined in Section IV of this Consent Decree, concerning the Site; (2) reimbursement of Ohio EPA's future Oversight Costs as this term is defined in Section IV of this Consent Decree; and (3) implementation of the Groundwater Monitoring/Operation and Maintenance Plan, which has been approved by Ohio EPA and is attached hereto as Appendix A.

J. Solely for the purposes of Section 113(j) of CERCLA, the Remedial Action selected by the ROD and the Work as defined in Section IV of this Consent Decree to be performed by the Settling Defendants shall constitute response action taken or ordered by the President.

K. The Defendants and Third-Party Defendants that have entered

into this Consent Decree do not admit any liability to the State of Ohio arising out of the transactions or occurrences alleged in the Complaint.

L. The Parties recognize, and the Court by entering this Consent Decree finds, that this Consent Decree has been negotiated by the Parties in good faith, that performance of the requirements of this Consent Decree will facilitate the performance of the Operation and Maintenance Work Plan and will avoid prolonged and costly litigation between the Parties, and that this Consent Decree is fair, reasonable, and in the public interest.

NOW, THEREFORE, it is hereby ORDERED, ADJUDGED, AND DECREED:

**II. JURISDICTION**

1. This Court has jurisdiction over the subject matter herein, and the parties hereto pursuant to 28 U.S.C. §1331 and 42 U.S.C. §§9607 and 9613(b) and this Court's pendent jurisdiction over State claims. Settling Defendants and Third-Party Defendants shall not challenge this Court's jurisdiction to enter and enforce this Consent Decree, and waive service of summons in this action. Venue is proper in this court. Settling Defendants and Third-Party Defendants shall not challenge the terms of this Consent Decree.

**III. PARTIES BOUND**

2. This Consent Decree applies to and is binding upon the State of Ohio and upon Settling Defendants and Third-Party Defendants and their heirs, successors and assigns. Any change in ownership or corporate status of a Settling Defendant or a Third-Party Defendant including, but not limited to, any transfer of assets or real or

personal property shall in no way alter such Settling Defendants' or Third-Party Defendants' responsibilities under this Consent Decree.

3. Settling Defendants shall provide a copy of this Consent Decree to each contractor hired to perform the Work required by this Consent Decree and to each person representing any Settling Defendant with respect to the Site or the Work and shall condition all contracts entered into hereunder upon performance of the Work in conformity with the terms of this Consent Decree. Settling Defendants or their contractors shall provide written notice of the Consent Decree to all subcontractors hired to perform any portion of the Work required by this Consent Decree. Settling Defendants shall nonetheless be responsible for ensuring that their contractors and subcontractors perform the Work contemplated herein in accordance with this Consent Decree. With regard to the activities undertaken pursuant to this Consent Decree, each contractor and subcontractor shall be deemed to be in a contractual relationship with the Settling Defendants within the meaning of Section 107(b)(3) of CERCLA, 42 U.S.C. §9607(b)(3).

**IV. DEFINITIONS**

4. Unless otherwise expressly provided herein, terms used in this Consent Decree 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 Consent Decree or in the appendices attached hereto and incorporated hereunder, the following definitions shall apply:

"Additional Work" shall mean Work not required in the Operation

and Maintenance Work Plan, but required to maintain the effectiveness of the Remedial Action.

"CERCLA" shall mean the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended, 42 U.S.C. §9601 et seq.

"Consent Decree" shall mean this Decree and all appendices attached hereto (listed in Section XXVII). In the event of a conflict between this Decree and any appendix, this Decree shall control.

"Costs" shall mean Response Costs, and Oversight Costs.

"Day" shall mean a calendar day unless expressly stated to be a working day. "Working Day" shall mean a day other than a Saturday, Sunday, or state or federal holiday. In computing any period of time under this Consent Decree, where the last day would fall on a Saturday, Sunday, or federal holiday, the period shall run until the close of business of the next Working Day.

"Ohio Environmental Protection Agency" or "Ohio EPA" shall mean the State Environmental Protection Agency and any successor departments or agencies of the State.

"U.S. EPA" shall mean the United States Environmental Protection Agency and any successor departments or agencies of the United States.

"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, including, but not limited to, any amendments

thereto.

"Operation and Maintenance" or "O & M" shall mean all activities required to maintain the effectiveness of the Remedial Action, including but not limited to groundwater and surface water monitoring, gas monitoring, wetlands maintenance, and inspection and maintenance of the landfill cap, as required under the Operation and Maintenance Work Plan approved by Ohio EPA pursuant to the ROD.

"Operation and Maintenance Work Plan" or "Work Plan" shall mean the document entitled "Groundwater Monitoring/Operation and Maintenance Plan," attached hereto as Appendix A, which has been approved by Ohio EPA and which describes the O&M activities to be undertaken pursuant to this Consent Decree, any documents incorporated by reference and any modifications made to Appendix A in accordance with this Consent Decree. The Operation and Maintenance Work Plan includes by reference: (1) a Health and Safety Plan for field activities which conforms to the applicable Occupational Safety and Health Administration requirements including, but not limited to, 29 C.F.R. § 1910.120; and (2) a Quality Assurance Project Plan ("QAPP") which is not inconsistent with the NCP and applicable guidance documents. The Health and Safety Plan which will be reviewed and commented on by Ohio EPA, and the QAPP, which will be approved by Ohio EPA are/shall be incorporated by reference in this Consent Decree but are not included in Appendix A hereto due to their voluminous nature. The Work Plan, including the Health and Safety Plan and the QAPP, is or shall upon completion be available for review at the information repository for the Site located at the

Pickaway County District Library in Circleville, Ohio, at Ohio EPA's Central District Office, Columbus, Ohio, and at U.S. EPA, Region V, in Chicago, Illinois.

"Oversight Costs" shall mean all costs not inconsistent with the National Contingency Plan, incurred by the State in monitoring and ensuring compliance with the requirements of this Consent Decree, including but not limited to monitoring and ensuring compliance with the Operation and Maintenance Work Plan including any modifications thereto. Such costs shall include, but are not limited to, payroll and other direct costs, indirect and overhead costs, sampling and laboratory costs, travel costs, contractor costs, and all costs of reviewing the Work performed pursuant to this Consent Decree.

"Owner Settlor" or "Owner" shall mean Third-Party Defendant Ellen J. Bowers, as Executrix of the Estate of John N. Bowers, or her successor.

"Paragraph" shall mean a portion of this Consent Decree identified by an arabic numeral or an upper case letter.

"Parties" shall mean the State of Ohio, the Defendants and the Third-Party Defendants.

"Plaintiff" shall mean the State of Ohio.

"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).

"Record of Decision" or "ROD" shall mean the U.S. EPA Record of Decision relating to the Bowers Site signed on March 31, 1989, by the Regional Administrator, U.S. EPA Region V, and all attachments

thereto.

"Remedial Action" shall mean those activities undertaken by U.S. EPA and/or Ohio EPA to implement the remedy as selected in the ROD. For purposes of this Consent Decree, Remedial Action shall not include Operation and Maintenance activities.

"Response Costs" shall mean all direct and indirect costs incurred by the State concerning the Site, which are not inconsistent with the National Contingency Plan and which are (1) incurred by the State prior to the entry of this Consent Decree, or (2) incurred pursuant to this Consent Decree. Response Costs shall include, without limitation, costs incurred by the Ohio Attorney General's Office and the ten percent (10%) share of the costs to complete the Remedial Action incurred by the United States pursuant to the June 1991 "Superfund State Contract Between the Ohio Environmental Protection Agency and the United States Environmental Protection Agency for Remedial Activities at the Bowers Landfill Site". Only for the purposes of this Consent Decree, Response Costs shall not include Oversight Costs. Nothing in this definition or this Consent Decree shall be construed as an admission by the State that oversight costs are not recoverable as costs of removal or remedial action under 42 U.S.C. 9607(a). Nothing in this definition or this Consent Decree shall be construed as an admission by Settling Defendants that oversight costs are recoverable as costs of removal or remedial action under 42 U.S.C. 9607(a).

"Settling Defendants" or "Defendants" shall mean E.I. du Pont de Nemours and Company and PPG Industries, Inc.

"Site" shall mean the Bowers Landfill Superfund Site, encompassing approximately 12 acres, located in rural Pickaway County, Ohio, approximately 2.5 miles north of the City of Circleville, Ohio. The Site is immediately northwest of the intersection of Island Road and Circleville-Florence Chapel Road, on the east side of the Scioto River Valley. The landfill lies within the Scioto River floodplain. Its northwestern and southern-most points abut the Scioto River as depicted generally on the map attached as Appendix C.

"State" shall mean the State of Ohio, including without limitation its agencies, departments, successors and assigns.

"Supervising Contractor" shall mean the principal contractor retained by the Settling Defendants to supervise and direct the performance of the Work under this Consent Decree.

"Third-Party Defendants" or "Settling Third-Party Defendants" shall mean Ellen J. Bowers, as Executrix of the Estate of John N. Bowers, Georgia-Pacific Corporation, and General Electric Company.

"United States" shall mean the United States of America.

"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); and (3) any "hazardous waste" under Ohio Revised Code §3734.01(J) and the rules promulgated thereunder.

"Work" shall mean all activities Settling Defendants are required to perform under this Consent Decree in conjunction with the requirements of the Operation and Maintenance Work Plan (including

any modifications thereto) to maintain the effectiveness of the Remedial Action, except those activities required by Section XXIII (Retention of Records).

V. GENERAL PROVISIONS

5. Objectives of the Parties

The objectives of the Parties in entering into this Consent Decree are to protect public health, welfare and the environment at the Site by the performance of Operation and Maintenance activities, at the Site by the Settling Defendants in accordance with this Consent Decree and the Operation and Maintenance Work Plan and to reimburse the State of Ohio's Oversight Costs and Response Costs.

6. Commitments by Settling Defendants

a. Settling Defendants shall finance and perform the Work, and Additional Work, if any, required pursuant to Paragraph 11 of this Consent Decree, in accordance with this Consent Decree and shall reimburse the State for Oversight Costs as provided in this Consent Decree. Settling Defendants and Third-Party Defendants, excepting the Owner, together shall reimburse the State for Response Costs, as provided in this Consent Decree.

b. Notwithstanding any other provision in this Consent Decree, Settling Defendants do not agree, nor shall they be required by this Consent Decree, to perform any task, in addition to the Work, or Additional Work, if required, which constitutes "corrective action" as that term is used in the ROD. By entering into this Consent Decree, the State of Ohio and the Settling Defendants are admitting neither that the Settling Defendants are liable to perform

a "corrective action" as used in the ROD, nor that the Settling Defendants are not so liable. The Parties will determine that liability in the future, if and when the need arises. The State of Ohio reserves all rights to take any action to require any or all Settling Defendants to perform "corrective action" as that term is used in the ROD.

c. The obligations of Settling Defendants to finance and perform the Work and to reimburse the State for Oversight Costs are joint and several. The obligations of Settling Defendants and Third-Party Defendants, excepting the Owner, to reimburse the State for its Response Costs are joint and several. In the event of the insolvency or other failure of one of the Settling Defendants to perform the Work required by this Consent Decree or to pay the State's Oversight Costs, the remaining Settling Defendant shall complete the Work and pay such costs. In the event of the insolvency or other failure of one of the Settling Defendants or Third-Party Defendants, excepting the Owner, to pay the State's Response Costs, the remaining Settling Defendants or Third-Party Defendants, excepting the Owner, shall pay such Response Costs.

7. Compliance With Applicable Law

All activities undertaken by Settling Defendants pursuant to this Consent Decree shall be performed in accordance with the requirements of all applicable federal and state laws and regulations. Settling Defendants also must comply with all applicable or relevant and appropriate requirements of all federal and state environmental laws as set forth in the ROD and the

Operation and Maintenance Work Plan.

8. Permits

a. As provided in Section 121(e) of CERCLA and Section 300.5 of the NCP, no permit shall be required for any portion of the Work conducted entirely on-site. Where any portion of the Work requires a federal or state permit or approval, Settling Defendants shall submit timely and complete applications and take all other actions necessary to obtain all such permits or approvals.

b. Delays in performance of Work or Additional Work covered by this Consent Decree due to the time taken for government review shall not be considered a violation of this Decree or counted toward the running of time limits under this Decree.

c. This Consent Decree is not, and shall not be construed to be, a permit issued pursuant to any federal or state statute or regulation.

9. Notice of Obligations to Successors-in-Title

a. Within 15 days after the entry of this Consent Decree, the Owner shall record a certified copy of this Consent Decree with the Recorder's Office, Pickaway County, State of Ohio. Thereafter, each deed, title, or other instrument conveying an interest in the property included in the Site shall contain a notice stating that the property is subject to this Consent Decree and any lien retained by the State, and shall reference the recorded location of the Consent Decree and any restrictions applicable to the property under this Consent Decree.

b. The obligations of the Owner with respect to the

provision of access under Section VIII (Access) and compliance with the deed restrictions set forth in Appendix D, shall be binding upon such Owner and any and all persons who subsequently acquire any such interest or portion thereof (hereinafter "Successors-in-Title"). Within 15 days after the entry of this Consent Decree, the Owner shall record at the Recorder's Office, Pickaway County, a notice of obligation to provide access under Section VIII (Access) and related covenants, and a fully executed copy of the deed restrictions set forth in Appendix D hereto. Each subsequent instrument conveying an interest to any such property included in the Site shall reference the recorded location of such notice, deed restrictions, and covenants applicable to the property.

c. The Owner and any Successor-in-Title shall, at least 30 days prior to the conveyance of any such interest, give written notice of this Consent Decree to the grantee and written notice to Ohio EPA and U.S. EPA of the proposed conveyance, including the name and address of the grantee, and the date on which notice of the Consent Decree was given to the grantee. In the event of any such conveyance, the Settling Defendants' and Third-Party Defendants' obligations under this Consent Decree, including such obligations as are set forth in Section VIII to provide or secure access, shall continue to be met by the Settling Defendants and Third-Party Defendants. In no event shall the conveyance of an interest in property that includes, or is a portion of, the Site release or otherwise affect the liability of the Settling Defendants and Third-Party Defendants to comply with the Consent Decree.

VI. PERFORMANCE OF THE WORK BY SETTling DEFENDANTS

10. Selection of Supervising Contractor.

All aspects of the Work to be performed by Settling Defendants pursuant to Sections VI (Performance of the Work by Settling Defendants) and VII (Quality Assurance, Sampling and Data Analysis) of this Consent Decree shall be under the direction and supervision of a qualified engineer, geologist, architect, or other individual, with expertise in hazardous waste site investigations and remediation. The Supervising Contractor is Cummings Riter Consultants, Inc. If at any time Settling Defendants propose to change the Supervising Contractor or Subcontractor, Settling Defendants shall give such notice to Ohio EPA at a minimum of five (5) days prior to initiating such change.

11. Additional Work.

a. Should Ohio EPA determine that Additional Work is necessary, Ohio EPA may notify Settling Defendants of the need for such Additional Work. Within twenty (20) working days of receipt of such notification from Ohio EPA or as otherwise agreed by the Site Coordinator, Settling Defendants shall prepare and submit to Ohio EPA for review and approval a new or revised document incorporating the Additional Work. If Settling Defendants elect not to perform such proposed Additional Work, within fourteen (14) calendar days from receipt of notification from Ohio EPA of the need for Additional Work, Settling Defendants shall notify Ohio EPA in writing of this election, and Settling Defendants shall institute dispute resolution

mechanisms as set forth in Section XVII. Notwithstanding the provisions of this paragraph, Work or Additional Work needed to address emergency situations shall be governed by Paragraph 32 of this Consent Decree.

b. Should Settling Defendants determine that Additional Work is necessary, Settling Defendants shall, prior to performance of the Additional Work, submit to Ohio EPA for approval their plan for performing such Additional Work.

c. In the event that Additional Work is necessary for any task described in this Consent Decree, and should Settling Defendants elect to perform such Additional Work or be directed to perform such Additional Work by this Court, the deadline for completing such task(s) shall be extended by the amount of time required to perform the Additional Work required, including the period of time required to plan and/or obtain approval from the Ohio EPA for the performance of such work.

**VII. QUALITY ASSURANCE, SAMPLING, and DATA ANALYSIS**

12. Settling Defendants shall use quality assurance, quality control, and chain of custody procedures for the Operation and Maintenance samples in accordance with the applicable provisions of guidance documents which are either listed in Appendix B or are referenced in the Operation and Maintenance Work Plan and QAPP, and any subsequent amendments to such guidance documents upon notification by Ohio EPA to Settling Defendants of such amendment. Amended guidelines shall apply only to procedures conducted after such notification.

13. If relevant to the proceeding, the Parties agree that validated sampling data generated in accordance with the QAPP, incorporated by reference in Appendix A hereto and approved by Ohio EPA shall be admissible as evidence, without objection, in any proceeding under this Decree.

14. Settling Defendants shall ensure that Ohio EPA personnel and its authorized representatives are allowed access at reasonable times to all laboratories utilized by Settling Defendants in carrying out this Consent Decree. Settling Defendants shall ensure that the laboratories they utilize for the analysis of samples taken pursuant to this Decree perform all analyses according to accepted U.S. EPA methods. Accepted U.S. EPA methods consist of those methods which are documented in the QAPP and any amendments made thereto during the course of the performance of this Consent Decree. Settling Defendants shall ensure that all laboratories which they use for analysis of samples taken pursuant to this Consent Decree participate in a U.S. EPA or U.S. EPA-equivalent QA/QC program.

15. Upon request, Settling Defendants shall allow split or duplicate samples to be taken by Ohio EPA, U.S. EPA, and/or their authorized representatives. Settling Defendants shall notify Ohio EPA and U.S. EPA not less than twenty-eight (28) days in advance of any sample collection activity unless shorter notice is agreed to by Ohio EPA. In addition, Ohio EPA and U.S. EPA shall have the right to take any additional samples that Ohio EPA or U.S. EPA deems necessary. Upon request, Ohio EPA and U.S. EPA shall allow the Settling Defendants to take split or duplicate samples of any samples

taken as part of the oversight of the Settling Defendant's performance of the Work provided that such split or duplicate sampling does not delay sampling by Ohio EPA to a degree to which Ohio EPA does not approve. The Ohio EPA states its intention, in the normal course, to notify the Supervising Contractor not less than fourteen days before collecting any samples, provided that failure to give prior notice will not invalidate or limit use of samples by Ohio EPA in any proceeding or subject Ohio EPA to sanction under this Consent Decree or otherwise; and provided that despite the stated intention, Ohio EPA retains all rights-of-entry and other authorities and rights set forth in R.C. §§3734.07 and 3734.20 and referred to in paragraph 18 of this Consent Decree.

16. In addition to reporting requirements in the Work Plan, Settling Defendants shall submit to Ohio EPA two (2) copies of the results of all sampling and/or tests or other data, reports, analyses obtained or generated by or on behalf of Settling Defendants outside the requirements of the Work Plan with respect to the Site and/or the performance of this Consent Decree, unless Ohio EPA agrees otherwise.

17. Notwithstanding any provision of this Consent Decree, the State hereby retains all of its information gathering and inspection authorities and rights, including enforcement actions related thereto, under CERCLA, RCRA and any other applicable statutes or regulations.

#### **VIII. ACCESS**

18. Commencing upon the date of filing this Consent Decree, Owner agrees to permit Settling Defendants, and their representatives

and contractors, access at all reasonable times to the Site and to any other property within the control of Owner to which access is required for the purposes of performing the activities required to comply with this Consent Decree. Commencing upon the date of filing this Consent Decree, Owner also agrees to permit the State and the United States, and their respective representatives, including Ohio EPA , U.S. EPA, and their contractors, access at all reasonable times to the Site and to any other property to which access is required for the performance of this Consent Decree for the purposes of conducting any activity related to this Consent Decree including, but not limited to:

- a. Monitoring the Work;
- b. Verifying any data or information submitted to Ohio and/or the United States;
- c. Conducting investigations relating to contamination at or near the Site;
- d. Obtaining samples;
- e. Assessing the need for, planning, or implementing additional response actions at or near the Site;
- f. Inspecting and copying records, operating logs, contracts, or other documents maintained or generated by Settling Defendants or their agents, consistent with Section XXIII; and
- g. Assessing compliance with this Consent Decree.

Settling Defendants and Third-Party Defendants also are bound by this Paragraph to the extent that they control access to the Site or any other property to which access is required for the performance of

this Consent Decree.

19. To the extent that the Site or any other property to which access is required for the performance of this Consent Decree is owned or controlled by persons other than Settling Defendants or Owner, Settling Defendants or Owner shall use best efforts to secure from such persons access for Settling Defendants, as well as for the State and the United States and their representatives, including, but not limited to, their contractors, as necessary to effectuate this Consent Decree. For purposes of this Paragraph "best efforts" includes the payment of reasonable sums of money in consideration of access. If any access required to complete the Work is not obtained within 45 days of the date of filing this Consent Decree, or within 45 days of the date Ohio EPA notifies the Settling Defendants in writing that additional access beyond that previously secured is necessary, Settling Defendants shall promptly notify the State, and shall include in that notification a summary of the steps Settling Defendants have taken to attempt to obtain access. The State may, as it deems appropriate, assist Settling Defendants or Owner in obtaining access. Settling Defendants shall reimburse the State in accordance with the procedures in Section XIII (Reimbursement), for all costs incurred by the State in obtaining access. Owner shall not be entitled to any compensation by other parties to this Consent Decree for permitting access to the Site, and to any other property controlled by Owner to which access is required for the performance of this Consent Decree.

20. Notwithstanding any provision of this Consent Decree, the

State retains all of its access authorities and rights, including enforcement authorities related thereto, under CERCLA, RCRA and any other applicable statute or regulations.

IX. REPORTING REQUIREMENTS

21. Settling Defendants shall submit to Ohio EPA Gas Monitoring Documentation, Inspection Documentation, Maintenance Activity Documentation, and Site Safety Documentation as required by the Work Plan.

22. Reports submitted by Settling Defendants shall describe to Ohio EPA any change from the schedules in the approved Operation and Maintenance Work Plan for the performance of any activity, including but not limited to, data collection and implementation of work plans.

23. Upon the occurrence of any event during performance of the Work that Settling Defendants are required to report pursuant to Section 103 of CERCLA or Section 304 of the Emergency Planning and Community Right-to-Know Act (EPCRA), Settling Defendants shall within 24 hours of the onset of such event orally notify (1) the Ohio EPA Site Coordinator, or the supervisor of the Ohio EPA Site Coordinator if the Site Coordinator is not available, and (2) the Emergency Response Unit, Ohio Environmental Protection Agency. Notification of the Ohio EPA Site Coordinator or his or her supervisor is in addition to the reporting required by CERCLA Section 103 or EPCRA Section 304.

24. Within 20 days of the onset of such an event, Settling Defendants shall furnish to Ohio EPA and U.S. EPA a written report, signed by the Settling Defendant's Supervising Contractor, setting forth the events which occurred and the measures taken, and to be

taken, in response thereto. Within 30 days of the conclusion of such an event, Settling Defendants shall submit a report setting forth all actions taken in response thereto.

25. Settling Defendants shall submit 2 (two) copies of all plans, reports, and data required by the Operation and Maintenance Work Plan (Appendix A), or any other approved plans, to Ohio EPA in accordance with the schedules set forth in such plans. Settling Defendants simultaneously shall submit 2 (two) copies of all such plans, reports and data to U.S. EPA.

26. All reports and other documents submitted by Settling Defendants to Ohio EPA and U.S. EPA which purport to document Settling Defendants' compliance with the terms of this Consent Decree shall be signed by an authorized representative of the Settling Defendants.

x. PROJECT/ SITE COORDINATORS

27. The names, address and telephone number of Settling Defendants' Supervising Contractor's Project Coordinator and Alternate Project Coordinator are Patrick F. O'Hara and Douglas E. Spicuzza, respectively, both of Cummings Riter Consultants, Inc., 339 Haymaker Road, Parkway Building, Suite 201, Monroeville, Pennsylvania 15146, (412) 373-5240. If a Supervising Contractor's Project Coordinator or Alternate Project Coordinator initially designated is changed, the identity of the successor will be given to the other parties at least 5 working days before the changes occur, unless impracticable, but in no event later than the actual day the change is made. The Settling Defendants' Supervising Contractor's Project

Coordinator shall have the technical expertise sufficient to adequately oversee all aspects of the Work and carry out the terms of this Consent Decree. Settling Defendants shall notify Ohio EPA in writing of any subsequent Coordinator's name, title and qualifications. The Settling Defendants' Supervising Contractor's Project Coordinator shall not be an attorney for any of the Settling Defendants in this matter. He or she may assign other representatives, including other contractors, to serve as a Site representative for oversight of performance of daily operations during the Work.

28. The State may designate representatives, including, but not limited to Ohio EPA employees, and State contractors and consultants, to observe and monitor the progress of any activity undertaken pursuant to this Consent Decree. In addition, Ohio EPA's Site Coordinator shall have authority, consistent with the National Contingency Plan, to halt any Work required by this Consent Decree and to take any necessary response action when s/he determines that conditions at the Site constitute an emergency situation or may present an immediate threat to public health or welfare or the environment due to release or threatened release of Waste Material.

29. Ohio EPA's Site Coordinator, U.S. EPA's Project Coordinator, and the Settling Defendants' Supervising Contractor's Project Coordinator will meet at the earliest mutually agreeable date, if a meeting is requested by any of the said coordinators.

XI. ASSURANCE OF ABILITY TO COMPLETE WORK

30. Within 30 days of entry of this Consent Decree, Settling

Defendants shall establish and maintain financial security in the amount of \$1,975,369 in one of the following forms:

(a) A surety bond guaranteeing performance of the Work;

(b) One or more irrevocable letters of credit;

(c) A trust fund;

(d) 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 the Settling Defendants; or

(e) A demonstration that one or more of the Settling Defendants satisfies the requirements of O.A.C. §3745-55-45(F).

31. If Settling Defendants seek to demonstrate the ability to complete the Work through a guarantee by a third party pursuant to Paragraph 30(d) of this Consent Decree, Settling Defendants shall demonstrate that the guarantor satisfies the requirements of O.A.C. §3745-55-45(F). If Settling Defendants seek to demonstrate their ability to complete the Work by means of the financial test or the corporate guarantee pursuant to Paragraph 30(d) or (e), they shall resubmit sworn statements conveying the information required by O.A.C. §3745-55-45(F) annually, in accordance with the following provisions. Regardless of the form of financial security chosen by Settling Defendants, during the period in which Settling Defendants are performing the Work under this Consent Decree, and within ninety days after the close of their respective fiscal years, Settling Defendants shall estimate the total cost of the Work that remains to be done. If the value of the financial security established by

Settling Defendants is greater than the present value of the total estimated cost of the Work that remains to be done, the Settling Defendants may submit a written request to the Director for a reduction in the amount of financial security which has to be maintained and, for a trust, a release of the amount in excess of the current total estimated cost of the remaining Work. If the value of the financial security established by Settling Defendants is less than the total amount of the present value of the total estimated cost of the Work that remains to be done, the Settling Defendants shall, within ninety days after the close of their respective fiscal years, increase the amount of financial security which has to be maintained until it equals the present value of the total estimated cost of the remaining Work. Within ten days after entry of this Consent Decree, each Settling Defendant shall notify Ohio EPA in writing of date on which the fiscal year of the respective Settling Defendant closes. If the fiscal year closing date changes, the Settling Defendant shall notify the Ohio EPA of the change within thirty days after such change is made.

Instruments used by the Settling Defendants as financial assurance to comply with Paragraphs 30 and 31 of this Consent Decree shall conform to the requirements of Section 3745-55-51 of the Ohio Administrative Code, except that such instruments shall make reference to performing the Work under this Consent Decree in substitution of references to closure and post closure.

In the event that Ohio EPA determines at any time that the financial assurances provided pursuant to Paragraph 30(a), (b), (c),

(d), or (e) are inadequate, Settling Defendants shall, within 30 days of receipt of notice of Ohio EPA's determination, obtain and present to Ohio EPA for approval one of the forms of financial assurance listed in Paragraph 30 of this Consent Decree. Settling Defendants' failure to demonstrate financial ability to complete the Work shall not excuse performance of any activities required under this Consent Decree.

**XII. EMERGENCY RESPONSE**

32. In the event of any action or occurrence during the performance of the Work at the Site which causes or threatens a release of Waste Material from the Site that constitutes an emergency situation which presents an immediate threat to public health or welfare or the environment, Settling Defendants shall, subject to Paragraph 33, immediately take all appropriate action to prevent, abate, or minimize such release or threat of release, and shall immediately notify the Ohio EPA Emergency Response Unit, in Columbus, Ohio, and the Ohio EPA Site Coordinator, or, if the Site Coordinator is unavailable, Settling Defendants shall notify the supervisor of the Ohio EPA Site Coordinator. Settling Defendants also shall provide such immediate notification to the U.S. EPA Project Coordinator, or, if unavailable, the Alternate Project Coordinator. Settling Defendants shall take such actions in consultation with the Ohio EPA Site Coordinator or other available authorized Ohio EPA officer, and in accordance with all applicable provisions of the Health and Safety Plan and any other applicable plans or documents developed pursuant to the Operation and Maintenance Work Plan. In

the event that Settling Defendants fail to take appropriate response action as required by this Section, and Ohio EPA takes such action instead, Settling Defendants shall reimburse Ohio EPA all costs of the response action not inconsistent with the NCP pursuant to Section XIII (Reimbursement).

33. Nothing in the preceding Paragraph or in this Consent Decree shall be deemed to limit any authority of the State to take, direct, or order all appropriate action or to seek an order from the Court to protect human health and the environment or to prevent, abate, respond to, or minimize an actual or threatened release of Waste Material on, at, or from the Site.

**XIII. REIMBURSEMENT**

34. Settling Defendants and Third-Party Defendants, excepting the Owner, shall:

a. Within 60 days of the entry of this Consent Decree, pay to the State of Ohio \$215,317.12 in settlement of all Response Costs incurred by the State through December 31, 1994, other than the State of Ohio's 10% share of the Remedial Action Costs incurred by U.S. EPA. Payment shall be made in accordance with Paragraph 35 and/or instructions to be provided by the State of Ohio to Settling Defendants upon execution of the Consent Decree;

b. Within 60 days of receipt of an Ohio EPA billing statement and cost itemization prepared in accordance with subparagraph 34.e, pay to the State in the manner directed above, additional Response Costs incurred for the period from January 1, 1995 through the date of entry of this Consent Decree;

c. Within 60 days of the entry of this Consent Decree, pay to the State of Ohio its 10% share of the Remedial Action Costs incurred by U.S. EPA, which 10% share is in the amount of \$393,429.22;

d. Within 60 days of receipt of an Ohio EPA billing statement and cost itemization prepared in accordance with subparagraph 34.e, Settling Defendants shall pay the State its Oversight Costs incurred after the entry of this Decree. Such payment is in addition to the payments required under Subparagraphs a, b and c above, and will occur on an annual, or other periodic basis.

e. Ohio EPA billing statements and cost itemizations will be prepared in accordance with the invoice requirements of Ohio Revised Code Section 125.01(B) and will contain the following information, unless Ohio EPA billing procedures are instituted which do not allow for the generation of such information: name of employee; brief and general description of task performed; hours worked, direct and indirect charges, and overtime rates.

35. All payments under this Section shall be made by corporate check payable to "Treasurer, State of Ohio", and mailed to Matt Sanders, or his successor at 30 East Broad Street, 25th floor, Columbus, Ohio 43215-3428, and shall reference OEPA Number 165-0106 and OAG Case Number E1890032. Copies of check(s) paid pursuant to this Section, and any accompanying transmittal letter(s), shall be sent to Edith Long, Fiscal Officer for Ohio EPA, Division of Emergency and Remedial Response, 1800 WaterMark Drive, P.O. Box 1949,

Columbus, Ohio 43266 as provided in Section XXIV (Notices and Submissions).

36. Settling Defendants shall have a limited opportunity to challenge the Costs billed pursuant to Subparagraphs 34 b and d, to the extent the State has included Costs not incurred by the State in connection with the Site or has otherwise made an accounting error. Such objection shall be made in writing within 30 days of receipt of the bill and must be sent to the State pursuant to Section XXIV (Notices and Submissions), or any such objection shall be waived. Any such objection shall specifically identify the contested Costs and the basis for objection. In the event of an objection, Settling Defendants shall within the 60 day period pay all uncontested Costs to the State in the manner described in Paragraph 35. Simultaneously, such Settling Defendants shall establish an interest bearing escrow account in a federally-insured bank duly chartered in the State of Ohio and remit to that escrow account funds equivalent to the amount of the contested Costs. Settling Defendants shall send to the State, as provided in Section XXIV (Notices and Submissions), a copy of the transmittal letter and check paying the uncontested Costs, and a copy of the correspondence that establishes and funds the escrow account, including, but not limited to, information containing the identity of the bank and bank account under which the escrow account is established, as well as a bank statement showing the initial balance of the escrow account. Simultaneously with establishment of the escrow account, Settling Defendants shall initiate the Dispute Resolution procedures in Section XVII (Dispute

Resolution). If the State prevails in the dispute, within 5 days of the resolution of the dispute, Settling Defendants shall pay the sums due (with accrued interest) to the State in the manner described in Paragraph 35. If the Settling Defendants prevail concerning any aspect of the contested costs, such parties shall pay that portion of the costs (plus associated accrued interest) for which it did not prevail to the State in the manner described in Paragraph 35; Settling Defendants shall be disbursed any balance of the escrow account. The dispute resolution procedures set forth in this Paragraph in conjunction with the procedures set forth in Section XVII (Dispute Resolution) shall be the exclusive mechanisms for resolving disputes regarding the obligations under this Decree to reimburse the State for its Costs.

37. In the event that the payments required by Paragraphs 34.a and c are not made within 60 days of the effective date of this Consent Decree or the payments required by Paragraphs 34.b and d are not made within 60 days of the Settling Defendants' receipt of an OEPA billing statement and cost itemization, the parties required to make such payments shall pay interest on the unpaid balance at the rate established pursuant to Section 131.02 of the Ohio Revised Code. The interest on the unpaid balance of payments required by Paragraphs 34.a and c shall begin to accrue on the 61st day following the effective date of this Consent Decree and interest on the unpaid balance of payments required by Paragraphs 34.b and d shall begin to accrue on the 61st day following the Settling Defendants' receipt of an OEPA billing statement and cost itemization. Interest on any

other Response Costs shall begin to accrue on the date payment of the Response Costs are due in accordance with the applicable provisions of the Consent Decree, or, if there are no applicable provisions specifying a due date, on the 61st day following Settling Defendants' receipt of the OEPA billing statement and cost itemization. Interest shall accrue at the rate specified through the date of the State's receipt of the required payment. Payments of interest made under this Paragraph shall be in addition to such other remedies or sanctions available to Plaintiffs by virtue of the failure by any party to make timely payments under this Section.

**XIV. INDEMNIFICATION AND INSURANCE**

38. The State does not assume any liability by entering into this Consent Decree or by virtue of any designation of Settling Defendants as Ohio EPA's authorized representatives under Section 104(e) of CERCLA. Settling Defendants shall indemnify, save and hold harmless the State and its officials, agents, employees, contractors, subcontractors, or representatives for or from any and all claims or causes of action arising from, or on account of, acts or omissions of Settling Defendants, 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 Consent Decree, including, but not limited to, any claims arising from any designation of Settling Defendants as EPA's authorized representatives under Section 104(e) of CERCLA. Further, the Settling Defendants agree to pay the State all costs it incurs 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 acts or omissions of Settling Defendants, 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 Consent Decree. The State shall not be held out as a party to any contract entered into by or on behalf of Settling Defendants in carrying out activities pursuant to this Consent Decree. Neither the Settling Defendants, nor any such contractor shall be considered an agent of the State.

39. Settling Defendants waive all claims against the State for damages or reimbursement or for set-off of any payments made or to be made to the State, arising from or on account of any contract, agreement, or arrangement between any one or more of Settling Defendants and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays. In addition, Settling Defendants shall indemnify and hold harmless 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 Settling Defendants and any person for performance of Work on or relating to the Site, including, but not limited to, claims on account of construction delays.

40. No later than 15 days before commencing any on-site Work, Settling Defendants shall secure, and shall maintain comprehensive general liability insurance and automobile insurance with limits of

\$2 million dollars and \$1 million dollars, respectively, combined single limit, naming as additional insured the State or Ohio EPA. In addition, for the duration of this Consent Decree, Settling Defendants 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 Settling Defendants in furtherance of this Consent Decree. Prior to commencement of the Work under this Consent Decree, Settling Defendants shall provide to Ohio EPA certificates of such insurance and a copy of each insurance policy. Settling Defendants shall resubmit such certificates and copies of policies each year on the anniversary of the effective date of this Consent Decree. If Settling Defendants demonstrate by evidence satisfactory to Ohio EPA that any contractor or subcontractor maintains insurance equivalent to that described above, or insurance covering the same risks but in a lesser amount, then, with respect to that contractor or subcontractor, Settling Defendants need provide only that portion of the insurance described above which is not maintained by the contractor or subcontractor. It is agreed that the required insurance may be supplied by an endorsement to an existing policy, including, without limitation, a blanket policy.

**XV. DELAYS CAUSED BY FLOODING**

41. In the event that any site activity, or other requirement of this Consent Decree dependent upon a site activity, is delayed or may be delayed because of flooding or the residual effects of flooding on the Site, Settling Defendants shall notify the Ohio EPA

Site Coordinator within five (5) business days of the discovery of such delay or potential delay. The notice shall specify the field activity or other Consent Decree requirement that is being delayed or potentially delayed and estimate the anticipated duration of the delay. If Ohio concurs with the estimate, the time for the performance of the site activity or other requirement which is the subject of said notice shall be extended for a period equal to the duration of the delay caused by flooding or the residual effects of flooding on the site. Ohio EPA will not unreasonably withhold concurrence.

**XVI. POTENTIAL FORCE MAJEURE**

42. If any event occurs which causes or may cause a delay of any requirement of this Consent Decree applicable to Settling Defendants, Settling Defendants shall orally notify the Ohio EPA Site Coordinator or, in her or his absence, the Ohio EPA Site Coordinator's Supervisor, within 96 hours of when Settling Defendants first knew or should have known that the event might cause a delay. Settling Defendants also shall provide this oral notification to the U.S. EPA Project Coordinator. Within five (5) days after this oral notification, Settling Defendants shall provide in writing to Ohio EPA, with a copy to U.S. EPA, an explanation and description detailing the anticipated length of the delay, the precise cause or causes of delay, the measures taken and to be taken by Defendant to prevent or minimize the delay and the timetable by which those measures will be implemented. Defendant will adopt all reasonable measures to avoid or minimize any such delay.

43. In any action by the State of Ohio to enforce any of the provisions of this Consent Decree, Settling Defendants may raise at that time a question of whether it is entitled to a defense that its conduct was caused by reasons entirely beyond its control such as, by way of example and not limitations, acts of God, strikes, acts of war or civil disturbances, or orders of any regulatory agency. While the State of Ohio does not agree that such a defense exists, it is, however, hereby agreed upon by the parties that it is premature at this time to raise and adjudicate the existence of such a defense and that the appropriate point at which to adjudicate the existence of such a defense is the time that an enforcement action, if any, is commenced by Ohio. At that time the burden of proving that any delay was or will be caused by circumstances entirely beyond the control of Settling Defendants shall rest with Settling Defendants.

Unanticipated or increased costs associated with the implementation of any action required by this Consent Decree, or changed financial circumstances shall not constitute circumstances entirely beyond the control of Settling Defendants, or serve as a basis for an extension of time under this Consent Decree.

44. Failure by Settling Defendants to comply with the notice requirements of Paragraph 42 shall render this Section void and of no force and effect as to the particular incident involved and shall constitute a waiver of Settling Defendants' right to request an extension of its obligations under this Consent Decree based on such incident. Acceptance of this Consent Decree without a force majeure clause as to the State of Ohio does not constitute a waiver by

Defendant of any rights or defenses it may have under applicable law.

XVII. DISPUTE RESOLUTION

45. Unless otherwise expressly provided for in this Consent Decree, the dispute resolution procedures of this Section shall be the exclusive mechanism to resolve disputes arising under or with respect to this Consent Decree. However, the procedures set forth in this Section shall not apply to actions by the State to enforce obligations of Settling Defendants if Settling Defendants have not availed themselves of the opportunity to dispute the said obligation in accordance with this Section.

46. The Coordinators shall, whenever possible, operate by consensus, and in the event that there is a disapproval of any report or disagreement about the conduct of the Work performed under this Consent Decree or Work Plan, or modified or additional work or schedules required under this Consent Decree, the coordinators shall have seven (7) days to negotiate in good faith in an attempt to resolve the differences.

47. In the event that the Coordinators are unable to reach consensus on the disapproval or disagreement in seven (7) days, then each Coordinator shall reduce his/her position to written form within seven (7) days of the end of the good faith negotiations referenced above. The written Statements of Position on the matter in dispute shall include but not be limited to, any factual data, analysis or opinion supporting that position and any supporting documentation relied upon by Settling Defendants. Those written statements shall be immediately exchanged by the Coordinators.

48. Following the exchange of the written Statements of Positions, the parties shall have an additional seven (7) days to resolve their differences. If Ohio EPA concurs with the position of the Settling Defendants, Ohio EPA shall, when necessary, petition this Court for modification of the Consent Decree to include necessary extensions of time or variances of required work. If Ohio EPA does not concur with the position of the Settling Defendants, Ohio EPA will resolve the dispute based upon and consistent with the Consent Decree, the Work Plan, and State Law, and the regulations promulgated thereunder, the National Contingency Plan, 40 CFR Part 300 and any other applicable state or federal law. Nothing in this Consent Decree shall be construed to allow any dispute by Settling Defendants regarding the validity of the ROD's provisions.

49. The pendency of dispute resolution set forth in this Section shall not affect the time period for completion of Work to be performed under this Consent Decree, except that upon mutual agreement of the parties, any time may be extended as appropriate under the circumstances. Such agreement will not be unreasonably withheld by Ohio EPA. Elements of Work not affected by the dispute will be completed in accordance with the schedules contained in the Operation and Maintenance Work Plan.

50. If Settling Defendants or Ohio EPA do not agree on a resolution of the dispute within twenty-one (21) days, either party may institute an action in this Court to resolve the dispute under this Consent Decree. In this Court proceeding, Settling Defendants shall have the burden of demonstrating by a preponderance of the

evidence that the decision by Ohio EPA is unlawful or unreasonable.

51. If either Ohio EPA or Settling Defendants believe that a dispute is not a good faith dispute, or that a delay would pose or increase a threat of harm to the public or the environment, either party may petition the Court for relief without following the dispute resolution procedures of Paragraphs 45 through 48.

52. Within thirty (30) days of resolution of any dispute, Settling Defendants shall incorporate the resolution and final determination into the Operation and Maintenance Work Plan, schedule or procedures and proceed to implement this Consent Decree according to the amended Work Plan, schedule or procedures.

53. In any dispute subject to dispute resolution, the parties may, by written agreement, modify the procedures of Paragraphs 45 through 53 above.

**XVIII. STIPULATED PENALTIES**

54. In the event the Settling Defendants fail to meet any of the requirements of this Consent Decree, the Settling Defendants shall be immediately liable for and shall pay to the State the following stipulated penalties for each day of violation of each requirement:

- a) For each day Settling Defendants are late in submitting the reports required pursuant to the Operation and Maintenance Work Plan:

- \$250.00 for each day up to and including 10 days;
  - \$500.00 for each day from 11 through 30 days;
  - \$1,000.00 for each day from 31 days.

Any payment required under this paragraph shall be paid by corporate check, payable to the Treasurer of the State of Ohio, sent

to: Matt Sanders, Administrative Assistant, or his successor at the Ohio Attorney General's Office, 30 East Broad Street, 25th Floor, Columbus, Ohio 43215-3428. All stipulated penalties due under this Section shall be paid within seven (7) days of the date of violation.

55. This Decree in no way affects, alters or diminishes the right of the State to pursue further enforcement action and/or penalties for violation of this Order or for future violations. The payment of penalties shall not alter in any way Settling Defendants' obligation to complete performance of the Work required under this Consent Decree.

**XIX. COVENANT NOT TO SUE BY PLAINTIFF**

56. In consideration of the actions that will be performed and the payments that will be made by the Settling Defendants and Third-Party Defendants under the terms of this Consent Decree, and except as specifically provided in Paragraph 57 of this Decree, the State covenants not to sue or to take administrative action against Settling Defendants and Third-Party Defendants for recovery of any Costs related to the Site which were incurred by the State prior to December 31, 1994. This covenant not to sue, as to any past Response Costs incurred on or after December 31, 1994, shall be effective as to each such Response Cost upon Ohio EPA's receipt of the corresponding payment of that Response Cost made according to Subparagraph 34 b. This covenant not to sue, as to Oversight Costs, shall be effective as to each incremental Oversight Cost upon receipt by Ohio EPA of each corresponding payment of Oversight Costs made according to subparagraph 34.d. This covenant not to sue extends only

to the Settling Defendants and Third-Party Defendants and does not extend to any other person. This covenant not to sue does not apply to violations of this Consent Decree.

XX. GENERAL RESERVATIONS OF RIGHTS.

57. a. The covenant not to sue set forth above does not pertain to any matters other than those expressly specified in Paragraph 56. The State reserves, and this Consent Decree is without prejudice to, all rights against Settling Defendants and Third-Party Defendants with respect to all other matters, including but not limited to:

- (1) claims based on a failure by Settling Defendants and Third-Party Defendants to meet a requirement of this Consent Decree;
- (2) liability arising from the past, present, or future disposal, release, or threat of release of Waste Materials outside of the Site;
- (3) liability for damages for injury to, destruction of, or loss of natural resources;
- (4) liability for response costs that have been or may be incurred by the State of Ohio as a natural resources trustee;
- (5) criminal liability;
- (6) liability for violations of federal or state law;
- (7) liability for any corrective action, as that term is used in Section 10.1 of the ROD, determined by Ohio EPA to be necessary to address any groundwater contamination from the Site, based on groundwater monitoring conducted in accordance with the remedy selected in the ROD;
- (8) liability for any response actions taken or ordered, or response or oversight costs incurred, by the State following December 31, 1994 other than the Response Costs and Oversight Costs provided for in this Consent Decree; and

(9) liability for work beyond the scope of the Consent Decree.

b. Nothing herein shall in any way limit or restrict the response and enforcement authority of the State to initiate appropriate action, either judicial or administrative, under Sections 107, 121, and 310 of CERCLA, 42 U.S.C. §§9607, 9621 and 9659, or any other provision of State or Federal law, against any person or entity not a Party to this Consent Decree. Any claims or defenses which the Plaintiff, Settling Defendants, or Settling Third-Party Defendants may have against any other person or entity not a Party to this Consent Decree, including, without limitation, claims for indemnity or contribution, are expressly reserved.

58. In the event Ohio EPA determines that Settling Defendants have failed to perform any provisions of the Work in an adequate or timely manner, Ohio EPA may perform any and all portions of the Work as Ohio EPA determines necessary. Settling Defendants may invoke the procedures set forth in Section XVII (Dispute Resolution) to dispute Ohio EPA's determination that Settling Defendants failed to carry out a provision of the Work in an adequate or timely manner as unlawful or unreasonable. Costs incurred by the State in performing the Work pursuant to this Paragraph shall be considered Response Costs that Settling Defendants shall pay pursuant to Section XIII (Reimbursement).

59. By her signature to this Consent Decree, the Owner certifies to the best of her knowledge and belief that the information she has given the government in the companion Case, No.

C2-91-742 regarding the income and financial status of the estate of John N. Bowers is true, correct and complete. The State of Ohio reserves all rights it may have to bring any action against the Owner, and the covenant not to sue in Paragraph 56 of this Section shall not be effective, if this information is not true, correct, and complete.

60. Notwithstanding any other provision of this Consent Decree, the State retains all authority and reserves all rights to take any and all response actions authorized by law. Nothing in this Consent Decree shall constitute or be construed as a release or a covenant not to sue regarding any claim or cause of action against any person, firm, trust, joint venture, partnership, corporation or other entity not a signatory to this Consent Decree for any liability it may have arising out of or relating to the Site, including but not limited to liability from any Response Costs and Oversight Costs unreimbursed by this Consent Decree. The State expressly reserves the right to sue any person other than Defendants, in connection with the Site.

**XXI. EFFECT OF SETTLEMENT; CONTRIBUTION PROTECTION**

61. Nothing in this Consent Decree shall be construed to create any rights in, or grant any cause of action to, any person not a party to this Consent Decree. The preceding sentence shall not be construed to waive or nullify any rights that any person not a signatory to this Decree may have under applicable law. Each of the Parties expressly reserves any and all rights (including, but not limited to, any right to contribution), defenses, claims, demands,

and causes of action which each party may have with respect to any matter, transaction, or occurrence relating in any way to the Site against any person not a party hereto.

62. With regard to claims for contribution against Settling Defendants and Third-Party Defendants for matters addressed in this Consent Decree, the Parties hereto agree that the Settling Defendants and Third-Party Defendants are entitled to such protection from contribution actions or claims as is provided by CERCLA Section 113(f)(2), 42 U.S.C. §9613(f)(2).

The Settling Defendants and Third-Party Defendants agree that with respect to any suit or claim for contribution brought by them for matters related to this Consent Decree they will notify the State in writing no later than 60 days prior to the initiation of such suit or claim.

63. The Settling Defendants and Third-Party Defendants also agree that with respect to any suit or claim for contribution brought against them for matters related to this Consent Decree they will notify the State in writing within 10 days of service of the complaint on them. In addition, Settling Defendants and Third-Party Defendants shall notify the State within 10 days of service or receipt of any Motion for Summary Judgment and within 10 days of receipt of any order from a court setting a case for trial.

64. In any subsequent administrative or judicial proceeding initiated by the State for injunctive relief, recovery of response costs, or other appropriate relief relating to the Site, Settling Defendants and Third-Party Defendants shall not assert, and may not

maintain, any defense or claim based upon the principles of waiver, res judicata, collateral estoppel, issue preclusion, claim-splitting, or other defenses based upon any contention that the claims raised by the State in the subsequent proceeding were or should have been brought in the instant case; provided, however, that nothing in this Paragraph affects the enforceability of the covenants not to sue set forth in Section XIX (Covenant Not to Sue by Plaintiff).

**XXII. ACCESS TO INFORMATION**

65. Settling Defendants shall provide to Ohio EPA and U.S. EPA, 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 Site or to the performance of this Consent Decree, 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. Settling Defendants shall also make available to Ohio EPA and U.S. EPA, for purposes of investigation, information gathering or testimony, their employees, agents, or representatives with knowledge of relevant facts concerning the performance of the Work.

66. a. Settling Defendants may assert business confidentiality claims covering part or all of the documents or information submitted to Ohio EPA under this Consent Decree to the extent permitted by and in accordance with applicable State law or Section 104(e)(7) of CERCLA, 42 U.S.C. §9604(e)(7), and 40 C.F.R. §2.203(b). Documents or information determined to be confidential by Ohio EPA will be

afforded the protection specified in applicable State law or 40 C.F.R. Part 2, Subpart B. If no claim of confidentiality accompanies documents or information when they are submitted to Ohio EPA, or if Ohio EPA has notified Settling Defendants that the documents or information are not confidential under the standards of applicable State law or Section 104(e)(7) of CERCLA, the public may be given access to such documents or information without further notice to Settling Defendants.

b. Settling Defendants may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by state or federal law. If Settling Defendants assert such a privilege in lieu of providing documents, they shall provide Plaintiff with the following information, except to the extent such information is subject to a privilege recognized under federal or State law: (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 Settling Defendants. To the extent that Settling Defendants assert that any of the information enumerated above is subject to a privilege recognized under federal or state law, Settling Defendants shall identify the privilege asserted and the claimed basis for the privilege. No documents, reports or other information created or generated pursuant to the requirements of the

Consent Decree shall be withheld on the grounds that they are privileged.

67. 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 Site.

**XXIII. RETENTION OF RECORDS**

68. a. Each Settling Defendant and Third-Party Defendant shall preserve and retain all records and documents 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 liability of any person for response actions conducted and to be conducted at the Site, regardless of any corporate retention policy to the contrary for seven (7) years. Settling Defendants also shall instruct their contractors and agents to preserve all documents, records, and information of whatever kind, nature or description relating to the performance of the Work in the same manner and in accordance with the same time schedule set forth in this Decree.

b. At the conclusion of the document retention period specified in subparagraph 68.a, and all subsequent retention periods, Settling Defendants and Third-Party Defendants shall notify the State and the United States at least 90 days prior to the destruction of any such records or documents. In order to avoid piecemeal notification of records destruction, Settling Defendants and Third-Party Defendants shall give prior notification to the State of Ohio

of the proposed destruction of records during and only during the thirty days after any anniversary of the entry of this Consent Decree. Upon request by the State or the United States, Settling Defendants and Third-Party Defendants shall deliver in the manner required by Ohio EPA any such records or documents to Ohio EPA and/or U.S. EPA.

69. Settling Defendants and Third-Party Defendants may assert that certain documents, records and other information are privileged under the attorney-client privilege or any other privilege recognized by federal or state law. If the Settling Defendants or Third-Party Defendants assert such a privilege, they shall provide Plaintiff with the following, except to the extent such information is subject to a privilege recognized under state or federal law: (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. To the extent that Settling Defendants assert that any of the information enumerated above is subject to a privilege recognized under state or federal law, Settling Defendants shall identify the privilege asserted and the claimed basis for the privilege. No documents, reports or other information created or generated pursuant to the requirements of the Consent Decree and no sampling or analytical data concerning the Site shall be withheld on the grounds that they are privileged.

70. Each Settling Defendant and Third-Party Defendant hereby certifies, individually, that it has not altered, mutilated, discarded, destroyed or otherwise disposed of any records, documents or other information relating to its potential liability regarding the Site since notification of potential liability by the United States or the State or the filing of suit against it regarding the Site and that it has fully complied with any and all U.S. EPA requests for information pursuant to Sections 104(e) and 122(e) of CERCLA and Section 3007 of RCRA.

**XXIV. NOTICES AND SUBMISSIONS**

71. Whenever, under the terms of this Consent Decree, written notice is required to be given or a report or other document is required to be sent by one party to another, it shall 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. All notices and submissions shall become incorporated by reference into and be an enforceable part of this Consent Decree. All notices and submissions shall be considered effective upon receipt, unless otherwise provided. Written notice as specified herein shall constitute complete satisfaction of any written notice requirement of the Consent Decree with respect to the State, Ohio EPA, the Settling Defendants, and Third-Party Defendants respectively.

**As to Ohio EPA:**

Diana Bynum (or her successor)  
Ohio EPA Site Coordinator  
Ohio Environmental Protection Agency

Central District Office  
2305 Westbrooke, Building C  
P.O. Box 2198  
Columbus, Ohio 43266-2198

and

Ohio EPA  
Attn: Technical and Program Support Section  
Division of Emergency and Remedial Response  
Re: Bowers  
P. O. Box 1049  
Columbus, Ohio 43216-0149

As to the State of Ohio:

Bryan F. Zima (or his successor)  
Assistant Attorney General  
State of Ohio  
Environmental Enforcement Section  
30 East Broad Street, 25th Floor  
Columbus, Ohio 43215-3428

As to the United States:

Chief, Environmental Enforcement Section  
Environment and Natural Resources Division  
U.S. Department of Justice  
P.O. Box 7611  
Ben Franklin Station  
Washington, D.C. 20044  
Re: DJ # 90-11-2-345

and

Director, Waste Management Division  
United States Environmental Protection Agency  
Region V  
77 W. Jackson Blvd.  
Chicago, IL 60604-3590

As to U.S. EPA:

David Wilson  
U.S. EPA Project Coordinator  
United States Environmental Protection Agency  
Region V  
77 W. Jackson Blvd.  
Chicago, IL 60604-3590

As to the Settling Defendants:

John W. Ubinger, Jr.  
Jones, Day, Reavis & Pogue  
One Mellon Bank Center  
500 Grant Street  
Pittsburgh, Pennsylvania 15219

Ross E. Austin  
Senior Counsel  
E.I. du Pont de Nemours and Company  
Legal Department-Room 7016  
1007 Market Street  
Wilmington, Delaware 19898

Senior Counsel, Environmental Health & Safety  
PPG Industries, Inc.  
One PPG Place  
Pittsburgh, Pennsylvania 15272

As to the Third-Party Defendants, except the Owner:

Gary P. Gengel, Esq.  
Popham, Haik, Schnobrich & Kaufman, Ltd.  
Suite 3300  
222 South 9th Street  
Minneapolis, MN 55402

As to the Owner:

John E. Bowers, Esq.  
233 North Court Street  
Circleville, OH 43113

**XXV. EFFECTIVE DATE**

72. The effective date of this Consent Decree shall be the date upon which this Consent Decree is entered by the Court, except as otherwise provided herein.

**XXVI. RETENTION OF JURISDICTION**

73. This Court retains jurisdiction over both the subject matter of this Consent Decree and Settling Defendants and Third-Party Defendants for the duration of the performance of the terms and

provisions of this Consent Decree for the purpose of enabling any of the Parties to apply to the Court at any time for such further order, direction, and relief as may be necessary or appropriate for the construction or modification of this Consent Decree, or to effectuate or enforce compliance with its terms, or to resolve disputes in accordance with Section XVII (Dispute Resolution) hereof.

**XXVII. APPENDICES**

74. All Appendices to this Consent Decree shall become incorporated by reference into and be an enforceable part of this Consent Decree. The following appendices are attached to this Consent Decree at the time of signing by the Parties:

"Appendix A" is the Operation and Maintenance Work Plan.

"Appendix B" is the Guidance Document List.

"Appendix C" is the map of the Site.

"Appendix D" contains deed restrictions applicable to the Site.

**XXVIII. MODIFICATION**

75. Schedules specified in this Consent Decree for completion of the Work may be modified by agreement of Ohio EPA and Settling Defendants. All such modifications shall be made in writing.

76. No material modifications shall be made to the Operation and Maintenance Work Plan without written notification to and written approval of the State and Settling Defendants. Prior to providing its approval to any modification, the State will provide the United States with a reasonable opportunity to review and comment on the proposed modification. Modifications that do not materially alter that document may be made by written agreement between Ohio EPA and

Settling Defendants, after providing the United States with a reasonable opportunity to review and comment on the proposed modification.

77. Nothing in this Decree shall be deemed to alter the Court's power to enforce, supervise or approve modifications to this Consent Decree.

**XXIX. COMMUNITY RELATIONS**

78. Settling Defendants shall cooperate with Ohio EPA in providing information regarding the Work and the Site to the public. As requested by Ohio EPA, Settling Defendants shall participate in the preparation of such information for dissemination to the public which may be held or sponsored by Ohio EPA to explain activities at or relating to the Site.

**XXX. SIGNATORIES/SERVICE**

79. Each undersigned representative of a Settling Defendant and Third-Party Defendant to this Consent Decree and the Assistant Attorney General for the State of Ohio Environmental Enforcement Section certifies that she or he is fully authorized to enter into the terms and conditions of this Consent Decree and to execute and legally bind such party to this document.

80. Each Settling Defendant and Third-Party Defendant hereby agrees not to oppose entry of this Consent Decree by this Court nor to challenge any provision of this Consent Decree unless the State has notified the Settling Defendants and Third-Party Defendants in writing that it no longer supports entry of the Consent Decree.

81. Each Settling Defendant and Third-Party Defendant shall identify, on the attached signature page, the name, address and telephone number of an agent who is authorized to accept service of process by mail on behalf of that party with respect to all matters arising under or relating to this Consent Decree. Settling Defendants and Third-Party Defendants hereby agree to accept service in that manner and to waive the formal service requirements set forth in Rule 4 of the Federal Rules of Civil Procedure and any applicable local rules of this Court.

SO ORDERED THIS 13<sup>th</sup> DAY OF September, 1996.

  
United States District Judge

THE UNDERSIGNED PARTIES enter into this Consent Decree in the matter of State, ex rel. Montgomery v. E.I. du Pont de Nemours, et al. (No. \_\_\_\_\_, S.D. Ohio) relating to the Bowers Landfill Superfund Site.

FOR THE STATE OF OHIO:

Date: 8/4/96

Betty D. Montgomery  
Attorney General of Ohio

  
BRYAN F. ZIMA (0001053)  
Assistant Attorney General

Environmental Enforcement  
30 East Broad Street, 25th fl.  
Columbus, Ohio 43215-3428  
(614) 466-2766

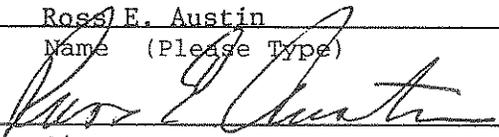
Attorney for State of Ohio

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of State, ex rel. Montgomery v. E.I. du Pont de Nemours, et al. (No. \_\_\_\_\_, S.D. Ohio) relating to the Bowers Landfill Superfund Site.

FOR: E. I. du Pont de Nemours & Co.  
Name of Settling Party (Please Type)

Date: 7/16/96

Ross E. Austin  
Name (Please Type)

  
Signature

Senior Counsel  
Title

1007 Market St. D8068

Wilmington, DE 19898  
Address

If different from above, the following is the name and address of the agent authorized to accept service on behalf of above-listed party:

\_\_\_\_\_  
Name

\_\_\_\_\_  
Address

Prior notice to all parties shall be provided by the above-listed party of any change in the identity or address of the above-listed party or its agent for service of process.

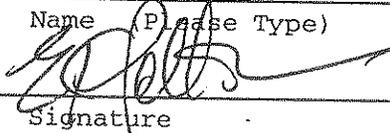
\_\_\_\_\_  
A separate signature page must be signed by each corporation, individual or other legal entity that is settling with the State.

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of State, ex rel. Montgomery v. E.I. du Pont de Nemours, et al. (No. \_\_\_\_\_, S.D. Ohio) relating to the Bowers Landfill Superfund Site.

FOR: PPG Industries, Inc.  
Name of Settling Party (Please Type)

Date: JULY 11, 1996

E. Kears Pollock  
Name (Please Type)

  
Signature

Senior Vice President, Coatings & Resins  
Title

One PPG Place

Pittsburgh, PA 15272  
Address

If different from above, the following is the name and address of the agent authorized to accept service on behalf of above-listed party:

Anne M. Foulkes  
Name

One PPG Place

Pittsburgh, PA 15272  
Address

Prior notice to all parties shall be provided by the above-listed party of any change in the identity or address of the above-listed party or its agent for service of process.

A separate signature page must be signed by each corporation, individual or other legal entity that is settling with the State.

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of State, ex rel. Montgomery v. E.I. du Pont de Nemours, et al. (No. \_\_\_\_\_, S.D. Ohio) relating to the Bowers Landfill Superfund Site.

FOR: Estate of John N. Bowers  
Name of Settling Party (Please Type)

Date: June 27, 1996

Ellen J. Bowers  
Name (Please Type)

*Ellen J. Bowers*  
Signature

Executrix  
Title

127 West High Street

Circleville, OH 43113  
Address

If different from above, the following is the name and address of the agent authorized to accept service on behalf of above-listed party:

\_\_\_\_\_  
Name

\_\_\_\_\_  
Address

Prior notice to all parties shall be provided by the above-listed party of any change in the identity or address of the above-listed party or its agent for service of process.

\_\_\_\_\_  
A separate signature page must be signed by each corporation, individual or other legal entity that is settling with the State.

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of State, ex rel. Montgomery v. E.I. du Pont de Nemours, et al. (No. \_\_\_\_\_, S.D. Ohio) relating to the Bowers Landfill Superfund Site.

FOR: Georgia-Pacific Corporation  
Name of Settling Party (Please Type)

Date: 7/29/96

Gordon R. Alphonso  
Name (Please Type)

Gordon R. Alphonso  
Signature

Senior Counsel  
Title

133 Peachtree Street, N.E.

Atlanta, Georgia 30303  
Address

If different from above, the following is the name and address of the agent authorized to accept service on behalf of above-listed party:

Gary P. Gengel, Esq.  
Name

Popham, Haik, Schnobrich & Kaufman

222 South Ninth Street  
Address  
Piper Jaffray Tower, Suite 3300  
Minneapolis, Minnesota 55402-3336

Prior notice to all parties shall be provided by the above-listed party of any change in the identity or address of the above-listed party or its agent for service of process.

A separate signature page must be signed by each corporation, individual or other legal entity that is settling with the State.

THE UNDERSIGNED PARTY enters into this Consent Decree in the matter of State, ex rel. Montgomery v. E.I. du Pont de Nemours, et al. (No. \_\_\_\_\_, S.D. Ohio) relating to the Bowers Landfill Superfund Site.

FOR: General Electric Company  
Name of Settling Party (Please Type)

Date: July 10, 1996

Ronald N. Cotman  
Name (Please Type)



Signature  
General Manager - Environment,  
Health & Safety Department  
Title

1975 Noble Road

Cleveland, Ohio 44112-6300  
Address

If different from above, the following is the name and address of the agent authorized to accept service on behalf of above-listed party:

Gary P. Gengey, II  
Popham, Haik, Schnobrich & Kaufman, Ltd

Name

Suite 3300, 222 South Ninth Street

Minneapolis, MN 55402

Address

Prior notice to all parties shall be provided by the above-listed party of any change in the identity or address of the above-listed party or its agent for service of process.

A separate signature page must be signed by each corporation, individual or other legal entity that is settling with the State.

APPENDICES

Appendix A - Groundwater Monitoring/Operation  
and Maintenance Plan

Appendix B - Guidance Document List

Appendix C - Map of the Site

Appendix D - Deed restrictions applicable to the Site

Appendix A - Groundwater Monitoring/Operation  
and Maintenance Plan

**WORK PLAN**  
**GROUNDWATER MONITORING/  
OPERATIONS AND MAINTENANCE PLAN**  
**BOWERS LANDFILL**  
**CIRCLEVILLE, OHIO**  
**PROJECT No. 93115**  
**MARCH 6, 1996**

339 Haymaker Road • Parkway Building • Suite 201 • Monroeville, PA 15146

(412) 373-5240 • FAX (412) 373-5242

Regional Office • 258 Chapman Road • Suite 202 • Newark, DE 19702 • (302) 731-9668 • FAX (302) 731-9609

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**WORK PLAN  
GROUNDWATER MONITORING/  
OPERATIONS AND MAINTENANCE PLAN  
BOWERS LANDFILL  
CIRCLEVILLE, OHIO**

**1.0 INTRODUCTION**

---

On March 31, 1989, the U.S. Environmental Protection Agency (USEPA) issued a Record of Decision (ROD) for the Bowers Landfill Superfund Site (USEPA, 1989a). This Work Plan for Groundwater Monitoring/Operations and Maintenance (Work Plan) has been prepared to satisfy the requirements outlined in the ROD. The purpose of this Work Plan is to describe the tasks necessary to monitor, operate, and maintain the Bowers Landfill beginning one year after the final landfill cap has been installed and accepted as complete by the USEPA. The USEPA was responsible for site maintenance through the first year of the post-construction period, which ended in June 1994. This Work Plan covers the ongoing operations, maintenance, and monitoring activities to be undertaken for Years 2 through 30 of the post-construction period.

Operational tasks include air monitoring for methane gas and volatile organic compounds (VOCs) and groundwater monitoring. Maintenance tasks include inspecting and repairing damage to the landfill cap, landfill vegetation, gas vents, monitoring wells, sheet piles, drainage ditch, culvert, the slope east of the drainage ditch, wetlands area, entrance gate, and security fencing. Section 2.0 describes the results of previous groundwater monitoring at this site. The groundwater monitoring program is discussed in Section 3.0. The gas monitoring program, maintenance activities, documentation procedures, and site safety measures are described in Section 4.0.

The state of Ohio has assumed responsibility for groundwater monitoring/operations and maintenance (GM/O&M) as stated in 40 CFR 300.435 (f) and 300.510 (c). Potentially Responsible Parties (PRPs) will perform the GM/O&M activities after the remedy is considered to be operational and functional as determined in accordance with the Consent Decree between the PRPs and the state of Ohio.

## 1.1 SITE DESCRIPTION AND BACKGROUND

Bowers Landfill is located in rural Pickaway County, Ohio, approximately 2.5 miles north of the city of Circleville (Figure 1-1). The site is located northwest of the intersection of Island Road and Circleville - Florence Chapel Road, on the eastern side of the Scioto River Valley. The site lies within the Scioto River flood plain. The northwestern and southernmost points of the landfill abut the Scioto River (Figure 1-2).

The landfill is situated on approximately 12 acres of land owned by the estate of Dr. John N. Bowers. The landfill was constructed as a berm approximately 3,500 feet long, with an average width of approximately 125 feet, and a top height approximately 10 feet above natural grade. The reported volume of waste placed in the landfill is approximately 130,000 cubic yards.

The area is rural with 15 houses located within one-half mile of the site. Houses in this area depend largely on private wells for water supply. There are no presently identified downgradient domestic water supply wells located within one mile of the site. The water supply wells for the city of Circleville are located approximately one and one-half miles south of the site.

## 1.2 LANDFILL OPERATIONS RECORD

Limited information is available on the types and quantities of wastes disposed of at Bowers Landfill. Information from the Ohio Environmental Protection Agency (OEPA) indicates that residential waste collected by private haulers in and around the Circleville area comprises most of the material in Bowers Landfill. Between 1963 and 1968, in addition to general domestic refuse, the site received wastes from local industries. Additional information on landfill operations is contained in the Administrative Record for the ROD which can be reviewed in the public library located in Circleville, Ohio or at USEPA Region V in Chicago, Illinois.

In 1980, three wells were installed to monitor groundwater quality. The monitoring wells, several existing residential wells, and surface water locations near the site were sampled.

VOCs, including ethylbenzene, toluene, and xylene, were detected in samples from monitoring wells immediately west of the landfill. Tetrachloroethene was detected in Monitoring Well MW-12 east of the landfill.

In 1982, the OEPA requested that the site be placed on the National Priorities List (NPL) as a Superfund site. The site was added to the NPL in September 1983. In 1985, the USEPA and OEPA signed a Consent Order with E.I. DuPont de Nemours and Company (DuPont) and PPG Industries, Inc. (PPG), two of the PRPs. This Consent Order outlined the scope and schedule for a remedial investigation/feasibility study (RI/FS) at the Bowers Landfill. Dames & Moore, under contract to DuPont and PPG, conducted the RI/FS from 1985 to 1989.

RI field activities began in July 1986 and included two phases: the first phase characterized contaminant levels at the site and the second phase addressed questions raised by the first phase. During the first phase, 18 groundwater monitoring wells were installed and sampled twice, and groundwater samples were collected once at four off-site residential wells. This first sampling phase was completed in May 1987 and the second phase of the RI was conducted during February and March 1988. The major purpose for the second phase was to assess groundwater flow direction in the deeper of the two aquifers underlying the site. Two additional groundwater monitoring wells were installed during the second phase, and five monitoring wells (including the two new wells) were sampled. Dames & Moore prepared an RI Report (Dames & Moore, 1988) describing these activities.

Dames & Moore began the FS in 1988. The FS was based on the results from the RI and also on the results of an Endangerment Assessment (EA) (PRC, 1988) prepared by a USEPA contractor, PRC Environmental Management, Inc. (PRC). Nine remedial alternatives (RA) for Bowers Landfill, including a "no-action" alternative, were evaluated in the FS. Dames & Moore prepared an FS Report (Dames & Moore, 1989) to describe the development and evaluation of these alternatives.

The ROD, signed March 31, 1989, specified a selected RA for the site and discussed the criteria used for its selection (USEPA, 1989a).

The remedial design (RD) for the ROD-specified remedy was performed by PRC under contract to the USEPA, and occurred primarily during 1990 and 1991. During the RD, groundwater samples were collected from 18 site monitoring wells and three surface water sampling locations. In addition, soil samples were collected for geotechnical analyses and soil gas sampling was performed. The RD also includes provisions for a landfill cover. The cover consists of approximately two feet of low-permeability clay overlain by a cover layer of soil. A wetlands area has been developed between the landfill and the Scioto River.

Post-remediation quarterly groundwater monitoring was initiated in October of 1993. This monitoring was performed by private parties under a Consent Decree with USEPA and is documented in the Year 1 Groundwater Monitoring Annual Report (Blasland, Bouck & Lee, 1994).

Other post-remediation inspection and monitoring repairs were undertaken on behalf of the USEPA by PRC. Those activities are based on the O&M program (PRC, 1993) developed for the USEPA.

## 2.0 SITE HYDROGEOLOGY AND GROUNDWATER CHARACTERISTICS

---

Based upon the results of the RI/FS, the Bowers Landfill site is underlain by 40 to 100 feet of glacial deposits which overlie shale bedrock. The glacial deposits are part of the groundwater system underlying the Scioto River flood plain. Glacial deposits are thickest to the south and west of the site and are thinnest at the northeast portion of the landfill. The glacial deposits are extensive and include two water-bearing zones. The first water-bearing zone is a brown sand and gravel deposit that lies approximately ten feet below the land surface, and the second water-bearing zone is a gray sand deposit with lesser amounts of gravel that lies just above the bedrock. These two zones are considered to be the upper and lower zones of interest for most of the site. Even though the two zones are separated by a low permeability silt-clay deposit, the two zones appear to be hydraulically connected at some site locations. In much of the Circleville area, the saturated unconfined zones function as a single groundwater system (Norris, 1975). The bedrock below the glacial deposits is considered to be an aquiclude and is not used locally for water supply. Additional information on regional hydrogeology is contained in the Administrative Record for the ROD for this site which is available for review in the public library located in Circleville, Ohio or at USEPA Region V in Chicago, Illinois.

### 2.1 RI/FS GROUNDWATER SAMPLING

During the RI, Dames & Moore installed 20 groundwater monitoring wells in 10 well clusters at the site (Figure 1-2). This included ten shallow wells, five intermediate wells, and five deep wells. A list of these wells and their depths is presented in Table 2-1. Shallow wells were screened at the water table near the top of the upper groundwater zone, intermediate wells were screened within the lower portion of the upper groundwater zone, and deep wells were screened within the lower groundwater zone. A comparison of groundwater levels for both the upper and lower zone wells indicates that groundwater near the site is moving west or southwest.

Groundwater samples were collected from monitoring wells in February 1987, May 1987, and March 1988. All samples were analyzed for VOCs, semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), metals, and cyanide. Samples collected in February and May 1987 were also analyzed for dioxin. Analytical results from groundwater sampled during the RI are included in Appendix A.

VOCs, including acetone, methylene chloride, tetrachloroethene, and benzene, were detected at low concentrations in some groundwater samples collected from RI/FS monitoring wells. In all, 9 of the 20 monitoring wells had VOC detections in one or more of the five sampling events. Most of the positive results were due to the presence of acetone and methylene chloride, common laboratory contaminants. Benzene and tetrachloroethene were detected in one well each. Benzene was detected in two of the three samples from Well P-6B, downgradient of the landfill. The highest concentration of benzene detected in Well P-6B was six micrograms per liter ( $\mu\text{g/l}$ ), which is above the USEPA drinking water standard of 5  $\mu\text{g/l}$ . Tetrachloroethene was detected in samples from upgradient Well W-12, collected in February and May of 1987. The maximum concentration of tetrachloroethene detected in Well W-12 was 5.3  $\mu\text{g/l}$ .

Bis(2-ethylhexyl)phthalate, an SVOC, was detected in several groundwater samples. Three other SVOCs, di-n-butyl phthalate, 2-methylnaphthalene, and n-nitrosodiphenylamine, were detected in one sample each. With the exception of bis(2-ethylhexyl)phthalate at 21  $\mu\text{g/l}$  in Well P-7A, all of these SVOCs were identified at levels below USEPA specified detection limits. No SVOCs were detected in any residential well samples.

A number of metals were detected in groundwater monitoring and residential wells. All of the levels of metals detected, except those for barium, were below USEPA drinking water standards. Barium was detected above drinking water standards in the three samples collected from Well P-5B. This well is screened in the lower aquifer near the south end of the site. Because barium was detected in all groundwater samples, including samples from residential wells and upgradient wells, we believe some portion of the barium found in Well P-5B may be due to natural sources.

Sampling during the RI indicated that residential wells did not appear to be affected by releases from the landfill. No metals were detected above drinking water standards.

Methylene chloride, a common laboratory contaminant, was the only organic compound detected in residential wells. In addition, sampling results obtained from the Circleville municipal well field, located one and one-half miles south of the landfill, indicate that the well field had not been affected by the Bowers Landfill. Samples of the municipal well field were collected from 1980 through 1987 and again in 1988; sample results are presented in the EA (PRC, 1988) and the ROD (USEPA, 1989a), respectively. Groundwater contaminant concentrations appear to be confined to the area between the landfill and the Scioto River. The Scioto River is the probable discharge point for groundwater being monitored under this Work Plan.

## 2.2 REMEDIAL DESIGN SAMPLING

As a part of the RD, 18 of the 20 wells were sampled in August 1990. This sampling generally confirmed the results of the RI. The laboratory results for this sampling event are included as Appendix B.

Tetrachloroethene was detected in Well W-12 (3  $\mu\text{g/l}$ ) during the RD sampling event. Benzene was detected in two of three samples collected during the RI/FS in Well P-6B. Well P-6B was not sampled by PRC during the RD sampling round because the well casing was damaged. Carbon disulfide was detected in seven monitoring wells and methylene chloride was detected in two monitoring wells during the RD sampling round.

Bis(2-ethylhexyl)phthalate was detected in two of three samples collected during the RI/FS in Well P-5B. Bis(2-ethylhexyl)phthalate was not detected in the sample collected from Well P-5B during the RD sampling round. Bis(2-ethylhexyl)phthalate was detected in one of two samples collected during the RI/FS in Well W-8. Bis(2-ethylhexyl)phthalate was detected in Well W-8 during the RD sampling round.

Barium was the only inorganic analyte detected above USEPA drinking water standards in any of the monitoring wells. Barium was detected above USEPA drinking water standards in all three samples collected from Well P-5B during the RI/FS. Barium was detected above USEPA drinking water standards in the RD sampling round. Because barium was detected in all groundwater samples, including samples from residential wells and upgradient wells, it is believed that the elevated level of barium found in Well P-5B may be due to natural sources.

The direction of groundwater flow in the upper aquifer was confirmed with two separate sets of water level measurements, February 1990 and August 1990. Complete (Cummings/Riter, 1993) groundwater sampling data from the RI and the RD are presented in Appendices A and B of this document, respectively.

### 2.3 YEAR 1 POST-REMEDATION GROUNDWATER MONITORING

The first year post-remediation groundwater sampling and analysis program has been completed for the Bowers Landfill in Circleville, Ohio, as described by the USEPA-approved Year 1 Groundwater Monitoring Work Plan (Cummings/Riter, 1993). The Year 1 Groundwater Monitoring Report (Blasland, Bouck, & Lee, 1994) presents an evaluation of the groundwater monitoring network, groundwater quality, and the baseline parameter concentrations for groundwater parameters at the Bowers Landfill. In addition, based on the results of the Year 1 sampling program, proposed specifications for groundwater monitoring for Years 2 through 4 were presented.

The results obtained from the Year 1 monitoring program can be summarized as follows:

- Overall groundwater quality is consistent with the conditions reported during the RI/FS and RD phases (Sections 2.1 and 2.2).
- No plume of groundwater contamination is evident.
- Certain organic substances were reported at low levels in two of the monitoring wells. One of these monitoring wells is upgradient of the landfill and the other well has a physical constraint (i.e., a bailer is lodged in the well) that precludes use of the sampling protocols cited in the quality assurance project plan (QAPP). The specific cause(s) of the reported detections in these two wells is not evident.
- The results of unfiltered samples analyzed for inorganics are variable and appear to be impacted by natural materials that carry over from the geologic formations into the monitoring wells.

The data obtained from this program, when viewed within the context of previously existing data obtained during the RI/FS and RD, provide baseline information to which future monitoring results can be compared. The statistical baseline will be established at

the outset of the long-term groundwater monitoring program. In addition, as a result of the data obtained in this program, sufficient information exists to develop a protective, technically rational program for monitoring during Years 2 through 4. The analytical results for the Year 1 program are summarized in Appendix C.

**2.4 SUMMARY OF COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION,  
LIABILITY ACT (CERCLA) GROUNDWATER MONITORING RESULTS**

In summary, the groundwater monitoring results indicate sporadic detections of low levels of certain Target Compound List/Target Analyte List (TCL/TAL) analytes. The landfill does not appear to have affected any residential wells. A first year monitoring plan was undertaken to develop a baseline that includes seasonal monitoring of substances detected in previous sampling events, as well as other substances that have not been detected in the five previous groundwater monitoring events. Section 3.0 describes the long-term groundwater monitoring program.

### 3.0 GROUNDWATER MONITORING PROGRAM

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The following section describes the phases, objectives, and activities of the groundwater monitoring portion of this Work Plan. As sampling is conducted as part of the groundwater monitoring activities, additional data on the quality of the groundwater at the site will be obtained.

The groundwater monitoring program is designed to allow definition of variables such as sampling locations, analytical parameters, sampling frequency, and methods of data analysis for each phase of groundwater monitoring, based on a review of the results from the previous phase. These results will be presented in reports submitted at the end of each monitoring phase. The reports will include proposals for the upcoming phase. Proposals submitted in these reports will become a part of the groundwater monitoring program upon approval of OEPA.

#### 3.1 MONITORING PHASES

In accordance with 40 CFR 300.435 (f) and 40 CFR 300.510 (c), the USEPA will be considered to be the lead agency responsible for groundwater monitoring at the site until the USEPA and OEPA determine that the remedy is functioning properly and performing as designed. This determination is generally made one year after RA construction is complete. The PRPs completed the Year 1 groundwater monitoring program. The PRPs will assume responsibility for O&M after entry of the Consent Decree (Section 1.0). The monitoring activities are discussed separately for the following monitoring phases:

- Phase 1: Year 1 (not part of this program),
- Phase 2: Years 2 through 4, and
- Phase 3: Years 5 through 30.

#### 3.2 OBJECTIVES

This groundwater monitoring program is designed as part of the RA selected for the Bowers Landfill Superfund site. The RA was selected based on nine criteria discussed in Section 9.0 of the ROD. This groundwater monitoring program is designed to monitor long-term effectiveness and permanence of the RA. Groundwater monitoring will also help protect human health and the environment and will comply with applicable or

relevant and appropriate requirements (ARARs). In accordance with the ROD, this program meets the substantive relevant requirements for groundwater monitoring at facilities regulated under the Resource Conservation and Recovery Act (RCRA), as specified in 40 CFR 264, Subpart F.

The specific objectives of this groundwater monitoring program are as follows:

- Periodically measure the concentrations of selected chemicals at the site;
- Compare measured concentrations with established baseline concentrations;
- Identify a statistically significant increase in a measured concentration that may indicate the release of a contaminant from the site;
- Assess the need for further action; and
- Define contingencies in case further action is required.

### **3.2.1 Year 1 Monitoring Program**

Year 1 of the groundwater monitoring program was performed by the PRPs as described in the Year 1 Groundwater Monitoring Work Plan (Cummings/Riter, 1993).

During Year 1, groundwater monitoring was performed to establish baseline concentrations of selected groundwater contaminants at the site. These concentrations, along with data collected during the RI and RD, will be used as a basis of comparison for sampling results obtained in Years 2 through 30. Comparison of sample results with baseline concentrations will permit identification of statistically significant increases in contaminant concentrations, which may indicate that a release has occurred. The sampling results from Year 1 allow the following:

- Characterization of the variability in chemical concentrations and groundwater elevations at the site.
- Development of concentration limits which may be used in assessing whether an identified release is significant and requires further action. These limits will be the maximum contaminant levels (MCLs)

promulgated under the Safe Drinking Water Act, health-based levels as indicated by an incremental excess cancer risk of  $1 \times 10^{-6}$  or a Hazard Index greater than 1.0 for noncarcinogenic constituents, or alternate concentration limits (ACLs) when MCLs are not available. ACLs may be determined in a manner consistent with Section 10.1 of the ROD.

- Development of statistical methods for analysis of future sampling data.

The results obtained from the Year 1 monitoring program can be summarized as follows:

- Overall groundwater quality is consistent with the conditions reported during the RI/FS and RD phases.
- No plume of groundwater contamination is evident.
- Certain organic substances were reported at low levels in two of the monitoring wells. One of these wells is upgradient of the landfill and the other well has a physical constraint (i.e., a bailer is lodged in the well) that precludes use of the sampling protocols cited in the QAPP. The specific cause(s) of the reported detections in these two wells is not evident.
- The results of unfiltered samples analyzed for inorganics are variable and appear to be impacted by natural materials that carry over from the geologic formations into the monitoring wells.

The data obtained from this program, when viewed within the context of previously existing data obtained during the RI/FS and the RD, provide baseline information to which subsequent monitoring results can be compared.

### **3.2.2 Objectives for Years 2 Through 4 and Years 5 Through 30**

During Years 2 through 4 and Years 5 through 30, the groundwater monitoring program has two main objectives. The first objective is to monitor trends in the concentrations of selected contaminants on the site which may indicate that a release from the landfill has occurred. The second objective is to evaluate whether an identified release is statistically significant and requires further action. This identification and evaluation may be based on a reduced number of sampling locations and analytical parameters, as approved by the OEPA.

### **3.3 INSTALLATION OF NEW WELLS AND MODIFICATION OF EXISTING WELLS**

The Year 1 Groundwater Monitoring Report (Blasland Bouck & Lee, Inc., 1994) included recommendations for modification of the monitoring well network. Those recommendations were considered in developing the monitoring program. This program is summarized in Tables 3-1 and 3-2, with rationale for the monitoring well network for Years 2 through 4. Well W-9 will be abandoned and Well P-15B will be abandoned and replaced at the outset of the long-term groundwater monitoring program.

### **3.4 SAMPLE COLLECTION, HANDLING, ANALYSIS, AND QUALITY ASSURANCE/ QUALITY CONTROL**

The original QAPP prepared for Year 1 will be revised as necessary before subsequent phases of the groundwater monitoring program begin (Phase II begins in Year 2, and Phase III begins in Year 5). The plan for Years 2 through 4 will be revised based upon the Year 1 Groundwater Monitoring Report (Blasland, Bouck & Lee, 1994). It will provide for Tier III analytical protocols with full independent validation with regression analysis on 10 percent of the sample analysis. During Phase III of the groundwater monitoring program (Years 5 through 30), the QAPP will be reviewed and revised as necessary at five-year intervals. This interval corresponds to the five-year review period described in 40 CFR 300.430 (f)(4)(ii) for this type of RA.

The QAPP specifies the following:

- Sample collection procedures,
- Sample preservation and handling procedures,
- Chain-of-custody procedures,
- Analytical procedures, and
- Field and laboratory quality assurance/quality control procedures.

Measurement validity will be evaluated as described in Sections 3.5 and 3.6.

#### **3.4.1 Sampling Locations, Frequency, and Analytical Parameters for Years 2 Through 4**

In accordance with the ROD, sampling will be performed quarterly in Years 2 through 4. The monitoring wells to be sampled and parameters for analyses are shown in Tables 3-1 and 3-3, respectively. The Year 1 groundwater sampling, RI/FS sampling, and RD sampling and analyses are technical bases for this selection.

If the eastern drainage ditch contains surface water during a groundwater sampling event, a single surface water sample will be collected from the southern end of the ditch. A minimum of two surface water samples will be obtained each year. The two wetlands ponds will be sampled once per year.

Groundwater elevations will be measured at all site monitoring wells during each quarterly sampling event.

#### **3.4.2 Sampling Locations, Frequency, and Analytical Parameters for Years 5 Through 30**

The monitoring wells to be sampled, sampling frequency, and parameters for analysis will be selected based on the data obtained in Years 2 through 4.

If the eastern drainage ditch contains surface water during a groundwater sampling event, a single sample will be collected from the southern end of the ditch. A minimum of two surface water samples will be obtained each year.

The analytical parameters and monitoring frequency for Years 5 through 30 will be developed based upon the monitoring results of Years 2 through 4.

#### **3.5 ANALYSIS OF DATA**

Statistical evaluation of the analytical data will be performed to determine if a release has occurred at the site. Statistical methods for analyzing data will be proposed before each phase and approved by the OEPA. As required by the ROD, statistical evaluation methods should be based on those identified in 40 CFR 264.97 (h) as appropriate for RCRA groundwater monitoring. In addition, these methods should meet the performance standards specified in 40 CFR 264.97 (i) and further specified in *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities* (USEPA, 1989b), and February 1995 guidance issued by the OEPA. Statistical methods using USEPA's GRITS/STAT software will be developed prior to reporting results under the long-term groundwater monitoring program.

If statistical evaluation indicates a release has occurred, the concentration will then be compared to the appropriate MCL or other accepted health-based level to determine if

further action is required. As stated in the ROD, if no MCL exists for a specific constituent, an ACL may be developed. Unless otherwise directed by the OEPA, further action will not be required if no MCL or health-based level is exceeded. If the concentration exceeds an MCL or a health-based level, the measures outlined in Section 3.6 will be followed.

The following subsections outline a potential statistical analysis program for analytical data collected from Bowers Landfill. The program is based on RCRA groundwater monitoring requirements and guidance, and identifies statistical methods that may be appropriate based on previous groundwater sampling results. The methods of statistical analysis described below will be revised as necessary after analytical data have been collected and reviewed. The report prepared at the end of Year 1 presents the initial baseline data for use in statistical analysis.

### 3.5.1 Analysis of Data for Year 1

Sampling data compiled from Year 1 was combined with data from both the RI and the RD to allow the following:

- Identification of constituents in groundwater at the site.
- Tabulation of baseline concentrations for these constituents. Sampling results in Years 2 through 4 and Years 5 through 30 will be compared to these baseline concentrations to determine if a release has occurred.
- Establishment of site-specific upgradient background concentrations for constituents and assessment of the variability in background concentrations.
- Identification of a mutually agreed upon proposed MCL or ACL for each contaminant proposed for monitoring during Years 2 through 4. As specified in Section 10.1 of the ROD, an ACL may be calculated for any identified contaminant for which no MCL or health-based level is available. ACLs will be concentrations that pose an estimated increase in carcinogenic risk of  $1 \times 10^{-6}$ , or a noncarcinogenic risk (Hazard Index) of 1, using procedures outlined in *USEPA Risk Assessment Guidance for Superfund* (USEPA, 1989c).

The Year 1 Groundwater Monitoring Report (Blasland, Bouck & Lee, Inc., 1994) documents the results of the Year 1 program.

### 3.5.2 Analysis of Data for Years 2 Through 4

Analytical results obtained in Years 2 through 4 will be compared to baseline concentrations presented in the Year 1 Groundwater Monitoring Report (Blasland, Bouck & Lee, Inc., 1994) monitoring report for Year 1. These comparisons will be made quarterly and will be completed within one month of the receipt of laboratory results. The statistical method(s) used to compare results will be based upon considerations described in this section and approved by the OEPA. The Year 1 Groundwater Monitoring Report (Blasland, Bouck & Lee, Inc., 1994) presents analytical data for the first year.

RCRA groundwater monitoring requirements in 40 CFR 264.97 (i)(1) specify "the statistical method used to evaluate groundwater monitoring data shall be appropriate for the distribution of chemical parameters or hazardous constituents." Based on groundwater sampling results from the RI and RD, monitoring results are expected to include few detectable concentrations of VOCs; as a result the data will probably not be normally distributed. Therefore, use of a statistical method based on a normal distribution of data would not be appropriate. Instead, a statistical procedure based on a Poisson distribution of rare events will be considered to interpret the VOC analytical results (Gibbons, 1987).

In this test, the Poisson distribution is used to predict both the total number of VOCs detected and the sum total of all VOC concentrations detected. Predictions will be made based on analytical data from Year 1 combined with data from the RI and the RD, if laboratory results are greater than MCLs and greater than the statistically predicted concentration.

Based on previous results, analytical data for selected metals will indicate fewer "not detected" (ND) results than for the VOCs. Because of this, the use of an analysis of variance (ANOVA) may be appropriate for a statistical analysis of the metal concentrations. The type of ANOVA used should be appropriate for the data distribution and will be determined based on monitoring data from Year 1 combined with RI and RD data.

Data from the Year 1 monitoring program will be entered into GRITS/STAT. Data from ongoing groundwater monitoring efforts will also be entered into GRITS/STAT and the methodologies for ongoing data assessment will be reviewed and evaluated at the outset of Year 2 groundwater monitoring.

For parameters found to have a statistically significant increase in contamination, MCLs or other health-based levels defined for specific compounds or analytes will be used as action levels to trigger further assessment of groundwater conditions at the Bowers Landfill site as described in Section 3.6. If compounds or analytes that do not have an MCL are confirmed to be significantly elevated, procedures to establish an ACL will be developed by DuPont and PPG as provided for in the ROD. If the concentration exceeds an MCL or other appropriate health-based level, the measures outlined in Section 3.6 will be followed.

### **3.5.3 Analysis of Data for Years 5 Through 30**

Sampling results obtained in Years 5 through 30 will be compared to baseline concentrations presented in the monitoring report for Year 2. The baseline concentrations will be adjusted to take into account monitoring data from Years 2 through 4. Comparisons of data from Years 5 through 30 will be made for each sampling event, and will be completed within one month of receipt of sample results. The method of statistical analysis used will be determined by the OEPA based on the methods proposed in the monitoring report for Years 2 through 4. If statistical comparison indicates that a significant increase in concentration has occurred, the occurrence will then be assessed using MCLs or health-based levels to determine if further action is required.

At this time, the statistical analysis methods recommended for Years 2 through 4 are expected to be appropriate for evaluating analytical data collected during Years 5 through 30.

## **3.6 CONTINGENCIES**

Analysis and interpretation of each round of sampling data in Years 2 through 4 and Years 5 through 30 will determine if a statistically significant release has occurred. The OEPA will be notified of statistically significant releases. If no statistically significant release is identified, monitoring will continue as prescribed through the remainder of the monitoring period.

If a statistically significant release is identified, but no individual sample concentration exceeds an MCL or health-based level, the OEPA site manager will be contacted and notified in writing within seven days of a verified release. Unless otherwise directed by the OEPA site manager, monitoring will continue according to the groundwater monitoring program. The OEPA will provide the USEPA with written notification of any actions taken in response to a release.

If a statistically significant release is identified and the individual laboratory result exceeds an MCL or health-based level, the OEPA site manager will be contacted within seven days, and the following steps may be taken in concurrence with OEPA:

- Resample the wells showing concentrations above criteria described in the ROD to assess the validity of the result;
- Comparison of any concentration exceeding the criteria described in the ROD to samples from an upgradient well to determine if the increase in concentration is attributable to the site;
- Sample additional wells not designated for sampling in the current monitoring period to assess the vertical and horizontal extent of concentrations;
- Calculate an ACL for any identified contaminant for which no MCL or health-based level is available, as specified in Section 10.1 of the ROD; and
- Assess the list of analytical parameters and expand the list, if needed.

The USEPA will also receive written notification from OEPA 1) within seven days of the determination of any identified statistically significant release and 2) of the steps taken by OEPA to respond to the release.

### 3.7 REPORTING

During all phases of the groundwater monitoring program, a data summary will be submitted to the OEPA and USEPA within 30 days following the receipt of analytical results from each round of sampling. In addition, a summary report will be submitted to

OEPA and USEPA within 45 days of the receipt of samples for the end of each monitoring phase (Year 4 and Year 30). At a minimum, the summary reports will contain the following:

- A summary of the sampling results from the most recently completed monitoring phase as well as the groundwater elevation at each monitoring well and the groundwater flow direction.
- A list of proposed wells to be sampled in the following monitoring phase, if applicable, including the rationale for well selection.
- A list of proposed analytical parameters for the following monitoring phase, if applicable.
- A proposed sampling frequency for the following monitoring phase.
- Proposed statistical tests to be used in the following monitoring phase to evaluate whether or not a statistically significant release has occurred.
- MCLs, health-based levels, and ACLs to be used to assess whether a laboratory result is significant and requires further action.
- A summary of the monitoring results from Years 2 through 4 and Years 5 through 30.

The need for testing of the full TAL list of parameters will be reviewed after Year 2 of the monitoring program.

Data from the Year 1 monitoring program will be entered into the GRITS/STAT at the outset of the Year 2 groundwater monitoring program. Data entry will be planned such that a statistical comparison using GRITS/STAT will be available to evaluate the laboratory results of the first quarter sampling event for Year 2. An informal reevaluation of the statistical data evaluation procedures will be undertaken and reported at the completion of Year 2 using GRITS/STAT to assess the inorganic parameter list for subsequent monitoring.

## 4.0 OPERATIONS AND MAINTENANCE PROGRAM

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The following section describes the activities of the O&M portion of this Work Plan. The purpose of the O&M program is to describe the tasks necessary to operate and maintain the Bowers Landfill after the installation of the final cap has been completed. Table 4-1 depicts the initial schedule for O&M activities.

### 4.1 GAS MONITORING PROGRAM

Methane and VOCs will be monitored at each of the eight gas vent pipes at the Bowers Landfill. All measurements will be made with direct-reading survey instruments as described in Subsection 4.1.1, using the sampling port near the top of the gas vent pipe. Three readings for methane and three readings for VOCs will be taken in ambient air above the sampling port and in the sampling port at each vent pipe. The inspector will record methane and VOC readings in an inspection log and will compare them to site-specific action levels. The inspector will determine an appropriate course of action if any reading is above an action level. The action levels are provided in Subsection 4.1.2, and field forms are provided in Appendix D.

#### 4.1.1 Monitoring Instruments

Methane and VOC monitoring equipment used at the Bowers Landfill will be direct-reading instruments. Each instrument will be calibrated both before and after each monitoring round to verify proper functioning. Calibration results will be recorded on calibration logs. If the instruments cannot be calibrated within seven days, gas monitoring will be postponed until such calibration can be properly completed and the OEPA will be notified.

The methane monitoring instrument will be capable of measuring the full range of methane, from 0 to 100 percent. The instrument will have multiple measuring ranges, and one range will have an upper limit no higher than 10 percent methane. The instrument will also be able to measure methane without being affected by VOCs. The methane monitoring instrument will be calibrated with methane-free air and at least one methane standard. If a single methane standard is used, the concentration must not exceed 5 percent (the methane action level identified in Section 4.1.2). Both instruments will utilize a sampling probe to sample inside of the gas vent sampling ports.

The VOC monitoring instrument will be a total organic vapor analyzer capable of measuring a VOC range from 0 to at least 1,000 parts per million (ppm). The instrument will have multiple measuring ranges, and one range will have an upper limit no higher than 100 ppm. The instrument will also be able to measure VOCs without being significantly affected by methane. The VOC monitoring instrument will be calibrated with VOC-free air and at least one VOC standard. The VOC standard concentration must not exceed 120 ppm (four times the VOC action level identified in Section 4.1.2). Both instruments will utilize a sampling probe to sample inside of the gas vent sampling ports.

#### 4.1.2 Action Levels

The action levels presented in this section are conservative estimates of concentrations that may pose health and safety problems for workers engaged in O&M activities at the Bowers Landfill. The action levels have been set to alert the lead agency of potential gas emission problems before the problems become critical. Because conservative action levels have been chosen, a methane or VOC reading at the action level does not necessarily indicate an immediate threat. Instead, the detection of methane or VOCs at action levels indicates a situation requiring further investigation and a possible need for increased monitoring. Exceedances of action levels will be reported to the OEPA within 24 hours of detection.

The methane action level is 5 percent in ambient air directly above the gas vent pipe. This level was determined from RCRA regulations in 40 CFR 257.3-8 (a), which set limits for concentrations of explosive gases in solid waste landfills. The regulations state that "the concentration of explosive gases generated . . . shall not exceed 1) 25 percent of the lower explosive limit (LEL) for gases in facility structures (excluding gas control or recovery system components); and 2) the LEL for the gases at the property boundary." Because ambient air is not a facility structure, the first value is not applicable and the second value (the LEL) has been selected as the action level. The LEL for methane is 5 percent.

The VOC action level is 30 ppm in ambient air directly above the gas vent pipe. This action level will prevent on-site O&M workers from being exposed to organic vapors at concentrations above permissible exposure limits (PEL) established by the Occupational Safety and Health Administration (OSHA). In addition, the 30 ppm action level will protect residents living near the Bowers Landfill. The action level is based on the 1 ppm

PEL for 1,2-dichloroethane. This is the lowest PEL for any VOC previously detected at the Bowers Landfill, considering 1) all sample results from 1980 through 1990 and 2) all environmental media.

Based upon results reported by the USEPA's O&M contractor (PRC, 1994), there were no VOC action level exceedances recorded in Year 1. The planned frequency of future VOC monitoring is indicated in Table 4-1. The frequency may be reduced after Year 4, depending on VOC monitoring results for Years 2 through 4. The frequency of VOC monitoring will be reviewed by the OEPA at the end of each O&M phase.

The frequency of methane monitoring will be quarterly for Years 2 through 4. If, after Year 4, all readings have been below the action level, the methane monitoring frequency should be reduced to semi-annually. The frequency of methane monitoring will be reviewed by the OEPA at the end of each O&M phase.

#### 4.2 MAINTENANCE ACTIVITIES

Maintenance activities will be conducted quarterly at the Bowers Landfill for the first four years. For Years 5 through 30, maintenance activities will be conducted semi-annually, except for mowing which will normally be done four times each growing season. Maintenance activities will be reviewed by the OEPA after the end of Year 4 and may be reduced as appropriate. The entire O&M schedule for Years 1 through 30 is shown in Table 4-1. Maintenance activities include inspecting and repairing damage to the landfill cap, landfill vegetation, gas vents, bird screens, monitoring wells, sheet piles, drainage ditch, culvert, slope east of the drainage ditch, wetlands area, entrance gate, and security fencing. A copy of the site inspection log is presented in Appendix D. In addition to regularly scheduled inspections, additional inspections will be conducted after flood events. The additional inspections will be performed when the soil is not saturated and is stable. The U.S. Army Corps of Engineers office in Huntington, West Virginia (304/529-5604) will be contacted monthly for Scioto River level information. Repair of minor damage will begin within approximately 15 days of the inspection and will be completed within the following 30 days as practicable. Repair of major damage will begin within approximately 15 days of the inspection and will be completed within the following 45 days as practicable. Repair and reconstruction activities will be performed to standards consistent with those employed by the government for the remedial construction project at this site.

#### 4.2.1 Landfill Cap

The landfill cover consists of a two-foot clay layer beneath a three-foot topsoil layer. The landfill cover will be visually inspected for settlement, cracks, holes, and other defects. Defects could result from the settlement of existing landfill material or burrowing animals leaving holes in the cover. Conditions will be assessed by the OEPA with respect to their technical significance, and if the integrity of the cover has been significantly compromised as regards its overall effectiveness. The cover will be repaired using materials and methods that are equivalent to those utilized in the original cap construction, and repaired to its original condition according to the time frames previously discussed in Section 4.2.

The landfill will also be inspected for leachate production. If there is visible evidence of leachate production, the leachate will be sampled for VOCs, SVOCs and total metals. If the levels exceed MCLs or health-based levels, the OEPA will determine an appropriate course of action.

After a flood, the landfill topsoil may be saturated and not stable enough to permit an inspection. The landfill will not be inspected until the soil is dry enough and the conditions are such that there will be no tracking of the soil onto the landfill.

#### 4.2.2 Landfill Vegetation

The landfill cover will be mowed four times every year during the months of May through October, or as otherwise dictated by vegetative growth. If gas monitoring results confirm methane concentrations at or above 20 percent the LEL in ambient air above any vent pipe during any monitoring event, then the mower will be required to be fitted with spark arresters to prevent sparking of the equipment. The grass will be cut to approximately five inches above the landfill cap and the cuttings will be left on the landfill surface.

Mowing frequency could decrease if flooding limits access to the landfill. Mowing will also be performed around the mounds where the new monitoring wells have been installed. The gas vents and monitoring wells are set in four-foot concrete bases with steel bumper posts which should be avoided during mowing.

Light vehicles with rubber tires will normally be permitted to operate on the landfill cover surface. After flooding, the landfill topsoil may be saturated and not stable enough to permit these vehicles to operate. If necessary, a walkover inspection will be performed. Mowing the landfill before the soil is dry could damage the cover and may make it difficult to move mowing equipment off the landfill. Mowing will be performed when the soil is dry and when the conditions allow mowing vehicles to operate without adverse impacts. Slopes should be traversed perpendicular to the contour lines when possible.

The landfill cap will be inspected for bare areas. Bare areas will be reseeded as necessary to standards consistent with those employed by the government for the remedial construction project at the site. The re-establishment of vegetation is essential to reduce the amount of infiltration into the landfill and to prevent erosion.

The landfill surface will also be inspected for saplings and brush after mowing. This vegetation will be removed by cutting. The debris that washes up on the landfill after flooding will be removed and properly disposed of.

#### **4.2.3 Gas Vents and Monitoring Wells**

The gas vents and bird screens will be inspected for damage. If paint on the gas vents peels, paint will be scraped off and the vent will be repainted. If there is significant rust on the gas vents, the rusted area will be scraped, primed, and repainted in accordance with the RD specifications. Damaged well pads will be repaired and excess brush will be trimmed from around the well as appropriate. Damage that may limit the effectiveness of the gas venting system will be repaired or replaced expeditiously to mitigate against gas buildup beneath the cap. Bird screens will be inspected to assess integrity, and obstructions in the screens or vents will be removed. Vegetation or other debris caught in the bird screens will be removed. The screens will be inspected for damage by vandals. Damaged bird screens will be replaced or repaired in accordance with the construction specifications. Gas vent and bird screen repairs will be made in accordance with the time frames discussed in Section 4.2.

All gas vents and monitoring wells will be maintained in a like condition. Wells that were not refurbished by the USEPA during remedial construction will be inspected and maintained, as described previously, if they are retained and used in the groundwater monitoring program. The monitoring well protective casings and bumper posts will be inspected. If paint on these items peels, the paint will be scraped off and they will be repainted. Weep holes will be cleared and installed, if necessary. The locks will also be inspected to make sure that they are in working order. Monitoring wells that are no longer needed for water level measurement or sampling will be abandoned with concurrence of OEPA.

#### **4.2.4 Sheet Piles**

Sheet piles will be inspected for separation. Water pressure or soil movement on the landfill cap may cause the piles to move out laterally from the landfill. Separation of the sheet piles will be noted in the inspection log, and the OEPA will be notified seven days before the work commences regarding the recommended course of action.

Soil erosion on the side of the walls facing the Scioto River will be evaluated. The maximum freestanding height of the wall should not exceed 18 feet. Backfill will be placed at the base of the wall, if necessary, to maintain that height.

#### **4.2.5 Drainage Ditch, Culvert, and East Slope**

The drainage ditch and culvert pipe will be inspected for debris that may prevent drainage to the river. Debris found in the culvert will be removed and properly disposed of. The culvert headwalls will be inspected for any damage that may be caused by weathering, erosion, or other factors. Appropriate corrective measures will be taken to repair the damage to the drainage ditch and culvert pipe. Any debris blocking the ditch will also be removed and properly disposed of.

The east slope will be inspected for excessive erosion and bare areas. The east slope will be repaired using methods that are equivalent to those utilized in the original construction and will be repaired to its condition at the transfer of O&M responsibility from the USEPA to the OEPA according to the time frames discussed in Section 4.2.

#### 4.2.6 Wetlands

The wetlands area (Figure 1-2) will be inspected for debris that may have washed up after flooding. Debris will be removed and properly disposed of. The wetlands will also be inspected for bare areas, the presence of standing water, and volunteer hydrophytic species. If bare areas persist, the lead agency will be notified regarding proposed corrective actions.

#### 4.2.7 Entrance Gates, Security Fencing, and Signs

The entrance gates will be inspected to make sure that they are locked and in proper working order. The condition of the locks, fence, and signs will be inspected. Damage to the locks, fence, gates, barbed wire, and signs could result from weathering or vandalism. The plunger bar and locks will be oiled. If locks have rusted and do not function properly, they will be repaired or replaced. If the fence or fence posts have been damaged so that a person could be injured or could enter the site, the damaged fence area will be repaired or replaced. Fencing repairs will be made according to the time frames discussed in Section 4.2.

Signs posted around the landfill area will be inspected to ensure that they are fastened securely to the fences. Signs detached from the fence will be secured. Any missing or illegible sign will be replaced with a sign that complies with the construction specifications. Repair of signs will be made in accordance with the time frames discussed in Section 4.2.

### 4.3 SITE SAFETY MEASURES

O&M personnel on site must take necessary precautions to avoid injuries and maintain the integrity of the cap. Documentation procedures for site safety measures are described in Section 4.4. The following subsections present precautions and safety guidelines for O&M procedures.

#### 4.3.1 Emergency Telephone Numbers

The following emergency numbers should be posted in the field office or in the possession of O&M personnel and kept current:

- Circleville Fire Department (614) 474-2144 or 911
- Pickaway County Sheriff (614) 474-2176 or 911  
or CB Channel 9
- Ambulance Service, Pickaway Co. (614) 474-2176 or 911
- Berger Hospital, Circleville (614) 474-2126
- Pickaway County Disaster Services (614) 477-1165
- USEPA 1-800-572-2515
- OEPA 1-800-282-9378

Fire protection for the Bowers Landfill area is provided by the Circleville Fire Department. In the case of a fire, the Circleville Fire Department should be notified at (614) 474-2144 or 911.

#### 4.3.2 Equipment and Protective Clothing

The Health and Safety Plan (Cummings/Riter, 1993a) contains detailed information on protective equipment and clothing. All personnel inspecting the landfill site or involved in monitoring activities at the landfill will be required to wear steel-toed work boots and work clothing.

Safety equipment will be worn by site visitors and all workers inspecting the fencing and mowing. Safety equipment may include steel-toed work boots and hearing and eye protection when necessary. First aid kits should be included in all maintenance vehicles.

#### 4.3.3 Decontamination

If maintenance equipment comes into contact with waste or contaminated soil or water, it will be rinsed to remove mud and dirt from tires and tracks in a decontamination area. The decontamination water will be collected and disposed of properly according to state and federal regulations. Personnel decontamination procedures are included in the Health and Safety Plan (Cummings/Riter, 1993a).

#### 4.3.4 Noise Levels

Noise levels at the Bowers Landfill will not be excessive. Noise will be limited to that generated by maintenance equipment. However, hearing protection will be available and worn when appropriate.

#### **4.3.5 Landfill Methane and Storage of Flammable Material**

Smoking and open flames shall be prohibited in the immediate vicinity of gas vents to prevent accidental ignition of any gases generated. If gas monitoring results show ambient methane concentrations at or above 20 percent of the LEL, the mower will be fitted with spark arresters.

Flammable material will not be stored at the Bowers Landfill unless necessary and only during working hours. Fuels and lubricants used in landfill maintenance equipment will be stored in proper containers.

#### **4.4 DOCUMENTATION PROCEDURES**

Files containing all O&M information will be maintained by the PRPs or their contractors. The files will include all monitoring logs, records of O&M costs, inspection logs, maintenance records, personnel records, reported emergency records, and monthly and annual reports to the lead agency. Reports to the OEPA will include gas monitoring, maintenance activity, O&M costs, and site safety information. All records and reports will be dated and signed by O&M personnel.

##### **4.4.1 Gas Monitoring Documentation**

Gas monitoring documentation will consist of monitoring logs and records for operating costs. Methane and VOC monitoring logs will include the date and time monitoring occurred, the location of the gas vent, the results of the readings taken, the weather at the time of inspection, and the names of the monitoring team members. A calibration log will include the equipment calibration results. These logs will be submitted to the OEPA with the inspection reports.

##### **4.4.2 Maintenance Activity Documentation**

Maintenance activity documentation will consist of inspection logs, maintenance records, and personnel records. Personnel records will list O&M personnel and their responsibilities. Inspection logs will include the date of inspection, the name of the inspector(s), inspections performed, the weather conditions on the day of the inspection, the condition of the item inspected, and notation of any damages requiring attention. Maintenance records will detail which component of the landfill was damaged and the repair procedure involved. Maintenance records will include the dates the repair was

initiated and completed and the name of the person recording the information. Comments may also be added. Copies of this documentation will be submitted to the OEPA and USEPA. The OEPA will inspect the repairs to ensure that the damage has been repaired satisfactorily and a report will be filed.

#### **4.4.3 Site Safety Documentation**

Site safety documentation will consist of reported emergency records. These records will list the date and time of reporting, a description of the emergency, the action taken, and the signature of the person recording the information. The records will be submitted to the OEPA.

#### **4.5 REPORTING**

A copy of the maintenance, inspection and gas monitoring documentation described in the preceding sections will be submitted to the designated OEPA representative within ten days of the completion of each respective maintenance, inspection or monitoring activity.

If requested by the OEPA, written briefings of the progress of work will also be prepared and submitted.

## REFERENCES

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- Blasland, Bouck & Lee, Inc., 1994, "Annual Report, Year One Ground-Water Monitoring Plan, Bowers Landfill, Circleville, Ohio."
- Cummings/Riter Consultants, Inc., 1993, "Work Plan, Year 1 Groundwater Monitoring, Bowers Landfill Superfund Site, Circleville, Ohio."
- Cummings/Riter Consultants, Inc., 1993a, "Health and Safety Plan, Year 1 Groundwater Monitoring, Bowers Landfill Superfund Site, Circleville, Ohio."
- Dames and Moore, 1988, "Remedial Investigation Report, Remedial Investigation/ Feasibility Study, Bowers Landfill, Circleville, Ohio," prepared for PPG Industries, Inc. and E.I. DuPont de Nemours and Company, Inc.
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- Gibbons, Robert D., 1987, *Statistical Models for the Analysis of Volatile Organic Compounds in Waste Disposal Sites, Ground Water*, Vol. 25, No. 5, pages 572-80.
- Norris, Stanley E., 1975, "The Groundwater Situation in the Circleville Area, Pickaway County, South-Central Ohio," Report of Investigations No. 96, U.S. Geological Survey, Columbus, Ohio.
- PRC Environmental Management, Inc., 1988, "Bowers Landfill, Pickaway County, Ohio, Endangerment Assessment," prepared for U.S. Environmental Protection Agency, Office of Waste Programs Enforcement, under Contract No. 68-01-7331.
- PRC Environmental Management, Inc., 1993, "Bowers Landfill Site Remedial Action, Volume II, Contract Documents," prepared for USEPA Region V, EPA Contract No. 68-W8-0084.
- U.S. Environmental Protection Agency, 1980, "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans (QAMS-005/80)," Office of Monitoring Systems and Quality Assurance, Washington, DC.
- U.S. Environmental Protection Agency, 1989a, "Record of Decision Summary, Bowers Landfill, Circleville, Ohio," Valdas V. Adamkus, Regional Administrator, USEPA Region V.

REFERENCES  
(CONTINUED)

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U.S. Environmental Protection Agency, 1989b, "Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Interim Final Guidance," Office of Solid Waste, EPA/530-SW-29-026.

U.S. Environmental Protection Agency, 1989c, "Risk Assessment Guidance for Superfund," Volume I, Human Health Evaluation Manual (Part A), Interim Final, Office of Emergency and Remedial Response, EPA/540/1-89/002.

U.S. Environmental Protection Agency, 1991, "Region V Model Superfund Quality Assurance Project Plan (QAPP)," Office of Superfund.



# TABLES

## MONITORING WELL DATA

Well Number	Elevation at Top of Well Casing <sup>(a)</sup> (feet MSL)	Elevation at Top of Screen (feet MSL)	Depth to Top of Screen <sup>(b)</sup> (feet)
W-4	677.07	653	24
P-4A	676.22	620	56
W-5	673.69	635	39
P-5A	673.77	627	47
P-5B	673.17	596	77
W-6	676.70	644	32
P-6A	675.70	628	48
P-6B	675.76	613	63
W-7	675.77	642	34
P-7A	675.75	628	48
W-8	675.96	648	28
P-8A	675.78	617	59
P-8B	675.84	567	109
W-9	658.38	649	9
W-10	675.84	647	29
W-11	675.49	647	29
W-12	669.57	654	15
P-12B	668.83	612	56
P-13B	661.06	614	47
W-14 <sup>(c)(d)</sup>	675.83	640	36
P-14A <sup>(c)</sup>	679.29	635	41
P-14B <sup>(c)</sup>	679.15	615	61
P-15A <sup>(c)</sup>	675.27	620	63
P-15B <sup>(c)</sup>	676.89	595	82
W-16 <sup>(c)</sup>	687.01	638	49
P-16A <sup>(c)</sup>	687.55	613	75
P-16B <sup>(c)</sup>	687.96	590	98

- a. Elevations shown represent reported well elevations after modifications proposed in the RD have been made.
- b. Depths shown are estimated (to nearest foot) from top of well casing.
- c. Elevations at and depths to top of screen are estimated.
- d. The reported surface elevation for W-14 is believed to be incorrect and will be evaluated at the outset of the Years 2 through 4 sampling program.

REFERENCES: PRC Environmental Management, Inc., 1991.

PRC Drawing 22 of 22, Volume II of Contract Documents for the Bowers  
Landfill Site Remediation, dated August 18, 1993, Revision 2.

**TABLE 3-1  
MONITORING WELLS  
YEARS 2 THROUGH 4 MONITORING PROGRAM**

Wells, Years 2 through 4, to be included in monitoring.

WELL NUMBER	SATURATED ZONE/LOCATION	REASON FOR INCLUSION
W-5	Shallow, downgradient	Location - shallow well downgradient of landfill
W-6	Shallow, downgradient	Location - downgradient of landfill
W-7	Shallow, downgradient	Location - downgradient of landfill
W-11	Shallow, downgradient	Location - downgradient of landfill
W-12	Shallow, upgradient	Location - shallow upgradient well, unfiltered metal detections above MCL
W-14	Shallow, downgradient	Location - immediately downgradient of landfill, reported isolated detection of bis (2 ethylhexyl) phthalate
P-5A	Intermediate, downgradient	Location - intermediate well downgradient of landfill
P-6A	Intermediate, downgradient	Location - downgradient of landfill, reported isolated detection of bis (2 ethylhexyl) phthalate
P-7A	Intermediate, downgradient	Location - downgradient of landfill
P-15A	Intermediate, downgradient	Location - downgradient of landfill
P-16A	Intermediate, upgradient	Reported detection of bis (2 ethylhexyl) phthalate
P-5B	Deep, downgradient	Location - deep well downgradient of landfill, reported elevated detection of barium in filtered samples
P-6B	Deep, downgradient	Location - downgradient of landfill
P-12B	Deep, upgradient	Location - deep upgradient well
P-14B	Deep, downgradient	Location - downgradient of landfill
P-15B	Deep, downgradient (to be reinstalled)	Consistent reported detection of benzene, question of well integrity, bailer lodged in well, recommend well replacement
P-16B	Deep, upgradient	Location - between landfill and Circleville well field, reported consistent detection of bis (2 ethylhexyl) phthalate

1. Shallow (W-series) wells will be sampled each quarter.
2. Intermediate and deep wells will be sampled in alternate quarters. Wells P-5A, P-6A, P-7A, and P-15A will, however, be sampled in any quarter in which the vertical downward migration velocity is estimated to exceed one foot per month at their respective locations based upon actual water level measurements.

**TABLE 3-2  
RATIONALE FOR EXCLUSION OF MONITORING WELLS  
IN LONG-TERM MONITORING PROGRAM**

Wells recommended by the Year 1 Groundwater Monitoring Report to be excluded in long-term sampling. Water levels will still be obtained in Years 2, 3, and 4 unless noted otherwise.

WELL NUMBER	REASON FOR EXCLUSION
P-4A	Location - off site, location is not relevant to groundwater conditions at Bowers Landfill. Low or nondetection of parameters.
W-4	Location - off site, location is not relevant to groundwater conditions at Bowers Landfill. Low or nondetection of contaminants.
P-13B	Location - susceptible to flooding inundation, possible construction problem limiting sampling access. Low or non-detection of parameters.
P-14A	Location - proximity to P-6A. Low or nondetection of parameters.
W-16	Location - side gradient of landfill, excessive distance from landfill. Low or nondetection of parameters.
W-9	Location - prone to inundation during floods. Only used for water level measurement during Year 1.
W-8	Location - water quality likely affected by Scioto River. Only used for water level measurement during Year 1.
P-8A	Location - water quality likely affected by Scioto River. Only used for water level measurement during Year 1.
P-8B	Location - water quality likely affected by Scioto River. Only used for water level measurement during Year 1.

1. Well W-9 will be abandoned at the outset of the long-term monitoring program.

REFERENCE: Blasland, Bouck & Lee, 1994.

**TABLE 3-3  
ANALYTICAL PARAMETERS  
GROUNDWATER SAMPLING YEARS 2 THROUGH 4**

<b>VOLATILE ORGANIC COMPOUNDS (USEPA METHOD 8240)</b>	
Acetone	1,1 dichloroethylene
Benzene	1,2 dichloroethene (total)
1,1,1-trichloroethylene	
<b>SEMIVOLATILE ORGANIC COMPOUNDS (USEPA METHOD 8270)</b>	
2 Methylnaphtalene	Ideno (1,2,3-cd)pyrene
bis(2-Ethylhexyl)phthalate	Dimethylphthalate
Phenol	Diethylphthalate
Carbayole	Acenaphthene
Di-n-butyl phthalate	Phenanthrene
Fluoranthene	Napthalene
<b>INORGANIC ANALYTES (FILTERED SAMPLES)</b>	
TAL metals	

1. All parameters covered by Methods 8240 and 8270 will be analyzed and reported.
2. Statistical evaluations will be conducted for the parameters listed in this table.
3. Analyses will be on a quarterly basis for the shallow (W-series) wells. Analyses will be on a twice yearly basis for the intermediate and deep wells (P-series) in the sampling program (Table 3-1).
4. Turbidity will be measured for each sample. Samples with turbidity greater than 5 nephelometric turbidity units (NTU), will be filtered prior to analysis for inorganics. Both filtered and unfiltered samples will be analyzed for the inorganics in Table 3-3 if sample turbidity is less than 5 NTU.
5. TAL metals will be analyzed for samples obtained in the first four quarters of the monitoring program (Year 2). The inorganic parameter list will be reevaluated at the end of Year 2.

REFERENCE: Blasland, Bouck & Lee, 1994.

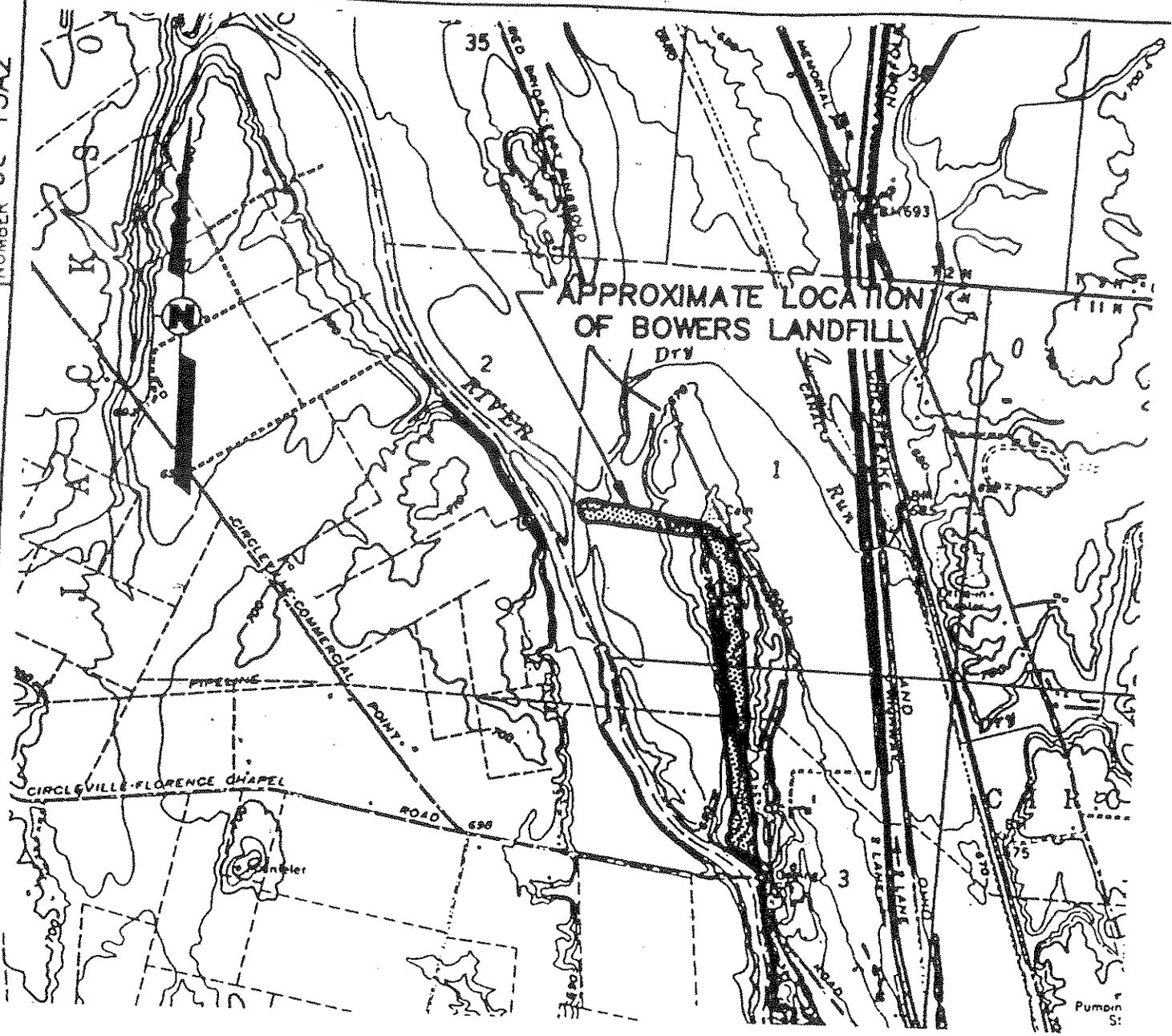
**TABLE 4-1  
O&M SCHEDULE**

TASK	YEAR I	YEARS 2-4 <sup>(a)</sup>	YEARS 5-30 <sup>(a)</sup>
Gas Monitoring for Methane	Quarterly	Quarterly	Semi-Annually
Gas Monitoring for VOCs	Quarterly	Semi-Annually	None
Landfill Cap Inspection	Quarterly	Quarterly	Semi-Annually
Landfill Vegetation Mowing	4 times per year <sup>(b)</sup>	4 times per year <sup>(b)</sup>	4 times per year <sup>(b)</sup>
Diversion Ditch Clearing	Quarterly	Quarterly	Semi-Annually
Gas Vent and Monitoring Well Inspection	Quarterly	Quarterly	Semi-Annually
Sheet Pile Inspection	Quarterly	Quarterly	Semi-Annually
Drainage Ditch and Culvert Inspection	Quarterly	Quarterly	Semi-Annually
Wetlands Inspection	Quarterly	Quarterly	Semi-Annually
Entrance Gates, Fencing, and Sign Inspection	Quarterly	Quarterly	Semi-Annually

- a. Actual frequency may be adjusted with OEPA approval based upon experience gained in the site O&M program.
- b. The landfill vegetation will be mowed four times every year during the months of May through October, or as otherwise necessary based upon vegetative growth.



# FIGURES



APPROXIMATE LOCATION OF BOWERS LANDFILL

SCALE



FIGURE 1-1  
SITE LOCATION MAP  
BOWERS LANDFILL  
CIRCLEVILLE, OH

PREPARED FOR  
E.I. du PONT de NEMOURS AND CO., INC.  
WILMINGTON, DE  
AND  
PPG INDUSTRIES, INC.  
PITTSBURGH, PA

REFERENCE:

7.5 MIN. U.S.G.S. TOPOGRAPHIC MAP  
OF ASHVILLE, OH QUADRANGLE,  
DATED: 1958, PHOTOREVISED: 1970,  
SCALE: 1"=2000'

**GUMMINGS  
RITER**  
CONSULTANTS, INC.

DRAWING NUMBER  
**93115A2**

DRAWN BY: B. HEINACK

DATE: 6-24-93

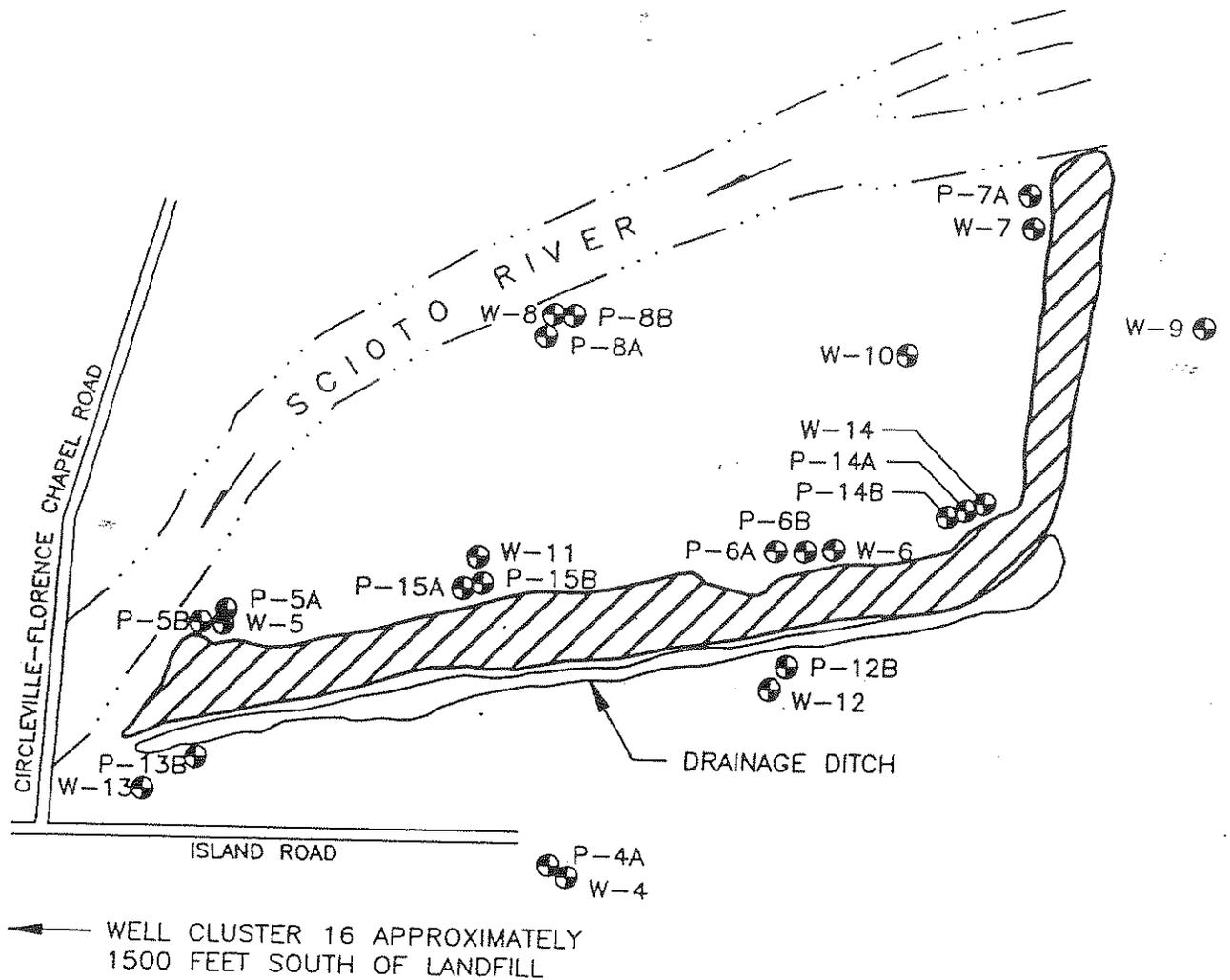
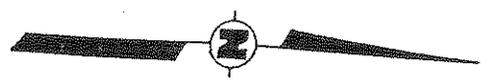
CHECKED BY: D. SPICUZZA

DATE: 6-24-93

APPROVED BY: P. O'HARA

DATE: 6-24-93

REVISION	DATE	DESCRIPTION



(NTS)

**LEGEND:**

- EXISTING LANDFILL
- MONITORING WELL

**REFERENCE:**

PRC ENVIRONMENTAL MANAGEMENT, INC., 1991, "GROUNDWATER MONITORING PLAN FOR BOWERS LANDFILL, CIRCLEVILLE, OHIO" PREPARED FOR UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION V, REMEDIAL AND ENFORCEMENT RESPONSE BRANCH.

**FIGURE 1-2  
GROUNDWATER  
SAMPLING LOCATIONS  
BOWERS LANDFILL  
CIRCLEVILLE, OH**

PREPARED FOR  
E.I. du PONT de NEMOURS AND CO., INC.  
WILMINGTON, DE  
AND  
PPG INDUSTRIES, INC.  
PITTSBURGH, PA

<b>CUMMINGS PETER CONSULTANTS, INC.</b>	DRAWING NUMBER <b>93115A1</b>
---	----------------------------------

DRAWN BY: <i>B. HEINACK</i>	DATE: 6-24-93
CHECKED BY: <i>D. SPICUZZA</i>	DATE: 6-24-93
APPROVED BY: <i>P. O'HARA</i>	DATE: 6-24-93

REVISION	DATE	DESCRIPTION

APPENDIX A

# APPENDIX A

## SUMMARY OF ANALYTICAL RESULTS REMEDIAL INVESTIGATION

TABLE A 2  
 POWERS LANDFILL  
 GROUND WATER SAMPLES (BOUNDS 1, 2, AND 3)

Sample Location:	W-4(1)	W-4(2)	P-4A(1)	P-4A(2)	W-5(1)	W-5(2)	(2-DUP)	M-5	P-5A	P-5A(1)	(1-DUP)	P-5A(2)	P-5B(1)	P-5B(2)	P-5C
<b>ORGANIC COMPOUNDS (UM/L)</b>															
<b>Volatiles</b>															
Benzene															
Methylene Chloride															
Acetone															
Tetrachloroethene															
<b>Non-Volatiles</b>															
Bis(2-ethylhexyl)phthalate															
Di-n-butyl phthalate															
2-Methylnaphthalene															
n-Nitroodiphenylamine															
<b>INORGANIC COMPOUNDS (UM/L)</b>															
Aluminum	(30)														
Arsenic	(3.6)														
Barium	(194) E	(6.4) M	(17.8)	(6.7) M	(3.0) M	(6.8) M	(53)	(2.5) M	(11.8)	(6.4) M	(8.7) M	(24)	(11.1) M	(18.1)	
Calcium	(15000)	(149)	(154) E	(143)	217	213	204	202	203 E	(195)	2020	2020	2020	2070	(18.1)
Chromium															
Cobalt	(11)	(2.3)	(6.4)	(1.2)	(0.30)	(2.60)	(7930)	(8050)	(5400)	(7920)	(7100)	(6730)	(4910)		
Copper	(55)	(67)	(25)	376	1100	794	728	(195)	(18)	(7.4)					
Iron															
Lead															
Cyanide	20														
Magnesium	(3180)														
Manganese	(395) E														
Mercury															
Nickel															
Potassium															
Selenium															
Sodium															
Vanadium															
Zinc															

TABLE A 2 (Continued)  
 BOWERS SAND/FILL  
 GROUND-WATER SAMPLES (ROUNDS 1, 2, AND 3)

Sample Location:	M 6		M 6		M 6(2)		P 6A(1)		P 6A(2)		P 6B		P 6B(2)		P 6B(3)	
	(1-DUP)	(1-EPA)	(1-EPA)	(1-EPA)	(1-EPA)	(1-EPA)	(1-EPA)	(1-EPA)	(1-EPA)	(1-EPA)	(2-DUP)	(2-DUP)	(2-DUP)	(2-DUP)	(2-DUP)	(2-DUP)
<b>ORGANIC COMPOUNDS (UM/L)</b>																
<b>Volatiles</b>																
Benzene																
Methylene Chloride																
Acetone																
Tetrachloroethene																
<b>Non-Volatiles</b>																
Di(2-Ethylhexyl)Phthalate																
Di-n-Butyl Phthalate																
2-Nitrophenol																
n-Nitrosodiphenylamine																

Sample Location:	M 6		M 6		M 6(2)		P 6A(1)		P 6A(2)		P 6B		P 6B(2)		P 6B(3)	
	(1-DUP)	(1-EPA)	(1-EPA)	(1-EPA)	(1-EPA)	(1-EPA)	(1-EPA)	(1-EPA)	(1-EPA)	(1-EPA)	(2-DUP)	(2-DUP)	(2-DUP)	(2-DUP)	(2-DUP)	(2-DUP)
<b>INORGANIC COMPOUNDS (UM/L)</b>																
Aluminum																
Arsenic																
Barium																
Calcium																
Chromium																
Cobalt																
Copper																
Iron																
Lead																
Cyanide																
Nitrate																
Nitrite																
Mercury																
Nickel																
Potassium																
Selenium																
Sodium																
Vanadium																
Zinc																

TABLE A 2 (Continued)  
 BOWERS (AR67) III  
 GROUND-WATER SAMPLES (BOROS 1, 2, AND 5)

Sample Location:	P-7A(1)	P-7A(2)	P-7A (2 EPA)	W-8(1)	W-8(2)	P-8A(1)	P-8A(2)	P-8B(1)	P-8B(2)	P-8B(3)	W-9(1)	W-9(2)	W-10(1)
<b>ORGANIC COMPOUNDS (UG/L)</b>													
<b>Yellish</b>													
Benzene													
Methylene Chloride													
Acetone													
Tetrachloroethene													
<b>Non-Yellish</b>													
Bis(2-Ethylhexyl)Phthalate													
Bis-N-Butyl Phthalate													
2-Naphthalene													
N-Nitrosodiphenylamine													
<b>INORGANIC COMPOUNDS (UG/L)</b>													
Aluminum													
Arsenic	(11)												
Berilium	309 E	306											
Calcium	92700	101000											
Chromium	(13.6)												
Cobalt	(18)												
Copper	1100												
Iron													
Lead													
Cyanide													
Magnesium	39300	35000											
Manganese	314 E	324 E											
Mercury													
Nickel	(28)												
Potassium	5270	11100											
Selenium													
Sodium	12900 E	9420											
Vanadium	(4.0)	(3.9)											
Zinc	(13)	(11)											



TABLE A-2 (Continued)  
 BONES LAKEVILLE  
 GROUND-WATER SAMPLES (ROUNDS 1, 2, AND 3)

Sample Location:	P-130(3)	RW-14(1)	RW-15(1)	RW-16(1)	RW-16(1) (1-DUP)	RW-16
<b>ORGANIC COMPOUNDS (UM/L)</b>						
<b>Volatiles</b>						
Benzene						
Methylene Chloride	1 J	4.3 J				2.4 J
Acetone						
Tetrachloroethene						
<b>Semi-Volatiles</b>						
Bis(2-Ethylhexyl)phthalate						
Di-n-Butyl Phthalate						
2-Methylphthalate						
n-Nitrosodiphenylamine						
<b>INORGANIC COMPOUNDS (UM/L)</b>						
Aluminum						
Arsenic						
Berilium						
Calcium	348	16	14	11	11	(34)
Chromium	78500	(123)	(130)	(9)	(9)	(127)
Cobalt		97100	101000	69700	86400	94100
Copper						
Iron		2510	36000	2370	2250	32
Lead						4670
Cyanide						
Magnesium						
Manganese	27900	39500	34200	31300	30900	31200
Mercury	50 E	39 E	31 E	42 E	42 E	16 E
Nickel						
Potassium						
Selenium						
Sodium	6040	8340 E	19000 E	10400 E	9900 E	9710 E
Vanadium	(4.9)	(16) E	20 E	20 E	22 E	174 E
Zinc						

TABLE A 2 (Continued)  
 MOERS LANDFILL  
 GROUND-WATER SAMPLES (ROUNDS 1, 2, AND 3)

Notes: Blank spaces in table indicate that compound was analyzed for but not detected.

- (1) Round 1 samples collected in February 1987.
- (2) Round 2 samples collected in April 1987.
- (3) Round 3 samples collected in March 1988.
- (DUP) Same 8 Moers field duplicate sample result.
- (EPA) U.S. EPA split sample result.

B Indicates that compound was found in blank samples.

J Indicates an estimated value; compound was found in sample at concentrations below the contract required detection limit.

(XX) See note for J above.

E Indicates that concentration is estimated due to presence of interference during analysis.

M Indicates that spike sample recovery is not within CIP control.

S: Indicates that concentration was determined by method of standard additions but correlation coefficient was less than 0.995.

APPENDIX B

## APPENDIX B

### SUMMARY OF ANALYTICAL RESULTS REMEDIAL DESIGN







TABLE 1 (CONTINUED)  
BOWERS LANDFILL  
GROUND-WATER AND SURFACE WATER SAMPLE RESULTS

ORGANIC COMPOUNDS (µg/L)	SW26 (Filtered)		SW26 (Dup)		SW26 (Filtered)		SW26 (Dup)		SW26 (Filtered)		SW26 (Dup)	
	SW26	SW26	SW26	SW26	SW26	SW26	SW26	SW26	SW26	SW26	SW26	SW26
Volatiles												
Methylene Chloride												
Carbon Disulfide												
Tetrachloroethene												
Semivolatiles												
Bis(2-Ethylhexyl) Phthalate		4 J										
2-Methylnaphthalene												
Di-n-Octyl Phthalate												
Dioctyl Phthalate												
Formaldehyde (SAS)												
<b>INORGANIC COMPOUNDS (µg/L)</b>												
Aluminum	156 B	55.6 B	147	36.4 B	356 B	49.2 B						
Antimony	26.8 B											
Arsenic												
Barium	9.2 B	91.3 B	93.2 B	91.8 B	63 B	62.9 B						
Beryllium												
Cadmium												
Calcium	70,000	71,100	70,300	72,300	267,000	267,000						
Chromium												
Cobalt	4.7 B		5.3 B	3.8 B	19.1 B	19.6 B						
Copper												
Iron	427	47.1 B	435	56.2 B	112	112						
Lead	1.30 BW											
Magnesium	19,200	19,700	19,400	20,100	149,000	150,000						
Manganese	319	264	325	276	30.8	23.1						
Mercury												
Nickel												
Potassium	4,180 B	4,370 B	4,370	4,490 B	19.7 B	15.1 B						
Selenium					9,500	9,910						
Silver												
Sodium	8,590	8,720	8,710	8,810	28,700	28,900						
Thallium												
Vanadium		2.2 B										
Zinc	9.3 B	4 B	9.3 B	10.6 B	3.6 B	6.7 B						

TABLE 2  
BOWERS LANDFILL  
QUALITY CONTROL GROUND-WATER AND SURFACE WATER SAMPLE RESULTS

VOLATILES	ORGANIC COMPOUNDS (ug/L)										
	T11	T12	T13	T14	T15	T16	T17	T18	T19	T20	T21
chloroform	18	17	16	15	13	14					
1,1,1-trichloroethane	2 J	-	-	-	-	-					
carbon disulfide	-	13	-	-	-	-					
toluene	-	1 J	-	-	-	-					
ORGANIC COMPOUNDS (ug/L)											
Aluminum	-	-	-	-	-	76.7	101 B	38.2 B	86.5 B	71.7 B	39.3 B
Antimony	-	-	-	-	-	-	-	-	-	-	-
Arsenic	-	-	-	-	-	-	-	-	-	-	-
Barium	-	-	-	-	-	3 B	-	-	2.4 B	-	-
Beryllium	-	-	-	-	-	-	-	-	-	-	-
Bismuth	-	-	-	-	-	-	-	-	-	-	-
Bromine	-	-	-	-	-	193 B	428 B	85.8 B	103 B	120 B	90.4 B
Calcium	-	-	-	-	-	-	-	-	-	-	-
Cadmium	-	-	-	-	-	-	-	-	-	-	-
Copper	-	-	-	-	-	-	-	-	-	-	-
Iron	-	-	-	-	-	-	-	-	-	-	-
Lead	-	-	-	-	-	81 B	10.8 B	81 B	-	19.9 B	11.8 B
Magnesium	-	-	-	-	-	-	1.6 B	2.3 B	1 B	2.4 B	2 B
Manganese	-	-	-	-	-	20.4 B	30.3 B	-	22.3 B	-	-
Mercury	-	-	-	-	-	1.2 B	-	-	-	-	-
Nickel	-	-	-	-	-	-	-	-	-	-	-
Potassium	-	-	-	-	-	-	-	-	-	-	-
Selenium	-	-	-	-	-	-	-	-	-	-	-
Silver	-	-	-	-	-	-	-	-	-	-	-
Sodium	-	-	-	-	-	-	-	-	-	-	-
Zinc	-	-	-	-	-	-	992 B	-	404 B	-	-
Vanadium	-	-	-	-	-	-	-	-	-	-	-
Chromium	-	-	-	-	-	2.6	4.2 B	-	2.8 B	4.8 B	8.9 B



TABLE 4  
LIST OF DEFINITIONS

DATA QUALIFIERS

- B Indicates that compound was found in blank samples and indicates possible probable contamination
- J Indicates an estimated value; compound was found in sample at concentrations below contract required detection limit; also used when estimating a concentration for TIC (Table 4)
- N Indicates the matrix spike sample recovery is outside the acceptable range
- W Indicates results may be questionable due to contamination in the laboratory (contaminated calibration blank samples)
- Indicates that laboratory duplicate analysis is not within CLP control limits

DEFINITION OF SAMPLES

- P and W Ground-water monitoring well sample
- SW Surface water sample
- TB Trip blank sample
- FB Field blank sample
- DT Decontamination tank sample



## APPENDIX C

### SUMMARY OF ANALYTICAL RESULTS FOR YEAR 1 GROUNDWATER MONITORING (BLASLAND, BOUCK & LEE, INC., 1994)

TABLE 4-13  
 Detected Compounds and Analytes  
 Bowers Lab 888  
 Circleville, OH

P-4A

Volume	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
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NONE DETECTED

Organics	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Is (2-Ethylhexyl) phthalate	ug/l	NO	31	85	318
Phenol	ug/l	NO	NO	2J	NO
Fluorethene	ug/l	NO	NO	NO	8.7J

Inorganics	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
Aluminum	ug/l	2200	49.8	438	NO	1400	70.8	438	102
Antimony	ug/l	NO	NO	NO	NO	NO	NO	NO	4J
Arsenic	ug/l	14.4	8.3	2.4	NO	8	2.8	NO	8.7
Barium	ug/l	178	144	180	140	138	NO	138	132
Beryllium	ug/l	NO	NO	NO	NO	NO	NO	NO	NO
Cadmium	ug/l	NO	NO	NO	NO	NO	NO	NO	NO
Calcium	ug/l	118000	101000	108000	101000	NO	NO	2.1	NO
Chromium	ug/l	41.4	8	49.5	101000	823000	83000	89700	100000
Cobalt	ug/l	8.8	4	NO	NO	30.7	7.8	44.8	NO
Copper	ug/l	11.8	4.2	12.5	NO	NO	NO	2.8	NO
Iron	ug/l	7360	2470	1870	83.7	4000	18.3	82.2	10.8
Lead	ug/l	8.5	1	NO	1	NO	NO	8090	183
Magnesium	ug/l	25800	31800	31800	30800	28000	28200	NO	NO
Manganese	ug/l	88.8	38.1	80.8	21.8	80.8	18.8	81800	82200
Mercury	ug/l	NO	NO	NO	NO	NO	NO	NO	NO
Nickel	ug/l	88.7	8.2	23.8	NO	NO	NO	70.3	18.7
Selenium	ug/l	3180	2210	2320	2380	18.1	NO	NO	NO
Silver	ug/l	NO	NO	NO	NO	2510	3010	80.7	8.8
Sodium	ug/l	NO	NO	NO	NO	NO	NO	4840	4880
Thallium	ug/l	18900	14900	18100	15100	NO	NO	NO	NO
Vanadium	ug/l	NO	1	NO	NO	18100	18200	18800	18800
Zinc	ug/l	8.3	2	NO	NO	NO	NO	NO	NO
		25.2	8	28.7	14.4	33.3	11.8	41.3	21.1

Notes:

- ND = Not Detected
- J = Detected, but below quantitation limits.
- B = Analyte found in the associated blanks, as well as in the sample.
- E = Compounds whose concentration exceeds the calibration range of GC/MS.

TABLE 4-13  
 Detected Compounds and Analytes  
 Brown Landfill  
 Circleville, OH

W-4

Volatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
NONE DETECTED					

Semivolatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
bis(2-Ethylhexyl)phthalate	ug/L	0.6, 0.8	1J	2J	0.8

Inorganics	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
Aluminum	ug/L	46400	83.7	2570	NO	10400	61.1	20800	134
Antimony	ug/L	NO	NO	NO	NO	NO	NO	NO	NO
Arsenic	ug/L	6.7	NO	6.8	NO	4	NO	8.7	4.8
Barium	ug/L	711	140	188	133	4	8.8	230	4.8
Beryllium	ug/L	4.7	NO	NO	NO	293	142	369	142
Cadmium	ug/L	NO	NO	NO	NO	NO	NO	1.8	NO
Calcium	ug/L	328000	86000	87200	NO	NO	NO	1.8	NO
Chromium	ug/L	118	NO	431	80500	131000	84700	218000	NO
Cobalt	ug/L	92.4	NO	NO	NO	78.4	NO	81.8	84300
Copper	ug/L	273	2.2	31	NO	NO	NO	81.8	NO
Iron	ug/L	412000	370	28400	10.8	49	NO	27.7	2.3
Lead	ug/L	88	2.8	4.5	1080	82000	1070	114	NO
Magnesium	ug/L	124000	3000	NO	NO	14.7	NO	211000	844
Manganese	ug/L	1780	108	31100	28200	48000	NO	88.7	NO
Mercury	ug/L	0.2	NO	189	82.8	414	30300	69900	30800
Nickel	ug/L	144	8.8	NO	NO	NO	78.8	1070	88.2
Potassium	ug/L	18200	2130	24	NO	NO	NO	NO	NO
Selenium	ug/L	NO	NO	NO	1710	83.8	NO	63.5	2.2
Silver	ug/L	4.8	NO	NO	NO	8570	1820	8100	1720
Sodium	ug/L	146000	11200	NO	NO	NO	NO	NO	NO
Thallium	ug/L	NO	NO	11700	11200	12500	NO	NO	NO
Vanadium	ug/L	188	NO	NO	NO	NO	11100	14200	12200
Zinc	ug/L	892	NO	84.5	NO	38.8	NO	84.3	NO
						128	4.2	378	21.8

Notes:  
 NO = Not Detected  
 J = Detected, but below quantitation limits.  
 S = Analyte found in the associated blanks, as well as in the samples.  
 E = Compounds whose concentration exceeds the calibration range of GC/MS.

TABLE 4-13  
 Detected Compounds and Analytes  
 Brown Landfill  
 Circleville, OH

P-84

Volatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
NONE DETECTED					

Semi-volatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Diethylphthalate	ug/L	NO	NO	NO	NO
Phenol	ug/L	NO	NO	8.1	NO
Di-n-butylphthalate	ug/L	NO	NO	NO	8.8
Phenanthrene	ug/L	NO	0.51	0.7.8	NO
			1.1	1.1	NO

Inorganics	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Disolved	Total	Disolved	Total	Disolved	Total	Disolved
Aluminum	ug/L	36200	801	1340	NO	NO	NO	57000	123
Antimony	ug/L	NO	NO	NO	NO	872	48.6	NO	NO
Arsenic	ug/L	14.3	2.8	7.1	NO	NO	NO	6	3.8
Barium	ug/L	828	228	233	NO	NO	NO	57000	NO
Beryllium	ug/L	1.8	NO	NO	228	211	NO	85.1	NO
Cadmium	ug/L	8.2	NO	NO	NO	NO	808	848	NO
Chromium	ug/L	203000	NO	NO	NO	NO	NO	2.8	212
Cobalt	ug/L	188	57800	83100	NO	NO	NO	8.3	NO
Copper	ug/L	28.1	NO	38.3	88000	83400	NO	6.3	NO
Iron	ug/L	83.1	4	NO	NO	40.4	85700	805000	67800
Lead	ug/L	57800	8.1	8.8	NO	NO	NO	258	NO
Magnesium	ug/L	34.2	NO	5340	2.8	10.4	NO	67	NO
Manganese	ug/L	70400	1	2.8	2120	1730	3.2	180	NO
Mercury	ug/L	829	27800	28800	1	NO	48.2	142000	388
Nickel	ug/L	NO	NO	128	28200	27100	NO	133	NO
Phosphorus	ug/L	147	8.2	NO	124	82.8	27800	300000	22800
Selenium	ug/L	14100	8.8	28	NO	NO	12	2310	88
Silver	ug/L	NO	NO	3010	NO	NO	NO	8.8	NO
Sodium	ug/L	NO	NO	NO	8800	3370	NO	278	NO
Thallium	ug/L	13700	3	NO	NO	NO	3380	18400	4380
Vanadium	ug/L	1.4	NO	11100	NO	NO	NO	NO	NO
Zinc	ug/L	101	1	NO	12000	NO	8.2	NO	2.2
		270	2.8	NO	NO	11800	11400	16700	14700
			40.2	28.3	10	482	284	182	38.8

Notes:  
 ND = Not Detected  
 J = Detected, but below quantitation limits.  
 S = Analyte found in the associated blanks, as well as in the sample.  
 E = Compounds whose concentration exceeds the calibration range of GC/MS.

TABLE 4-18

Detected Compounds and Analytes  
Sovereign Landfill  
Cincinnati, OH

Location	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Asbestos	ug/L	ND	ND	ND	ND

Substrate	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Isobutyl-2-thiopyranol	ug/L	2.28	2.1	1.1	ND
Phenol	ug/L	2.1	ND	2.2	ND
Chlorobenzene	ug/L	2.2	1.1	2.1	1.1
Diethyl-2-thiopyranol	ug/L	ND	2.2	1.1	2.1
Phenanthrene	ug/L	ND	ND	1.1	2.1
Anthracene	ug/L	ND	2.2	2.1	2.1
Fluoranthene	ug/L	ND	1.1	1.1	2.1
Benzo[a]pyrene	ug/L	ND	ND	2.1	2.1
Dibenz[a,h]anthracene	ug/L	ND	ND	2.1	2.1
Fluorene	ug/L	ND	ND	1.1	ND

Inorganic	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Detected	Total	Detected	Total	Detected	Total	Detected
Aluminum	ug/L	1000	41.5	728	48.8	638	188	284	104
Antimony	ug/L	12.1	12.8	ND	ND	ND	ND	ND	ND
Asphalt	ug/L	42.2	14.5	ND	ND	ND	ND	ND	ND
Beryllium	ug/L	2000	13.70	1728	18.8	1000	12.5	71	11.8
Calcium	ug/L	ND	ND	ND	ND	ND	1116	1040	1040
Chromium	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Cobalt	ug/L	222000	144000	ND	ND	ND	ND	ND	ND
Copper	ug/L	2.3	ND	144000	162000	270000	220000	220000	21000
Iron	ug/L	22.1	8	47.8	ND	22.8	220000	220000	21000
Lead	ug/L	24100	ND	ND	6	ND	ND	14.1	ND
Magnesium	ug/L	2.1	2816	10000	ND	11	ND	14.8	ND
Manganese	ug/L	72000	ND	1.5	ND	44000	13000	21000	11100
Mercury	ug/L	4778	72000	64300	60000	ND	ND	ND	11100
Nickel	ug/L	ND	2700	2540	2500	20000	22700	20000	20000
Polonium	ug/L	ND	ND	ND	ND	ND	1100	4916	2710
Selenium	ug/L	14000	13.8	28.1	2.1	ND	ND	ND	ND
Silver	ug/L	ND	22000	25400	27000	12.2	ND	10	ND
Sodium	ug/L	ND	ND	ND	ND	10000	12700	24000	24000
Vanadium	ug/L	141000	ND	ND	ND	ND	ND	ND	ND
Zinc	ug/L	ND	147000	122000	14000	22000	ND	ND	ND
	ug/L	2.1	ND	ND	ND	20000	100000	140000	107000
	ug/L	223	105	100	22.8	174	21.2	120	24.8

Notes:  
 ND - Not Detected  
 J - Detected, but below quantitation limits.  
 S - Analyte found in the associated blanks, as well as in the sample.  
 E - Compounds whose concentration exceeds the calibration range of GC/MS.

TABLE 4-13  
 Detected Compounds and Analytes  
 Brown Landfill  
 Cincinnati, OH

W-6

Variables	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Acetone	ug/L	ND	ND	ND	EJ
2-Butanone	ug/L	ND	ND	ND	4J

Ben/Aro/Alkyls	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Di(2-Ethylhexyl)phthalate	ug/L	6.8J	14	2J	2.8
Phenol	ug/L	ND	ND	6.8J	67.8
Di-n-butylphthalate	ug/L	ND	6.7J	1.8	ND
Phenanthrene	ug/L	ND	ND	ND	6.8J

Inorganics	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Detected	Total	Detected	Total	Detected	Total	Detected
Aluminum	ug/L	2810	60.2	605	ND	ND	ND	1540	60.8
Antimony	ug/L	ND	ND	ND	ND	800	ND	ND	ND
Arsenic	ug/L	11.2	4.7	2.8	ND	ND	ND	1540	60.8
Barium	ug/L	258	228	218	ND	2.7	ND	ND	ND
Beryllium	ug/L	ND	ND	ND	ND	244	203	272	23
Cadmium	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Calcium	ug/L	105000	60800	66800	ND	ND	ND	ND	ND
Cobalt	ug/L	6703	ND	80.7	60300	60400	60000	69700	60800
Copper	ug/L	8.1	4	ND	ND	ND	ND	ND	ND
Iron	ug/L	12.1	ND	11.8	ND	ND	ND	23.4	ND
Lead	ug/L	6250	ND	2920	ND	246	8.8	2.1	ND
Magnesium	ug/L	1.8	1	2.5	ND	2246	1570	773	1836
Manganese	ug/L	30500	28000	27800	ND	ND	ND	7720	1836
Mercury	ug/L	184	ND	66.8	26300	30000	28000	1	ND
Nickel	ug/L	ND	0.2	67.8	67.8	66.4	22700	26800	26800
Potassium	ug/L	48.2	7.8	ND	ND	ND	ND	121	77.8
Selenium	ug/L	2510	1	8050	8.8	ND	ND	ND	ND
Silver	ug/L	ND	ND	ND	4220	3000	2680	16.8	ND
Sodium	ug/L	ND	ND	ND	ND	ND	ND	2080	2680
Thallium	ug/L	12300	10800	11400	ND	ND	ND	ND	ND
Vanadium	ug/L	ND	ND	ND	11300	11800	12200	ND	ND
Zinc	ug/L	8.4	20.2	4.1	ND	ND	ND	ND	ND
	ug/L	81.8	51.8	648	488	24.8	8.8	63.6	28.8

Notes:

- ND = Not Detected
- J = Detected, but below quantitation limits.
- E = Analyte found in the associated blanks, as well as in the samples.
- E = Compounds whose concentration exceeds the calibration range of GC/MS.

TABLE 4-13  
 Detected Compounds and Analytes  
 Beaver Landfill  
 Cleveland, OH

P-6A

Volatiles		Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Acetone	ug/L		ND	ND	7J	6J

SemiVolatiles		Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Diethyl-terephthalate	ug/L		4J			
Phenol	ug/L		2J	1J	6J	238
Di-n-butyl-terephthalate	ug/L		0.8.8B	ND	0.8J	ND
Dioctyl-terephthalate	ug/L		ND	1J	ND	ND

Inorganics	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Disolved	Total	Disolved	Total	Disolved	Total	Disolved
Aluminum	ug/L	4340	44.7	1110	ND	718	44.8	773	78.3
Antimony	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	ug/L	2.2	2	2.8	ND	ND	ND	ND	ND
Barium	ug/L	291	116	208	ND	ND	ND	ND	ND
Beryllium	ug/L	ND	ND	1.2	110	148	ND	4.4	8.8
Cadmium	ug/L	ND	ND	ND	ND	ND	7	ND	ND
Calcium	ug/L	12500	90700	ND	ND	ND	ND	138	111
Chromium	ug/L	346	ND	87800	ND	ND	ND	ND	ND
Cobalt	ug/L	23.7	ND	888	ND	ND	ND	ND	ND
Copper	ug/L	29.4	ND	17.8	84500	80400	ND	1.4	ND
Iron	ug/L	13100	ND	88.6	8	11.8	87700	82700	81800
Lead	ug/L	7.1	136	8810	3.8	15.8	ND	140	ND
Magnesium	ug/L	41200	ND	3.8	85	8870	8.8	18.1	2.8
Mercury	ug/L	891	30500	1	1	ND	80.1	3270	ND
Nickel	ug/L	ND	885	30700	29700	ND	ND	3270	16.8
Potassium	ug/L	ND	ND	278	134	31800	29800	1.1	ND
Selenium	ug/L	202202	7.8	ND	ND	181	38	32000	81800
Silver	ug/L	4180	1850	234	20.7	ND	38	187	62.8
Sodium	ug/L	ND	ND	3020	2780	148	ND	ND	ND
Sulfur	ug/L	ND	ND	ND	ND	2180	3520	88.2	2.8
Titanium	ug/L	7100	4810	ND	ND	ND	ND	ND	3070
Vanadium	ug/L	ND	ND	8850	ND	ND	ND	ND	ND
Zinc	ug/L	17.3	ND	ND	8280	8380	8520	7180	ND
	ug/L	118	88.8	4.4	ND	ND	ND	2.4	ND
				80.8	34.2	34.2	13.8	83	80.4

Notes:  
 ND = Not Detected  
 J = Detected, but below quantitation limits.  
 B = Analyte found in the associated blanks, as well as in the sample.  
 E = Compounds whose concentration exceeds the calibration range of GC/MS.

TABLE 4-13  
 Detected Compounds and Analytes  
 Brown Landfill  
 Cleveland, OH

P-88

Volatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1,2-Dichloroethane (total)	ug/L	11	ND	ND	ND

Semi-volatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1,2-dibromochloroethane	ug/L	ND	28	18	228
Phenol	ug/L	6J	0.6J	ND	ND
Di-n-butylphthalate	ug/L	1.8E	1J	ND	ND
Dibutylphthalate	ug/L	ND	0.6J	ND	ND

Inorganics	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Detected	Total	Detected	Total	Detected	Total	Detected
Aluminum	ug/L	3700	86.1	1250	ND	831	ND	1250	86.1
Antimony	ug/L	ND	12.8	ND	ND	ND	48.8	ND	ND
Arsenic	ug/L	7.1	2.8	6.8	8.8	ND	ND	ND	ND
Barium	ug/L	1820	782	828	782	8.4	ND	12.7	ND
Beryllium	ug/L	ND	ND	ND	ND	808	1050	846	ND
Cadmium	ug/L	ND	ND	ND	ND	ND	ND	795	ND
Calcium	ug/L	79800	89000	ND	ND	ND	ND	ND	ND
Chromium	ug/L	2140	8.8	8900	8900	89200	8920	1.8	1
Cobalt	ug/L	24.3	ND	254	ND	88.3	8920	89400	82300
Copper	ug/L	78.8	2.8	8.4	ND	ND	ND	191	4
Iron	ug/L	17300	818	4070	2.4	12.8	ND	83.8	ND
Lead	ug/L	7.3	1.1	230	8980	48.8	ND	8310	186
Magnesium	ug/L	25400	22800	23400	2.8	ND	ND	1.7	ND
Manganese	ug/L	1270	858	778	887	22800	22700	25100	24800
Mercury	ug/L	ND	ND	ND	ND	887	820	713	843
Nickel	ug/L	1140	12.7	158	ND	ND	ND	ND	ND
Potassium	ug/L	15800	18200	4880	4810	4370	4830	4780	6080
Selenium	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Silver	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Sulfur	ug/L	24200	22800	18800	18200	18000	18000	18700	18800
Vanadium	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Zinc	ug/L	18.1	ND	8.4	ND	ND	15800	15700	18800
	ug/L	818	27.8	222	18.8	88.4	2.7	188	28.2

Notes:  
 ND = Not Detected  
 J = Detected, but below quantitation limits.  
 E = Analyte found in the associated blanks, as well as in the sample.  
 E = Compounds whose concentration exceeds the calibration range of GC/MS.

TABLE 4-13

Detectable Compounds and Analytes  
 Sewers Landfill  
 Circleville, OH

W-6

Volatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Acetone	ug/L	ND	ND	ND	ND

Semivolatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Di(2-Ethylhexyl)phthalate	ug/L	2J	2J	ND	1.8
Phenol	ug/L	0.8J	ND	ND	ND
Di-n-butylphthalate	ug/L	ND	0.8J	ND	ND
Dimethylphthalate	ug/L	3J	ND	ND	ND
Dioctylphthalate	ug/L	6J	0.7J	ND	ND

Inorganics	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Detected	Total	Detected	Total	Detected	Total	Detected
Aluminum	ug/L	14800	55.4	434	ND	3480	88	1820	84.8
Antimony	ug/L	ND	ND	ND	ND	ND	ND	ND	2.7
Arsenic	ug/L	180	ND	12.8	ND	ND	ND	ND	ND
Barium	ug/L	802	122	138	118	23.8	ND	27.8	ND
Beryllium	ug/L	1.3	ND	ND	ND	184	109	171	ND
Cadmium	ug/L	ND	ND	ND	ND	ND	ND	ND	107
Calcium	ug/L	18700	82300	88300	ND	ND	ND	ND	ND
Chromium	ug/L	808	ND	88400	88400	88100	78200	ND	ND
Cobalt	ug/L	22.7	ND	18.8	ND	28.7	ND	87700	78800
Copper	ug/L	74.8	2	ND	ND	8.8	ND	17.8	ND
Iron	ug/L	112000	38.1	7.7	8	17.2	ND	3.8	ND
Lead	ug/L	18.2	ND	8400	43.1	14800	ND	8.2	ND
Magnesium	ug/L	844000	28400	1.2	1.1	2.8	ND	11400	16.2
Manganese	ug/L	8710	2.7	28300	25800	28000	ND	1.8	ND
Mercury	ug/L	ND	ND	877	10.2	818	34800	28000	28800
Nickel	ug/L	339	ND	ND	ND	2.8	ND	821	7.8
Potassium	ug/L	8990	4.8	18.8	ND	ND	ND	ND	ND
Selenium	ug/L	ND	2880	2730	ND	21.8	ND	18.8	ND
Silver	ug/L	ND	ND	ND	2700	4220	3380	2870	ND
Sodium	ug/L	4.2	ND	ND	ND	ND	ND	7840	ND
Thallium	ug/L	8800	8870	ND	ND	ND	ND	ND	ND
Vanadium	ug/L	1.3	ND	7740	7080	7480	ND	ND	ND
Zinc	ug/L	57.8	ND	ND	ND	ND	8880	8700	7080
		334	8.2	37.3	40.8	10.4	ND	6.3	ND
						43.8	ND	48.1	13.4

Notes:

- ND = Not Detected
- J = Detected, but below quantitation limits.
- B = Analyte found in the associated blanks, as well as in the sample.
- E = Compounds whose concentration exceeds the calibration range of GC/MS.

TABLE 4-18  
 Detected Compounds and Analytes  
 Sewers Landfill  
 Cincinnati, OH

P-7A

Volatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Arsolene	ug/L	ND	13	ND	80

Semivolatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Diethyl-terephthalate	ug/L	ND	6.6J	6.6J	4J
Di-n-butyl-terephthalate	ug/L	6.6J	ND	ND	8J

Inorganics	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Detected	Total	Detected	Total	Detected	Total	Detected
Aluminum	ug/L	14000	85.4	3280	ND	1800	85.8	2220	84
Antimony	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	ug/L	14.2	ND	4.2	ND	ND	ND	ND	ND
Barium	ug/L	575	361	400	ND	ND	ND	ND	ND
Beryllium	ug/L	ND	ND	ND	872	329	312	412	388
Cadmium	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Calcium	ug/L	12800	103000	10800	108000	63500	81800	107000	104000
Cobalt	ug/L	147	ND	18.8	ND	18	ND	17.1	ND
Copper	ug/L	17.8	ND	7.8	ND	ND	ND	2.1	ND
Iron	ug/L	41.7	ND	43.1	ND	ND	ND	8.7	18.8
Lead	ug/L	30800	1800	11800	1830	18.8	17.7	6.7	18.8
Magnesium	ug/L	17.8	ND	8.2	ND	3710	1810	6080	1840
Manganese	ug/L	41000	32700	32800	81800	ND	ND	1.7	ND
Mercury	ug/L	416	87.8	211	82	28100	28700	33800	33000
Molibdenum	ug/L	ND	ND	ND	ND	118	80.4	181	102
Potassium	ug/L	120	8.7	21.8	ND	ND	ND	ND	ND
Selenium	ug/L	7070	2100	2100	1180	18.8	ND	18.8	1480
Silver	ug/L	ND	ND	ND	ND	1880	1280	2580	1480
Sodium	ug/L	4.2	ND	ND	ND	ND	ND	ND	ND
Thallium	ug/L	8580	8100	8040	5380	2	ND	ND	ND
Tungsten	ug/L	1.1	ND	ND	ND	8820	4780	7410	8020
Zinc	ug/L	80.2	ND	10.8	ND	8.2	ND	8.7	ND
	ug/L	154	1802	75.8	8.5	21.8	17.8	48.8	11.7

Notes:

- ND = Not Detected
- J = Detected, but below quantitation limits.
- B = Analyte found in the associated blanks, as well as in the sample.
- E = Compounds whose concentration exceeds the calibration range of GC/MS.

TABLE 4-18  
 Detected Compounds and Analytes  
 Bowers Landfill  
 Cleveland, OH

W-7

Volatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Arsenic	ug/L	ND	ND	108	18
Methylene Chloride	ug/L	ND	ND	ND	4

Semivolatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1,2-Dichloroethane	ug/L	ND	0.8J	1J	18
Phenol	ug/L	2J	2J	ND	ND
Di-n-butylphthalate	ug/L	0.8J	0.8J	ND	1J
Dibutylphthalate	ug/L	4J	ND	ND	ND
Diallylphthalate	ug/L	6J	ND	ND	ND

Inorganics	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
Aluminum	ug/L	1840	48	112	ND	188	63.2	888	88.8
Antimony	ug/L	ND	ND	ND	ND	ND	ND	ND	3.8
Arsenic	ug/L	47.8	10.4	ND	ND	ND	ND	ND	ND
Barium	ug/L	348	183	283	344	281	244	282	288
Beryllium	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Calcium	ug/L	114000	60300	10400	66800	87200	83700	67300	85000
Chromium	ug/L	811	ND	ND	ND	13.8	ND	14.8	ND
Cobalt	ug/L	8.1	ND	ND	ND	ND	ND	14.8	ND
Copper	ug/L	88.2	ND	6.3	ND	4.8	7.8	6.3	ND
Iron	ug/L	80200	2890	8520	4130	8480	4280	7830	3880
Lead	ug/L	2.2	ND	ND	ND	ND	ND	ND	ND
Magnesium	ug/L	43200	28800	3400	23400	ND	ND	ND	ND
Manganese	ug/L	182	83	74.1	70.4	80.7	70.4	32900	38200
Mercury	ug/L	ND	ND	ND	ND	ND	ND	61.1	72.2
Nickel	ug/L	474	4.1	ND	ND	ND	ND	ND	ND
Potassium	ug/L	6780	6170	848	857	883	858	11.2	ND
Selenium	ug/L	ND	ND	ND	ND	ND	ND	2040	1883
Silver	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Sodium	ug/L	7800	6870	7580	7080	6740	6880	7800	7580
Thallium	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	ug/L	8.7	ND	ND	ND	ND	ND	1.5	ND
Zinc	ug/L	112	17.2	22.4	18.7	37.4	20.4	38.8	12

Notes:

- ND = Not Detected
- J = Detected, but below quantitation limit.
- B = Analyte found in the associated blanks, as well as in the sample.
- E = Compounds whose concentration exceeds the calibration range of GC/MS.

TABLE 4-13  
 Detected Compounds and Analytes  
 Sectors Landfill  
 Cincinnati, OH

W-11

Volatiles		Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Acetone	ug/l		ND	ND	808	18

Semi-volatiles		Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
2-Methylfuranthione	ug/l		0.7.B	ND	ND	ND
2-Methylfuranthione	ug/l		ND	2.J	3.J	ND
Phenol	ug/l		0.8.B	ND	ND	U

Inorganics	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Disolved	Total	Disolved	Total	Disolved	Total	Disolved
Aluminum	ug/l	20000	ND	41	4830	82.1	ND	89.7	89
Antimony	ug/l	ND	ND	41	18.5	ND	870	ND	8.4
Arsenic	ug/l	41.8	ND	8.2	44.8	ND	ND	10.8	180
Barium	ug/l	2240	271	ND	822	8.1	78.4	ND	8.8
Beryllium	ug/l	2.6	ND	ND	ND	288	808	ND	208
Cadmium	ug/l	ND	ND	ND	ND	ND	301	ND	8.8
Chromium	ug/l	305000	975000	3.7	ND	ND	ND	ND	685
Cobalt	ug/l	158	ND	163000	ND	ND	ND	ND	ND
Copper	ug/l	44.7	ND	81.8	104000	127000	103000	1.8	ND
Iron	ug/l	84.7	ND	18.8	ND	48.4	ND	18700	103000
Lead	ug/l	1000000	ND	82.2	ND	8.4	ND	60.3	ND
Magnesium	ug/l	88.7	2080	68100	ND	82.2	ND	18.8	ND
Manganese	ug/l	88400	ND	11.3	8480	80400	7310	8.1	87.7
Mercury	ug/l	1440	30500	41000	ND	84.3	7310	100000	ND
Nickel	ug/l	ND	108	818	27100	34700	ND	82.8	4880
Potassium	ug/l	147	ND	ND	381	611	27300	45800	ND
Selenium	ug/l	20000	ND	72	ND	ND	387	733	28300
Silver	ug/l	ND	10400	2330	ND	48.3	ND	ND	417
Sodium	ug/l	ND	ND	ND	1870	4080	1130	71.4	ND
Vanadium	ug/l	12800	ND	ND	ND	ND	ND	8220	2040
Zinc	ug/l	3.8	10800	12400	ND	ND	ND	ND	ND
	ug/l	81.8	1	ND	11200	10000	10200	ND	ND
	ug/l	488	13.3	88.8	11.4	30.8	ND	11800	8850
						84.4	ND	34	ND
							ND	148	22

Notes:  
 ND = Not Detected  
 J = Detected, but below quantitation limits.  
 B = Analyte found in the associated blanks, as well as in the samples.  
 E = Compounds whose concentration exceeds the calibration range of GC/MS.

TABLE 4-13  
 Detected Compounds and Analytes  
 Bowers Landing  
 Cincinnati, OH

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Volatiles		Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Axetone	ug/L		ND	ND	ND	6J

Semi-volatiles		Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
2-Methyltetrahydrofuran	ug/L		1J	1J	ND	1J
Di(2-Ethylhexyl)phthalate	ug/L		ND	0.6J	6J	478

Inorganics	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
Aluminum	ug/L	20300	48.1	84100	87	8710	72.5	88300	116
Antimony	ug/L	18.2	ND	87.7	ND	21.8	ND	4.2	2.1
Arsenic	ug/L	28.2	2.3	27.7	7.3	6.8	ND	88	8.8
Barium	ug/L	478	327	884	230	877	2	88	84.8
Beryllium	ug/L	1.8	ND	8.8	ND	ND	ND	807	84.8
Cadmium	ug/L	ND	ND	ND	ND	ND	ND	1.4	ND
Chromium	ug/L	107000	78400	122000	76700	72800	82200	ND	ND
Cobalt	ug/L	89.8	ND	108	ND	30	ND	80000	76100
Copper	ug/L	30.8	ND	118	ND	ND	ND	63.8	ND
Iron	ug/L	88.8	ND	207	2.8	10.8	ND	81.8	ND
Lead	ug/L	84200	404	251000	1210	81.7	ND	84.7	ND
Magnesium	ug/L	34.8	ND	70.8	2.1	81000	1180	67800	1080
Manganese	ug/L	40800	28000	80400	28000	8.1	ND	28.8	ND
Mercury	ug/L	1880	807	8080	1130	27100	24800	88.8	ND
Nickel	ug/L	ND	ND	0.25	ND	1080	738	33100	27100
Potassium	ug/L	88.1	7	281	8.8	ND	ND	1710	882
Selenium	ug/L	10100	3590	13400	2860	34	ND	ND	ND
Silver	ug/L	ND	ND	ND	ND	4880	8178	61.7	3
Sodium	ug/L	ND	ND	ND	ND	ND	ND	11700	3430
Thallium	ug/L	13800	11700	8.2	ND	ND	ND	ND	ND
Vanadium	ug/L	ND	ND	12700	11800	14600	ND	ND	ND
Zinc	ug/L	48.3	ND	8.4	ND	ND	14500	14200	13300
	ug/L	128	13.1	831	8.8	14.7	ND	88.4	ND
						37.4	ND	153	34.4

Notes:

- ND = Not Detected
- J = Detected, but below quantitation limits.
- B = Analyte found in the associated blanks, as well as in the sample.
- E = Compounds whose concentration exceeds the calibration range of GC/MS.

TABLE 4-13  
 Detected Compounds and Analytes  
 Brown Landfill  
 Circleville, OH

W-12

Volatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Acetone	ug/L	ND	ND	ND	SJ
Tetrahydrothiophene	ug/L	ND	ND	ND	SJ

Organohalides	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
bis(2-Ethylhexyl)phthalate	ug/L	0.8J	4J	ND	8JB

Inorganics	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Detected	Total	Detected	Total	Detected	Total	Detected
Aluminum	ug/L	20400	18.2	5180	40.3	64500	393.1	14100	185
Antimony	ug/L	ND	ND	ND	ND	ND	ND	ND	4.4
Arsenic	ug/L	21.2	2	8.5	ND	ND	ND	15.5	ND
Barium	ug/L	472	132	156	117	21	232	13.5	ND
Beryllium	ug/L	1.7	ND	ND	ND	624	116	232	109
Calcium	ug/L	ND	ND	ND	ND	4.8	ND	ND	ND
Chlorine	ug/L	121000	1000000	80700	ND	ND	ND	ND	ND
Chromium	ug/L	213	ND	50.7	ND	141000	82300	41200	85000
Cobalt	ug/L	28.3	ND	8.2	ND	63.4	ND	46.4	ND
Copper	ug/L	87.2	ND	11.7	ND	41.8	ND	10.8	ND
Iron	ug/L	62600	42.8	8710	2.8	105	ND	18.8	ND
Lead	ug/L	45.8	ND	10.2	ND	10800	91.8	30100	ND
Magnesium	ug/L	38300	28400	84300	25300	203	ND	21.4	ND
Manganese	ug/L	1800	62.4	892	ND	82300	24800	28000	24300
Molybdenum	ug/L	ND	ND	ND	ND	2600	ND	885	8.8
Nickel	ug/L	180	4.3	53.1	ND	0.28	ND	ND	ND
Potassium	ug/L	8480	3850	4020	3100	111	ND	41.3	ND
Silver	ug/L	ND	ND	ND	ND	15700	2940	6220	2780
Sodium	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Thallium	ug/L	8000	8220	8980	5480	ND	ND	ND	ND
Vanadium	ug/L	ND	ND	ND	ND	8120	5750	6350	8640
Zinc	ug/L	85	2.6	18.7	ND	ND	ND	ND	ND
	ug/L	295	10.7	58.3	17.7	184	ND	42	10.1

Notes:

- ND = Not Detected
- J = Detected, but below quantitation limit
- S = Analyte found in the associated blanks, as well as in the sample.
- E = Compounds whose concentration exceeds the calibration range of GC/MS.

TABLE 4-13  
 Detected Compounds and Analytes  
 Beaver Lagoon  
 Clevelan, OH

W-13

Volatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
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NONE DETECTED

Organochlorides	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
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Di-n-butylphthalate ug/L 0.7J NO NO NO

Inorganics	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Detected	Total	Detected	Total	Detected	Total	Detected
Aluminum	ug/L	1400	45.3	NS	NS	NS	NS	NS	NS
Antimony	ug/L	ND	ND	NS	NS	NS	NS	NS	NS
Arsenic	ug/L	23.7	11.8	NS	NS	NS	NS	NS	NS
Bismuth	ug/L	28.1	258	NS	NS	NS	NS	NS	NS
Boron	ug/L	ND	ND	NS	NS	NS	NS	NS	NS
Cadmium	ug/L	ND	ND	NS	NS	NS	NS	NS	NS
Calcium	ug/L	ND	ND	NS	NS	NS	NS	NS	NS
Chromium	ug/L	80600	80100	NS	NS	NS	NS	NS	NS
Cobalt	ug/L	ND	ND	NS	NS	NS	NS	NS	NS
Copper	ug/L	ND	ND	NS	NS	NS	NS	NS	NS
Iron	ug/L	8.4	ND	NS	NS	NS	NS	NS	NS
Lead	ug/L	10500	3080	NS	NS	NS	NS	NS	NS
Magnesium	ug/L	ND	ND	NS	NS	NS	NS	NS	NS
Manganese	ug/L	27400	25200	NS	NS	NS	NS	NS	NS
Mercury	ug/L	801	485	NS	NS	NS	NS	NS	NS
Nickel	ug/L	ND	ND	NS	NS	NS	NS	NS	NS
Polonium	ug/L	17	ND	NS	NS	NS	NS	NS	NS
Selenium	ug/L	8460	8240	NS	NS	NS	NS	NS	NS
Silver	ug/L	ND	ND	NS	NS	NS	NS	NS	NS
Sodium	ug/L	ND	ND	NS	NS	NS	NS	NS	NS
Thallium	ug/L	10100	8200	NS	NS	NS	NS	NS	NS
Vanadium	ug/L	ND	ND	NS	NS	NS	NS	NS	NS
Zinc	ug/L	4.7	2.8	NS	NS	NS	NS	NS	NS
		44.4	11	NS	NS	NS	NS	NS	NS

Notes:

- ND = Not Detected
- J = Detected, but below quantitation limits
- B = Analyte found in the associated blank, as well as in the sample.
- E = Compounds whose concentration exceeds the calibration range of GC/MS.
- NA = Not available, abandoned in May 1994.
- NS = Not sampled.

TABLE 4-13  
 Detected Compounds and Analytes  
 Brown Landfill  
 Cleveland, OH

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Volatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Arsine	ug/L	ND	ND	ND	14

Isocyanides	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
2-Methylisothiazole	ug/L	1.8	ND	ND	ND
4-Methylisothiazole	ug/L	2.1	3.1	7.1	84.8
Formal	ug/L	2.1	ND	6.1	ND
Di-n-butylphthalate	ug/L	ND	ND	1.8	ND

Inorganics	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Disolved	Total	Disolved	Total	Disolved	Total	Disolved
Aluminum	ug/L	10400	82.1	711	ND	44100	123	1110	88.8
Arsenic	ug/L	23.8	ND	ND	82.8	ND	ND	ND	4.0
Azotic	ug/L	118	11.2	3.8	ND	80.8	84.8	7.8	ND
Baryum	ug/L	2210	222	303	300	1180	ND	84.8	ND
Calcium	ug/L	7.8	ND	ND	ND	4.8	ND	ND	34.2
Calcium	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	ug/L	814000	78400	80800	83000	8.8	78600	1.4	ND
Cobalt	ug/L	211	ND	21.1	ND	85.8	ND	78000	78100
Copper	ug/L	147	ND	ND	ND	48.8	8.1	25.4	ND
Iron	ug/L	288	ND	14	2.8	48.8	ND	8.8	ND
Lead	ug/L	240000	887	8340	48.1	188	384	12.8	8.8
Magnesium	ug/L	118	ND	ND	ND	123000	31000	3880	2700
Manganese	ug/L	222000	30800	28400	83.1	483	ND	ND	ND
Mercury	ug/L	2210	28.4	63.8	28400	13200	ND	28300	88300
Nickel	ug/L	ND	ND	ND	12.7	63.1	ND	63.1	84.8
Potassium	ug/L	313	ND	ND	ND	ND	3200	ND	ND
Selenium	ug/L	37000	4080	22.1	30.8	128	ND	18.8	4.4
Silver	ug/L	ND	ND	4480	4080	13100	ND	8430	2840
Sodium	ug/L	2.2	ND	ND	ND	ND	10400	ND	ND
Thallium	ug/L	8880	6370	8730	ND	2.8	ND	ND	ND
Vanadium	ug/L	7.8	1.4	ND	ND	12000	ND	8180	8830
Zinc	ug/L	238	ND	ND	ND	3	ND	ND	ND
	ug/L	801	7.4	40.8	8.8	424	10.4	32.8	17.8

Notes:

- ND = Not Detected
- J = Detected, but below quantitation limits.
- 8 = Analyte found in the associated blanks, as well as in the samples.
- E = Compounds whose concentration exceeds the calibration range of GC/MS.

TABLE 4-13  
 Detected Compounds and Analytes  
 Bowers Landfill  
 Circleville, OH

P-14A

Volatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
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NONE DETECTED

Nonvolatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
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Di-2-chlorophthalate	ug/L	148	nd	0.8J	2.8
Di-4-chlorophthalate	ug/L	NO	NO	1.8B	NO
Dichlorophthalate	ug/L	NO	NO	1.8B	NO

Inorganics	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Detected	Total	Detected	Total	Detected	Total	Detected
Aluminum	ug/L	1640	61.8	8000	44.8	2870	485	630	82.8
Antimony	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	ug/L	8.1	2.2	14.2	15.7	ND	ND	ND	4.4
Barium	ug/L	871	792	378	8	8	2.1	14.8	8.1
Beryllium	ug/L	ND	ND	ND	294	203	188	222	220
Cadmium	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Chromium	ug/L	82300	71800	187000	ND	ND	4.4	ND	ND
Chromium	ug/L	68.7	ND	18.1	ND	80700	61100	ND	ND
Cobalt	ug/L	4	ND	13.8	ND	10.1	ND	8630	8000
Copper	ug/L	138	18.3	31.8	ND	ND	ND	8.5	ND
Iron	ug/L	8310	77.8	2200	ND	ND	ND	2.1	2.8
Lead	ug/L	14.7	ND	8.7	420	8370	13.1	8.4	ND
Magnesium	ug/L	30300	26300	45400	ND	ND	2.4	ND	600
Manganese	ug/L	148	82.3	893	30800	21800	80100	ND	ND
Molybdenum	ug/L	ND	ND	838	78.8	ND	12.8	33300	34100
Nickel	ug/L	48.2	11.1	34.5	ND	ND	ND	638	627
Potassium	ug/L	5100	3480	3930	ND	ND	ND	ND	ND
Selenium	ug/L	ND	ND	ND	2080	2840	3340	8.8	2.1
Silver	ug/L	ND	ND	ND	ND	ND	ND	2740	2720
Sodium	ug/L	18700	14200	10700	ND	ND	ND	ND	ND
Thallium	ug/L	ND	ND	ND	8320	7430	8870	ND	ND
Vanadium	ug/L	8.3	ND	25.3	ND	ND	ND	11000	10800
Zinc	ug/L	43.8	16.2	88.8	8	ND	ND	1.8	ND
					ND	31.0	23.5	88	8.1

Notes:

- ND = Not Detected
- J = Detected, but below quantization limits.
- B = Analyte found in the associated blanks, as well as in the sample.
- E = Compounds whose concentration exceeds the calibration range of GC/MS.

TABLE 4-13  
 Detected Compounds and Analytes  
 Brown Landfill  
 Olmstedville, OH

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Volatiles		Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Tetrachloroethene	ug/L		2J	ND	ND	ND

Semi-volatiles		Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Diethylphthalate	ug/L		ND	0.8J	0.8J	0.7J
Dibutylphthalate	ug/L		ND	ND	1.8	ND

Inorganics	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Disolved	Total	Disolved	Total	Disolved	Total	Disolved
Aluminum	ug/L	11800	128	1210	138	3180	71.8	4080	64.8
Antimony	ug/L	33.7	ND	ND	ND	ND	ND	ND	4.1
Arsenic	ug/L	18.7	17.2	7.1	2.9	6.8	ND	ND	ND
Barium	ug/L	2340	318	718	718	6.8	4.5	ND	8.7
Beryllium	ug/L	7.3	ND	ND	888	894	808	881	ND
Cadmium	ug/L	8.3	ND	ND	ND	ND	ND	ND	64.5
Calcium	ug/L	1020000	83200	ND	ND	ND	ND	ND	ND
Chromium	ug/L	236	ND	80700	80800	88000	80800	ND	ND
Cobalt	ug/L	128	ND	30.2	ND	83.8	ND	88000	87400
Copper	ug/L	304	2	ND	ND	12.8	ND	67.7	ND
Iron	ug/L	30800	401	11.3	2	24.1	8.1	ND	ND
Lead	ug/L	121	ND	8380	1800	8380	1070	34.3	ND
Magnesium	ug/L	213000	33800	2.4	ND	8.8	ND	10000	1200
Manganese	ug/L	8000	443	31000	27800	34000	28000	8.1	ND
Mercury	ug/L	0.36	ND	102	51.3	180	ND	38800	22000
Nickel	ug/L	300	8.8	80	ND	ND	ND	143	40.5
Potassium	ug/L	28000	3140	2880	8.8	32	ND	ND	ND
Selenium	ug/L	ND	ND	2240	2240	4810	ND	88.1	2.2
Silver	ug/L	7.8	ND	ND	ND	ND	4170	4430	8780
Sodium	ug/L	17300	13200	10500	8080	1100	ND	ND	ND
Thallium	ug/L	1	ND	ND	ND	ND	ND	ND	ND
Vanadium	ug/L	443	ND	25.3	ND	ND	ND	11300	12400
Zinc	ug/L	10000	4.4	31.2	ND	41.8	12.7	10.5	ND

Notes:  
 @ = Not Detected  
 J = Detected, but below quantitation limits.  
 B = Analyte found in the associated blank(s), as well as in the sample.  
 E = Compounds whose concentration exceeds the calibration range of GC/MS.

TABLE 4-13  
 Detected Compounds and Analytes  
 Brown Landfill  
 Circleville, OH

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Volatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Acetone	ug/L	ND	ND	ND	41

Nonvolatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
1,2-Dichloroethane	ug/L	ND	ND	1J	3.8
Phenol	ug/L	ND	ND	0.8J	ND
Dibenzylideneacetone	ug/L	ND	ND	1.8	ND
Dibenzylideneacetone	ug/L	ND	3J	ND	ND

Inorganics	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
Aluminum	ug/L	30400	172	13000	38.2	23000	80.7	14300	170
Antimony	ug/L	ND	ND	ND	ND	ND	ND	14300	170
Arsenic	ug/L	8.8	4.2	13.1	7.6	27.3	6.9	7.1	2
Barium	ug/L	801	183	822	186	778	188	137	4.8
Beryllium	ug/L	2.4	ND	1.5	ND	3.25	ND	720	188
Cadmium	ug/L	ND	ND	ND	ND	ND	ND	1	ND
Chromium	ug/L	250000	82800	182000	89100	3	ND	1.8	ND
Cobalt	ug/L	102	ND	67.7	ND	218000	80300	204000	85100
Copper	ug/L	42.2	ND	80	ND	77.8	ND	88.1	ND
Iron	ug/L	140	ND	74.2	ND	84.4	ND	87.8	2.4
Lead	ug/L	137000	418	88800	438	114	3.2	103	ND
Magnesium	ug/L	88	ND	13.8	ND	110000	442	88000	190
Manganese	ug/L	7800	30800	81000	31200	87	ND	41.7	ND
Molybdenum	ug/L	1700	388	891	384	88400	28200	85100	32800
Nickel	ug/L	ND	ND	ND	ND	1420	288	1330	40
Potassium	ug/L	184	ND	80.8	ND	ND	ND	ND	ND
Selenium	ug/L	12100	2360	8780	2510	82	ND	120	ND
Silver	ug/L	ND	ND	ND	ND	10300	2570	7110	220
Sodium	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Thallium	ug/L	11000	8730	10200	ND	ND	ND	ND	ND
Vanadium	ug/L	ND	ND	ND	8250	10100	8780	12000	870
Zinc	ug/L	148	4.2	88.1	178	122	2.5	80.4	ND
		389				285	12.8	280	8.8

Notes:

- ND = Not Detected
- J = Detected, but below quantitation limits.
- S = Analyte found in the associated blanks, as well as in the samples.
- E = Compounds whose concentration exceeds the calibration range of GC/MS.

TABLE 4-13  
 Detected Compounds and Analyses  
 Brown Landfill  
 Circleville, OH

P-16A

Volatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
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NONE DETECTED

Semi-volatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
bio(2)-Dibenzophthalate	ug/L	ND	12	8J	8J
Di-n-butylphthalate	ug/L	ND	0.6J	ND	ND
Dibenzophthalate	ug/L	ND	0.7J	ND	ND
Acenaphthene	ug/L	ND	ND	7J	ND

Inorganics	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
Aluminum	ug/L	60700	170	6310	40.8	1680	78.7	1040	88.7
Antimony	ug/L	20.3	14.3	ND	ND	ND	ND	ND	2.3
Arsenic	ug/L	40.4	2.8	8.7	ND	ND	ND	ND	ND
Barium	ug/L	1020	60.7	171	76.8	83.8	71.8	81.8	80.1
Beryllium	ug/L	8.8	ND	ND	ND	ND	ND	ND	ND
Calcium	ug/L	8.1	ND	ND	ND	ND	ND	ND	ND
Chromium	ug/L	530000	60400	129000	63200	ND	ND	ND	ND
Cobalt	ug/L	310	ND	33.3	ND	67300	81600	69600	84100
Copper	ug/L	67.4	ND	8.8	ND	31.8	7.4	80.7	ND
Iron	ug/L	205	ND	28.8	ND	8.8	ND	8	ND
Lead	ug/L	166000	179	13200	110	12.8	ND	82.4	ND
Magnesium	ug/L	ND	ND	8.8	ND	3040	80	2280	23.8
Manganese	ug/L	168000	28200	40600	ND	ND	ND	ND	ND
Molybdenum	ug/L	3180	67.3	280	28800	27800	20300	26700	28300
Nickel	ug/L	ND	ND	ND	83.8	82.4	18.4	80.8	8.8
Potassium	ug/L	298	4.3	31.3	ND	ND	ND	ND	ND
Selenium	ug/L	28200	2130	8690	34.8	ND	ND	12.7	ND
Silver	ug/L	ND	ND	ND	3090	2480	2010	8410	ND
Sodium	ug/L	8.8	ND	ND	ND	ND	ND	ND	3470
Thallium	ug/L	7810	3740	4890	ND	ND	ND	ND	ND
Vanadium	ug/L	ND	ND	ND	4022	8180	3780	8600	4420
Zinc	ug/L	238	ND	22.1	ND	ND	ND	ND	ND
notes:		674	13.4	84.3	14.3	14.8	ND	84.3	12.8

ND = Not Detected  
 J = Detected, but below quantization limits.  
 B = Analyte found in the associated blanks, as well as in the samples.  
 E = Compounds whose concentration exceeds the calibration range of GC/MS.

TABLE 4-18  
 Detected Compounds and Analytes  
 Bowers Landfill  
 Circleville, OH

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Volatiles		Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Acetone			ND		NS	
Benzene	ug/L		ND	18	NS	
Tetrachloroethene	ug/L		ND	30	NS	18
				ND	NS	8J
					NS	ND

SemiVolatiles		Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Methylmethphalate						
Di-(2-Ethylhexyl)phthalate	ug/L		ND	2J	NS	ND
Phenol	ug/L		ND	19	NS	2.8
Di-n-butylphthalate	ug/L		ND	1J	NS	3.8
Dioctylphthalate	ug/L		ND	2J	NS	0.6J
				0.7J	ND	1J

Inorganics	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Detected	Total	Detected	Total	Detected	Total	Detected
Aluminum	ug/L								
Antimony	ug/L	2180	85.6	411000	282	NS			
Arsenic	ug/L	ND	3.8	45.8	NS				
Barium	ug/L	47.5	47.3	ND	51	NS	NS	175	89.5
Beryllium	ug/L	248	223	ND	ND	NS	NS	NS	NS
Cadmium	ug/L	ND	ND	6380	61.5	NS	NS	NS	8.9
Calcium	ug/L	ND	ND	38.2	ND	NS	NS	NS	ND
Chromium	ug/L	75800	ND	ND	ND	NS	NS	NS	620
Cobalt	ug/L	347	84800	2710000	7350	NS	NS	NS	NS
Copper	ug/L	8.3	ND	2510	ND	NS	NS	NS	81
Iron	ug/L	274	8.8	1380	ND	NS	NS	NS	65800
Lead	ug/L	11000	674	2180000	8.3	NS	NS	NS	8
Magnesium	ug/L	ND	ND	ND	1830	NS	NS	NS	ND
Manganese	ug/L	27300	ND	ND	NS	NS	NS	NS	8.4
Mercury	ug/L	730	21400	840000	ND	NS	NS	NS	8830
Nickel	ug/L	ND	347	24800	3430	NS	NS	NS	44.7
Potassium	ug/L	140	13.5	2.5	22.8	NS	NS	NS	18300
Selenium	ug/L	30800	29800	3080	10.5	NS	NS	NS	395
Silver	ug/L	ND	ND	80100	3730	NS	NS	NS	ND
Sodium	ug/L	4.2	ND	ND	ND	NS	NS	NS	23.4
Thallium	ug/L	38200	ND	40.8	ND	NS	NS	NS	23300
Vanadium	ug/L	ND	48500	110000	6.5	NS	NS	NS	ND
Zinc	ug/L	8.1	ND	1230	ND	NS	NS	NS	ND
		72.7	18.1	4820	12.5	NS	NS	NS	82000
									68500
									ND
									70.1
									12.4

Notes:  
 ND = Not Detected  
 J = Detected, but below quantitation limits.  
 B = Analyte found in the associated blanks, as well as in the samples.  
 E = Co-compounds whose concentration exceeds the calibration range of GC/MS.  
 NS = Not sampled.

TABLE 4-13  
 Detected Compounds and Analytes  
 Below Levels  
 Cincinnati, OH

P-16A

Volatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
S-Glutarone	ug/L	ND	ND	ND	2J

Semivolatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Methylmercaptane	ug/L	ND	1J	NS	ND
Diethyl-mercaptane	ug/L	ND	14	34	278
Phenol	ug/L	2J	ND	ND	0.5.5E
Di-n-butylmercaptane	ug/L	ND	0.6J	ND	ND

Inorganics	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Detected	Total	Detected	Total	Detected	Total	Detected
Aluminum	ug/L	18300	82.8	180000	108	30400	85	11000	84
Antimony	ug/L	ND	ND	80.4	ND	ND	ND	11000	2.0
Arsenic	ug/L	18.2	7.2	ND	ND	ND	ND	2.7	2.0
Barium	ug/L	482	227	2780	8.1	31.1	10.9	38.8	8.3
Beryllium	ug/L	1.8	ND	13.8	ND	788	250	421	272
Cadmium	ug/L	ND	ND	4	ND	4	ND	ND	ND
Chromium	ug/L	181000	78700	1810000	ND	ND	ND	ND	ND
Cobalt	ug/L	80	ND	408	77100	454000	81400	15808	ND
Copper	ug/L	19.4	4	848	ND	138	ND	15808	84200
Iron	ug/L	84.2	ND	780	ND	28.8	ND	44.8	ND
Lead	ug/L	80900	1080	830000	8	143	ND	16.2	ND
Magnesium	ug/L	88.8	1.8	188	1.8	168000	1250	84.7	ND
Manganese	ug/L	870000	27800	477000	1.8	68.2	ND	38000	1480
Molybdenum	ug/L	725	84	8220	27800	147000	27300	14.4	ND
Nickel	ug/L	ND	ND	8.84	134	1880	ND	82000	28400
Potassium	ug/L	74.8	4.3	874	ND	ND	4.2	800	27.7
Selenium	ug/L	12300	8780	35800	8.8	172	ND	ND	ND
Silver	ug/L	ND	ND	ND	2830	10900	ND	84.7	2.8
Sodium	ug/L	ND	ND	18	ND	ND	1880	8720	1880
Thallium	ug/L	8080	8780	8800	ND	ND	ND	ND	ND
Vanadium	ug/L	ND	ND	2	8400	8870	8180	ND	ND
Zinc	ug/L	44.7	ND	144	ND	3	8180	8340	8880
	ug/L	188	10.7	2230	8.2	428	4.2	21.8	ND
								110	13.1

Notes:  
 ND = Not Detected  
 J = Detected, but below quantitation limits.  
 E = Analyte found in the associated blanks, as well as in the sample.  
 E = Compounds whose concentration exceeds the calibration range of GC/MS.

TABLE 4-13  
 Detected Compounds and Analytes  
 Brown Landfill  
 Cincinnati, OH

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Volatile	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
NONE DETECTED					

Semi-volatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Di(2-Ethylhexyl)phthalate	ug/L	87EB	34	320E	84E
Di-n-butylphthalate	ug/L	ND	0.8J	2.8	0.7J
Dioctylphthalate	ug/L	ND	4J	0.8JB	ND

Inorganics	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Detected	Total	Detected	Total	Detected	Total	Detected
Aluminum	ug/L	897	82.8	1050	40.8	854	80.2	840	82.8
Antimony	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Arsenic	ug/L	8	7.8	13.8	6	28.2	8.2	8.8	ND
Barium	ug/L	248	187	212	201	346	232	274	257
Bismuth	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Calcium	ug/L	ND	ND	8.1	ND	ND	ND	ND	ND
Chromium	ug/L	84100	74400	78400	81800	87800	84800	82100	88500
Cobalt	ug/L	253	8.7	82.8	ND	28.3	ND	43	ND
Copper	ug/L	4.3	ND	ND	ND	ND	ND	4.3	ND
Iron	ug/L	78.7	ND	28.5	ND	ND	ND	2.4	ND
Lead	ug/L	8640	173	3780	18.3	18.3	ND	48.1	ND
Magnesium	ug/L	8.2	ND	3.8	ND	1.7	ND	2390	313
Manganese	ug/L	34800	28200	28000	28400	28400	ND	ND	ND
Mercury	ug/L	201	118	125	87.8	28400	28800	21800	30800
Nickel	ug/L	ND	ND	ND	ND	87	88.8	73.1	48.3
Potassium	ug/L	134	8.1	83.8	ND	ND	ND	ND	ND
Selenium	ug/L	5300	8000	4810	4680	3820	ND	28.3	8.8
Silver	ug/L	ND	ND	ND	ND	ND	ND	3300	2870
Sodium	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Thallium	ug/L	8010	7180	8510	31.7	ND	ND	ND	ND
Vanadium	ug/L	ND	ND	ND	8330	8110	8850	8080	8850
Zinc	ug/L	2.8	ND	ND	ND	ND	ND	ND	ND
	ug/L	80.8	4.3	38.5	10.7	23.8	2.7	27.4	10.1

Notes:  
 ND = Not Detected  
 J = Detected, but below quantitation limits.  
 B = Analyte found in the associated blanks, as well as in the sample.  
 E = Compounds whose concentration exceeds the calibration range of GC/MS.

TABLE 4-13  
 Detected Compounds and Analytes  
 Seneca Landfill  
 Circleville, OH

W-18

Volatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
NONE DETECTED					

Semivolatiles	Units	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Di- <i>n</i> -butylphthalate	ug/L	ND	4J	88	128
Di- <i>n</i> -octylphthalate	ug/L	ND	ND	ND	0.6J
Phenanthrene	ug/L	ND	ND	ND	0.6J

Inorganics	Units	FIRST QUARTER		SECOND QUARTER		THIRD QUARTER		FOURTH QUARTER	
		Total	Dissolved	Total	Dissolved	Total	Dissolved	Total	Dissolved
Aluminum	ug/L	21800	80.7	1720	ND	ND	ND	804	78.1
Arsimony	ug/L	17	ND	ND	ND	1810	58.7	ND	4.2
Arsenic	ug/L	7	7.7	8	8.8	ND	ND	ND	ND
Barium	ug/L	398	129	187	84.2	7.2	ND	11.8	ND
Beryllium	ug/L	2.1	ND	ND	ND	127	85.6	124	102
Cadmium	ug/L	12.9	ND	ND	ND	ND	ND	ND	ND
Calcium	ug/L	214000	123000	89800	89000	ND	ND	ND	ND
Chromium	ug/L	80.8	ND	28.4	ND	102000	87300	2.7	1.1
Cobalt	ug/L	22.8	ND	ND	ND	44.8	ND	110000	108000
Copper	ug/L	88.2	3.8	24.7	ND	ND	ND	21.1	ND
Iron	ug/L	102000	2050	10700	2.1	48.8	3.1	3.1	ND
Lead	ug/L	40.8	ND	10700	1880	7850	80.2	48.8	4.3
Magnesium	ug/L	67800	39300	3.5	ND	2.7	ND	7210	88.7
Manganese	ug/L	714	41.8	80.7	25900	32000	30800	2.8	ND
Mercury	ug/L	ND	ND	ND	31.8	70.8	8.8	30800	34800
Nickel	ug/L	74.8	10.3	21.2	ND	ND	ND	72.7	10.8
Potassium	ug/L	12300	8080	4830	ND	23.8	ND	ND	ND
Selenium	ug/L	ND	ND	ND	4640	8070	4530	15.8	3.7
Silver	ug/L	ND	ND	ND	ND	ND	ND	7880	7810
Sodium	ug/L	8570	8850	8280	8430	ND	ND	ND	ND
Thallium	ug/L	ND	ND	ND	ND	ND	ND	ND	ND
Vanadium	ug/L	88.8	ND	8.2	ND	8520	5830	8030	7820
Zinc	ug/L	219	8.8	48.5	8.5	55.7	10.8	2.8	ND
								58.8	18.1

Notes:

- ND = Not Detected
- J = Detected, but below quantization limits
- S = Analyte found in the associated blanks, as well as in the sample.
- E = Compounds whose concentration exceeds the calibration range of GC/MS.



# APPENDIX D

## FIELD FORMS







Appendix B - Guidance Document List

## Appendix B

# OHIO EPA AND U.S. EPA GUIDANCE DOCUMENTS

### Statement of Purpose and Use of This Guidance Document List:

The purpose of this list of Ohio EPA and U.S. EPA policies, directives and guidance documents is to provide a reference of the documents which provide essential direction and guidance for conducting investigations, evaluating alternative remedial actions, and designing and implementing selected remedial actions at sites for which the Division of Emergency and Remedial Response has authority over such activities. Certain sites may have contaminants or conditions which are not fully addressed by the documents in this list. There is an evolving body of policy directives, guidance and research documentation which should be utilized, as necessary, to address those conditions and contaminants not encompassed by the documents in this list. For sites where activities are conducted in response to an administrative or judicial order, this list would be an attachment to the order and would govern the work conducted pursuant to it. When entering into or issuing an order for a particular site, Ohio EPA reserves the right to modify this list to fully address the site conditions.

### OHIO EPA POLICIES AND GUIDANCE DOCUMENTS

1. Background Sampling Guidance, Final, Ohio EPA, Division of Emergency and Remedial Response, July 26, 1991
2. Best Available Treatment Technologies (BATT) for Remedial Response Program Sites, Ohio EPA Policy No. DERR-00-RR-016, Final, October 23, 1992
3. Guidelines and Specifications for Preparing Quality Assurance Project Plans, Ohio EPA, Division of Emergency and Remedial Response, Policy No. DERR-00-RR-008, March 1990
4. How Clean is Clean, Final, Ohio EPA, Division of Emergency and Remedial Response, Policy No. DERR-00-RR-009, July 26, 1991
5. Procedures for Evaluation of Response Action Alternatives and Remedy Selection for Remedial Response Program Sites, Ohio EPA Policy No. DERR-00-RR-019, Final, October 23, 1992
6. Technical Guidance Manual for Hydrogeologic Investigations and Ground Water Monitoring Programs, Ohio EPA, Division of Drinking and Ground Waters, Final, February 1995

7. Wastewater Discharges Resulting from Clean-Up of Response Action Sites Contaminated with Volatile Organic Compounds, Ohio EPA Policy No. DSW-DERR 0100.027, Final, September 22, 1994

Also, if there are any aquatic ecological concerns for the site under investigation please consult the following Biological Criteria documents:

- 8a. Biological Criteria for the Protection of Aquatic Life: Volume I. The Role of Biological Data in Water Quality Assessment. Ohio EPA, Division of Surface Water, 1987
- 8b. Biological Criteria for the Protection of Aquatic Life: Volume II. Users Manual for Biological Field Assessment of Ohio Surface Waters. Ohio EPA, Division of Surface Water, 1987
- 8c. Addendum to Biological Criteria for the Protection of Aquatic Life: Volume II. Users Manual for Biological Field Assessment of Ohio Surface Waters. Ohio EPA, Division of Surface Water, 1989
- 8d. Biological Criteria for the Protection of Aquatic Life: Volume III. Standardized Biological Field Assessment of Ohio Surface Waters. Ohio EPA, Division of Surface Water, 1989
- 8e. Rankin, E.T. 1989. The Qualitative Habitat Evaluation Index (QHEI): Rationale, Methods, and Application. Ohio EPA, Division of Surface Water, 1990

#### U.S. EPA GUIDANCE DOCUMENTS AND OTHER USEFUL GUIDANCE

9. CERCLA Compliance with Other Laws Manual - Part I, OSWER Directive 9234.1-01, EPA/540/G-89/006, August 1988, interim final
10. CERCLA Compliance with Other Laws Manual - Part II, OSWER 9234.1-01, EPA/540/G-89/006, August 1988, interim final
10. A Compendium of Technologies Used in the Treatment of Hazardous Wastes, EPA/625/8-87/014, September 1987
12. A Rationale for the Assessment of Errors in the Sampling of Soils, EPA/600/4-90/013, July 1990
13. Assessment of Technologies for the Remediation of Radioactively Contaminated Superfund Sites, EPA/540/2-90/001, January 1990
14. Closure of Hazardous Waste Surface Impoundments, SW-873, September 1980

15. Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites, OSWER Directive 9355.3-11, EPA/540/P-91/001, February 1991
16. Data Quality Objectives Process for Superfund, Interim Final Guidance, OSWER Directive 9355.9-01, EPA/540-R-93-071, September 1993
17. Ecological Assessments of Hazardous Wastes Sites: A Field and Laboratory Reference, EPA/600/3-89/013, March 1989
18. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments
19. Exposure Factors Handbook, EPA/600/8-89/043, March 1990
- 20.\* Guidance for Remedial Actions for Contaminated Ground Water at Superfund Sites, OSWER Directive 9283.1-2, EPA/540/G-88/003, December 1988, interim final
21. Guidance for Conducting Remedial Investigation and Feasibility Studies under CERCLA, Interim Final, OSWER 9355.3-01, EPA/540/G-89/004, October 1988
- 22.\* Guidance on Remedial Actions for Superfund Sites with PCB Contamination, OSWER Directive 9355.4-01, EPA/540/G-90/007, August 1990
23. Guidance Document on the Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities, EPA, 1989
24. Guidance on Applying the Data Quality Objectives Process for Ambient Air Monitoring Around Superfund Sites (Stages 1 & 2), EPA/450/4-89/015, August 1989
25. Guidance for Data Usability in Risk Assessment, OSWER Directive 9285.7-05, EPA/540/G-90/008, October 1990, interim final
- 26.\* Guide for Decontaminating Buildings, Structures, and Equipment at Superfund Sites, EPA/600/2-85/028, March 1985
27. Guide for Conducting Treatability Studies Under CERCLA: Soil Vapor Extraction, EPA/540/2-91/019A, September 1991, interim guidance
28. Guide for Conducting Treatability Studies Under CERCLA: Aerobic Biodegradation Remedy Screening, EPA/540/2-91/013A, July 1991, interim guidance

29. Guide for Conducting Treatability Studies Under CERCLA, EPA/540/2-89/058, December 1989, interim final
30. Handbook - Permit Writer's Guide to Test Burn Data - Hazardous Waste Incineration, EPA/625/6-86/012, September 1986
- 31.\* Handbook - Quality Assurance/Quality Control (QA/QC) Procedures for Hazardous Waste Incineration, EPA/625/6-89/023, January 1990
32. Handbook - Dust Control at Hazardous Waste Sites, EPA/540/2-85/003, November 1985
- 33.\* Handbook - Guidance on Setting Permit Conditions and Reporting Trial Burn Results - Volume II of the Hazardous Waste Incineration Guidance Series, EPA/625/6-89/019, January 1989
34. Handbook on In Situ Treatment of Hazardous Waste-Contaminated Soils, EPA/540/2-90/002, January 1990,
35. Handbook for Stabilization/Solidification of Hazardous Wastes, EPA/540/2-86/001, June 1986
36. Handbook - Hazardous Waste Incineration Measurement Guidance Manual - Volume III of the Hazardous Waste Incineration Guidance Series, EPA/625/6-89/021, June 1989
37. Leachate Plume Management, EPA/540/2-85/004, November 1985
38. Preparation Aids for the Development of Category 1 Quality Assurance Project Plans, EPA/600/8-91-003, February 1991
39. Quality Assurance/Quality Control Guidance for Removal Activities: Sampling QA/QC Plan and Data Validation Procedures, Interim Final, EPA/540/G-90/004, April 1989
40. RCRA Ground Water Monitoring Technical Enforcement Guidance Document (TEGD), OSWER Directive 9950.1, September 1986
41. Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part A), Interim Final, EPA/540/1-89/002, December 1989
42. Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part B), "Development of Risk-based Preliminary Remediation Goals," OSWER Directive 9285.7-01B, December 1991, Interim

43. Risk Assessment Guidance for Superfund: Volume II -Environmental Evaluation Manual, OSWER Directive 9285.7-01, EPA/540/1-89/001A, March 1989, interim final
44. Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors," OSWER Directive 9285.6-03, March 1991, interim final
45. Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part C), "Risk Evaluation of Remedial Alternatives," OSWER Directive 9285.7-01C, December 1991, Interim
- 46.\* Seminar Publication - Requirements for Hazardous Waste Landfill Design, Construction, and Closure, EPA/625/4-89/022, August 1989
47. SW 846, Test Methods for Evaluating Solid Waste, 3rd Edition and appropriate updates, November 1986.
48. Stabilization/Solidification of CERCLA and RCRA Wastes - Physical Tests, Chemical Testing Procedures, Technology Screening and Field Activities, EPA/625/6-89/022, May 1989
49. Standard Methods for the Examination of Water and Wastewater, American Public Health Association, 18th Edition, 1992
- 50.\* Superfund Remedial Design and Remedial Action Guidance, OSWER 9355.0-4A, June 1986
51. Superfund Exposure Assessment Manual, OSWER Directive 9285.5-1, EPA/540/1-88/001, April 1988
52. Superfund Ground Water Issue: Ground Water Sampling for Metals, EPA/540/4-89/001, March 1989
- 53.\* Technical Guidance Document: Final Covers on Hazardous Waste Landfills and Surface Impoundments, EPA/530-SW-89-047, July 1989
- 54.\* Technical Guidance Document: Inspection Techniques for the Fabrication of Geomembrane Field Seams, EPA/530/SW-91/051, May 1991
55. Technical Guidance for Corrective Measures - Subsurface Gas, EPA/530-SW-88-023, March 1985

56. Technical Guidance Document: Construction Quality Assurance and Quality Control for Waste Containment Facilities, EPA/600/R-93/182, September 1993
57. U.S. EPA Integrated Risk Information System (IRIS) Data Base
58. U.S. EPA Health Effects Assessment Summary Tables, Office of Emergency & Remedial Response, published annually
59. U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review, EPA-540/R-94-013, February 1994
60. U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review, EPA-540/R-94-012, February 1994

Notes:

- 1) Documents and guidances denoted by an asterisk (\*) are those which may be important to the Remedial Design/Remedial Action phase of a project but generally will have limited relevance to the Remedial Investigation/Feasibility Study process.
- 2) This list of guidance documents is updated periodically. You should check with Ohio EPA to verify that this list is the most current available.

Appendix C - Map of the Site

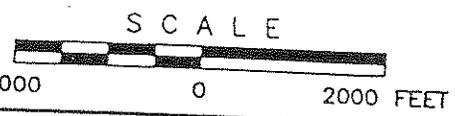
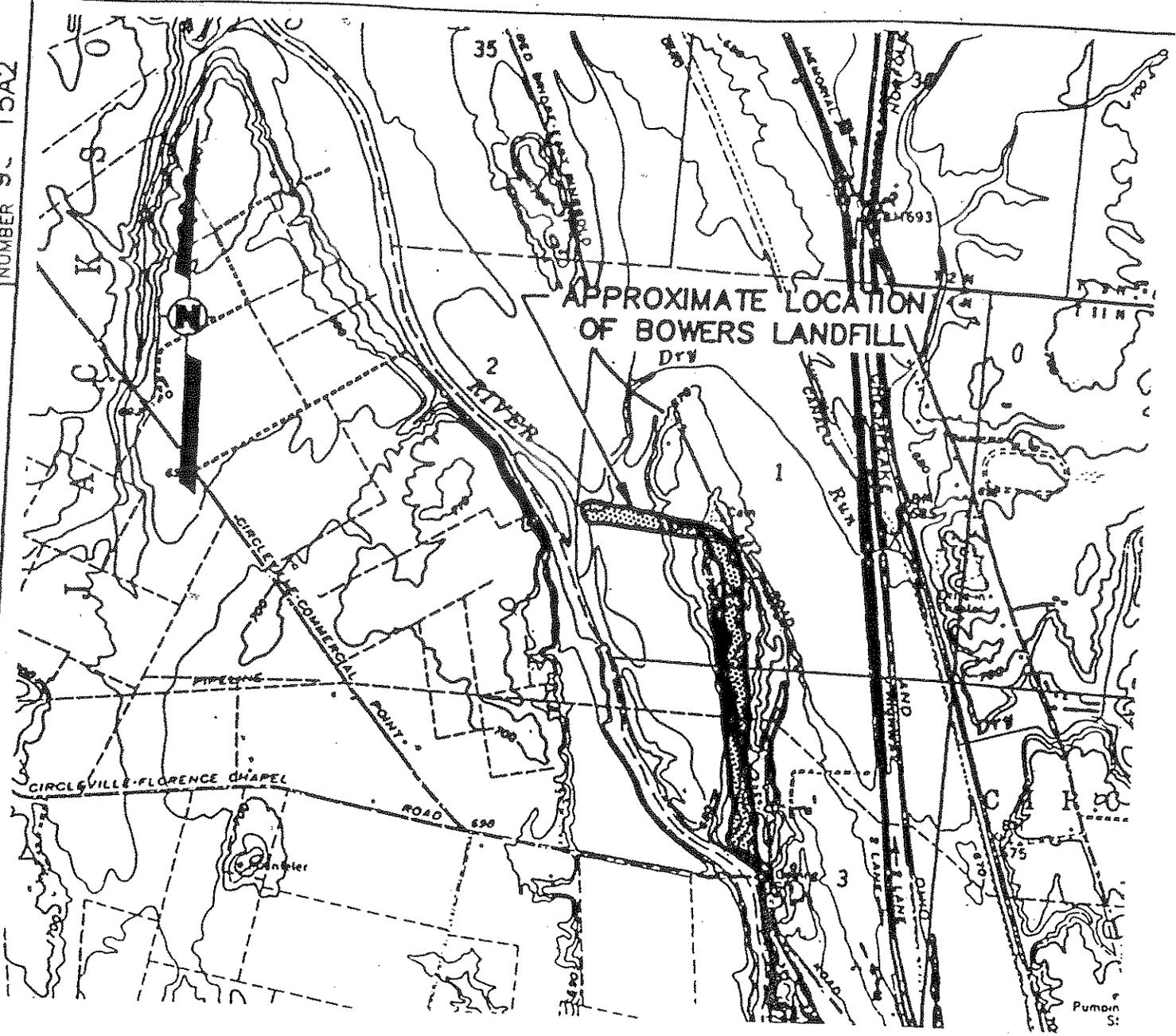


FIGURE 1-1  
SITE LOCATION MAP  
BOWERS LANDFILL  
CIRCLEVILLE, OH

PREPARED FOR  
E.I. du PONT de NEMOURS AND CO., INC.  
WILMINGTON, DE  
AND  
PPG INDUSTRIES, INC.  
PITTSBURGH, PA

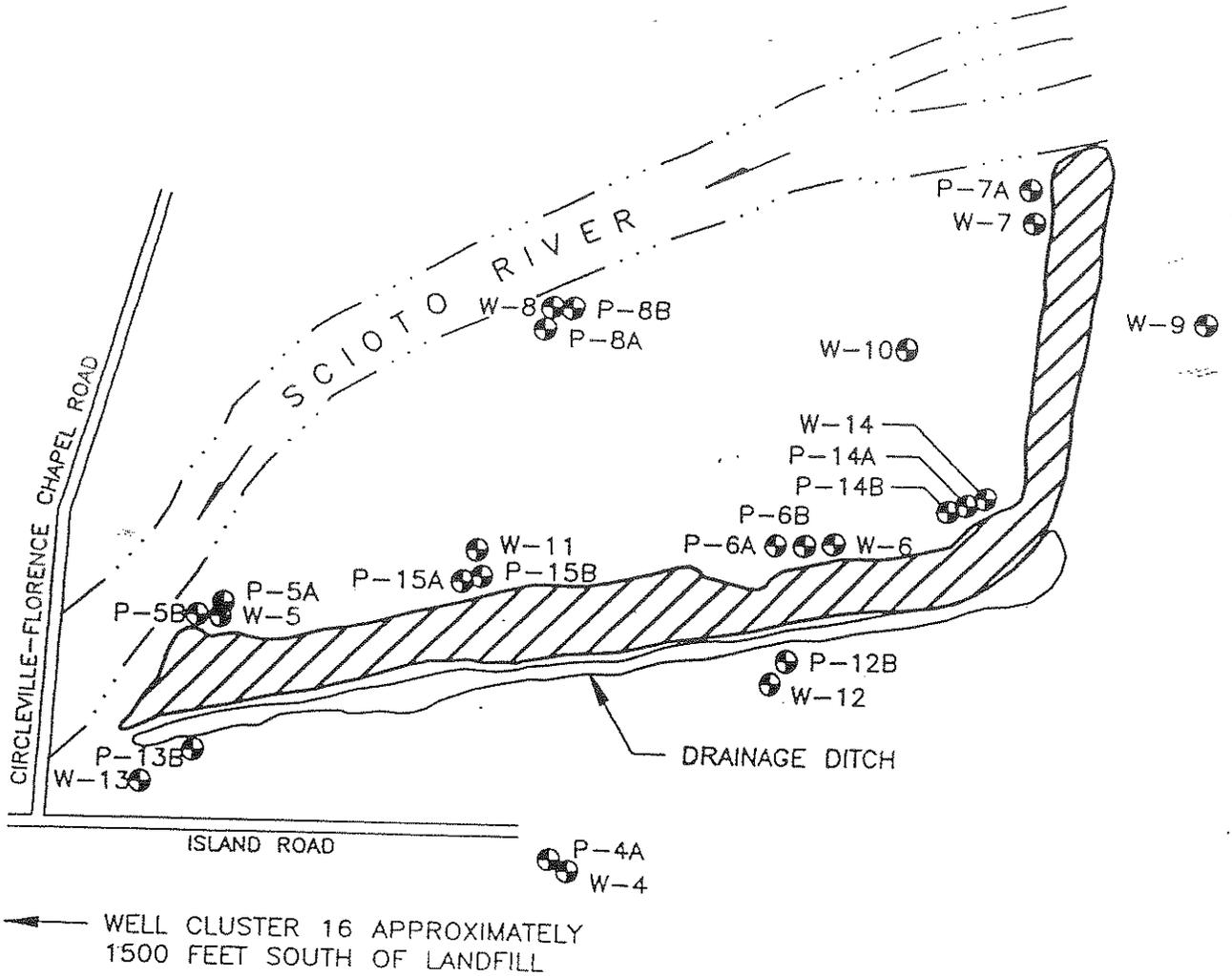
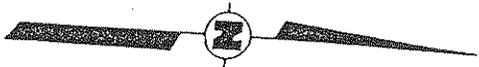
REFERENCE:  
7.5 MIN. U.S.G.S. TOPOGRAPHIC MAP  
OF ASHVILLE, OH QUADRANGLE,  
DATED: 1958, PHOTOREVISED: 1970,  
SCALE: 1" = 2000'

**CUMMINGS  
RITER  
CONSULTANTS, INC.**

DRAWING NUMBER  
**93115A2**

DRAWN BY: B. HEINACK DATE: 6-24-93  
CHECKED BY: D. SPICUZZA DATE: 6-24-93  
APPROVED BY: P. O'HARA DATE: 6-24-93

REVISION	DATE	DESCRIPTION



(NTS)

**LEGEND:**



EXISTING LANDFILL



MONITORING WELL

**REFERENCE:**

PRC ENVIRONMENTAL MANAGEMENT, INC., 1991, "GROUNDWATER MONITORING PLAN FOR BOWERS LANDFILL, CIRCLEVILLE, OHIO" PREPARED FOR UNITED STATES ENVIRONMENTAL PROTECTION AGENCY, REGION V, REMEDIAL AND ENFORCEMENT RESPONSE BRANCH.

**FIGURE 1-2  
GROUNDWATER  
SAMPLING LOCATIONS  
BOWERS LANDFILL  
CIRCLEVILLE, OH**

PREPARED FOR  
E.I. du PONT de NEMOURS AND CO., INC.  
WILMINGTON, DE  
AND  
PPG INDUSTRIES, INC.  
PITTSBURGH, PA

**CUMMINGS  
RITER  
CONSULTANTS, INC.**

DRAWING NUMBER  
**93115A1**

DRAWN BY: *B. HEINACK*

DATE: 6-24-93

CHECKED BY: *D. SPICUZZA*

DATE: 6-24-93

APPROVED BY: *P. O'HARA*

DATE: 6-24-93

REVISION	DATE	DESCRIPTION

Appendix D - Deed restrictions applicable to the Site

## BOWERS DEED RESTRICTIONS

The record owner, Ellen J. Bowers as Executrix for the Estate of John N. Bowers ("Owner"), hereby imposes restrictions on the real property, which real property includes the Bowers Landfill Superfund Site and adjacent property, and which real property is located in rural Pickaway County, Ohio, approximately 2.5 miles north of the City of Circleville, Ohio (hereafter "the Real Property"). The Real Property is more fully described as follows:

Situated in the Township of Circleville, County of Pickaway, State of Ohio and being part of Fractional Section 3, Township 4, Range 22 bounded and described as follows:

Being part of the residue of the 202 acres and 4 pole tract conveyed to John N. Bowers by deed recorded in Deed Book 156, Page 339 in the Pickaway County Recorder's Office.

Beginning at a 1/2" rebar found in the North line of section 3 being Northwest corner of a 3.16 acre tract of S. & D. Properties, Inc. and said to be 931.52 westerly from the point of intersection of the North line of Section 3 with the centerline of Island Rd; thence with the West line of said 3.16 acre tract S7°20'49" E. 156.34 feet to an iron pin found at the Southwest corner to said 3.16 acre tract; thence on a new line S17°15'58"E. 526.56 feet to an iron pin found at the corner of S. & D. Properties, Inc. 6.449 acre tract; thence with the West line of same S14°24'57" E. 627.23 feet to an iron pin found at the Southwest corner of said 6.449 acre tract; thence with nine new lines through said tract the following calls; S13°40'48" E. 340.79 feet to an iron pin set; thence S25°38'10" E. 134.52 feet to an iron pin set; thence S11°26'06" E. 426.80 feet to an iron pin set; thence S21°27'56" E. 494.61 feet to a 3" steel fence post; thence N59°07'19" W. 734.20 feet to an iron pin set; thence N74°32'05" W. 288.44 feet to an iron pin set; thence N46°51'53" W. 395.10 feet to an iron pin set; thence N29°16'27" W. 1220.48 feet; thence N 17°32'23" W. 917.67 feet to a 1/2" x 15" long bolt found on the East bank of the Scioto River being in the North line of Section 3 and the above referenced 202 acres and 4 pole tract; thence with said North line S87°07'10" E. 1334.66 feet to the place of beginning. Containing 60.404 acres, more or less. Subject to all existing valid rights-of-way of record.

The following restrictions are imposed upon the Real Property, its present and any future owners (including the heirs to the Estate of John N. Bowers), their

authorized agents, assigns, employees or persons acting under their direction or control, for the purposes of protecting public health and the environment, preventing interference with the performance and the maintenance, of any response action selected and/or undertaken by the United States Environmental Protection Agency ("U.S. EPA"), or any action under the oversight of U.S. EPA and/or the Ohio Environmental Protection Agency ("OEPA"), pursuant to Section 104 of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA), 42 U.S.C. Section 9601 et seq. Specifically, the following deed restrictions shall apply to the Real Property:

A. There shall be no consumptive or other use of the groundwater underlying the Real Property that could cause exposure of humans or animals to the groundwater underlying the Real Property;

B. There shall be no use of, or activity at, the Real Property that may interfere with, damage, or otherwise impair the effectiveness of any response action (or any component thereof, including, without limitation, operation and maintenance of such response action) selected and/or undertaken by U.S. EPA and/or Ohio Environmental Protection Agency (Ohio EPA), or any party acting under the oversight of U.S. EPA and/or Ohio EPA, except with the written approval of U.S. EPA, and Ohio EPA, and consistent with all statutory and regulatory requirements;

C. There shall be no residential, commercial, agricultural or recreational use of the Real Property including, but not limited to, any construction of residences, excavation, grading, filling, drilling, mining or other construction or development, farming, placing of any waste material at any portion of the property or any other activity. Upon the written request of Owner, the Ohio EPA, in its unreviewable discretion, may provide written permission to Owner for recreational use of the Real Property, subject to any limitations established by Ohio EPA, provided that no permission allowing a use shall override a prohibition against such use established by the U.S. EPA, or otherwise established by federal, state or local law.

D. There shall be no use of the Real Property that would allow the

continued presence of humans at the Real Property, other than any presence necessary for implementation of any response actions (or any component thereof, including, without limitation, operation and maintenance of such response action) selected and/or undertaken by U.S. EPA and/or the Ohio EPA, or any party acting under the oversight of U.S. EPA and/or OEPA, including such response actions taken by other responsible parties under a judicial or administrative order. A prohibited use of the Real Property includes, but is not limited to, recreational use;

E. There shall be no installation, removal, construction or use of any buildings, wells, pipes, roads, ditches or any other structures or materials at the Real Property except as approved, in writing, by Ohio EPA and U.S. EPA; and

F. There shall be no tampering with, or removal of, the containment or monitoring systems that remain on the Real Property as a result of the performance of any response action (or any component thereof, including, without limitation, operation and maintenance of such response action) which is selected and/or undertaken by U.S. EPA and/or the Ohio EPA, or any party acting under the oversight of U.S. EPA and/or OEPA.

The obligation to implement and maintain the above restrictions shall run with the land and shall remain in effect until such time as the Ohio EPA files with the Court a written certification stating:

1. The response action required at, under or adjacent to the Real Property by any consent decree or judicial or administrative order, entered pursuant to CERCLA, has been fully performed;

2. No other response actions are planned for the Real Property; and

3. The above restrictions are no longer necessary to meet the purposes of the consent decree filed in State of Ohio ex rel. Betty D. Montgomery v. E.I. DuPont De Nemours and Company, et. al, Case No. C2 96-783, United States District Court for the Southern District of Ohio.

FOR THE ESTATE OF JOHN N. BOWERS:

\_\_\_\_\_  
ELLEN J. BOWERS, as Executrix of The Estate  
of John N. Bowers

IN WITNESS WHEREOF, has caused these Deed Restrictions to be executed this \_\_\_\_ day of \_\_\_\_\_, 1996.

STATE OF OHIO, PICKAWAY COUNTY Sworn to and subscribed before me, a Notary Public in and for said State and County this \_\_\_\_ day of \_\_\_\_\_, 1996.

\_\_\_\_\_  
NOTARY PUBLIC

MY COMMISSION EXPIRES:

\_\_\_\_\_